

A Contextual-Behavioral Analysis of Travel Information Acquisition and Communication Media Choice of Public Transport Users

**Chang-Hyeon Joh^{a,*}, Backjin Lee^b, Miyoung Bin^c,
Theo Arentze^d, Harry Timmermans^d**

^a Department of Geography, Kyung Hee University

1 Hoegi-dong, Dongdaemun-gu, Seoul, 130-701, Korea

^b Transportation Research Division, Korea Research Institute for Human Settlements

1591-6 Kwangyang-dong, Dongan-gu, Anyang, Gyeonggi-do, 431-712, Korea

^c Department of Transportation Policy, Gyeonggi Research Institute

179 Pajang-dong, Jangan-gu, Suwon, Gyeonggi-do, 440-290, Korea

^d Eindhoven University of Technology, EIRASS

PO Box 513, 5600 MB Eindhoven, The Netherlands

* Corresponding author. Tel.: +82-2-961-9264; fax: +82-2-961-0251. *E-mail address:* bwchjoh@khu.ac.kr (C.H. Joh).

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Abstract

As the amount of information is rapidly growing, the question which kind of information to provide and which communication media to support is a major challenge for commercial and public travel-information service providers alike. This paper reports the analyses of data, collected in Metropolitan Seoul, about the acquisition of travel information and the communication media used. The study applies CHAID analysis to find homogeneous segments in information acquisition and use of communication media. Findings indicate that contextual variables are crucial to explain information acquisition behavior, depending on decision context.

Keywords: Public transportation information services, information acquisition behavior, information type, information medium, decision rule, decision context

1. Introduction

Transportation information services become increasingly more intelligent and improve service quality by providing real time information to help people reduce uncertainty and better manage their daily schedules (Chorus, *et al.*, 2008). The use of travel information is not only of academic interest. High expectations of policy-makers have put this topic high on the policy agenda.

Since early work by Khattak *et al.* (1996), several authors (e.g., Targa *et al.* (2002), and Pierce & Lappin (2004) have found evidence that travelers are more likely to use travel information if they are uncertain about the performance of their current transportation mode or the mode they intend to use. Travelers are more likely to collect information about their non-preferred transport mode, especially when they consider switching (e.g., Emmerink *et al.*, 1996; Mahmassani & Liu, 1996; Srinivasan *et al.*,

1998; Srinivasan & Mahmassani, 2003). Information acquisition has been found to be higher pre-trip (Lyons, 2001; Srinivasan & Mahmassani, 2003; Abdel-Aty & Abdalla, 2004; Geweke & Zumkeller, 2006), or in-trip near the origin (Jou *et al.*, 2005), and for longer trips in general (Mehndiratta *et al.*, 2000; Khattak *et al.*, 2003).

Despite these general findings, information providers face the problem what segment of the traveling population to support and which media to use. The amount of information that potentially has become available has rapidly increased.. Moreover, transportation companies have a choice of medium: the traditional radio and (local) television, web-service and nowadays also mobile services. Because as a business model it may not be optimal to provide all these services for every medium, it is of interest to better understand how different segments in the traveling population use different services and if they do which media are chosen.

This paper report the results of a study that was designed to examine the factors influencing travel information acquisition behavior of public transportation users.

2. Empirical analysis

2.1. Data

The Korea Research Institute for Human Settlements (KRIHS) collected activity-travel diary data and data on the acquisition of public transport information. The research was conducted for the local governments of Metropolitan Seoul including the capital city of Seoul and the surrounding central province of Gyeonggi which intend to launch user-oriented information services to facilitate the use of public transport modes in the area (Figure 2). The survey was conducted on two consecutive days: July 24 and 25, 2008. The respondents were randomly sampled by a professional survey company contracted with the KRIHS. They live in the Metropolitan area and travelled on the survey days within the boundary of the area.

The survey results from a total of 83 individuals, consisting of commuters, housewives and university students who are aware of or familiar with public transportation information services, were used in the current analysis. A total of 409 information acquisition records from 166 person-days (= 83×2) were obtained. Day 1 reports 201 records, and day 2 includes 208. Clearly, the survey does not guarantee the representativeness of the sample regarding in particular the sampling size.

The following kind of information was collected: socioeconomic characteristics

of the respondents (table 1), activity diaries including the decision context (Table 2), information acquisition (Table 3) and information type chosen and service medium used (Table 4). ,

2.2. Choice of information type

Choice of the information types is tested against the set of potentially influential socioeconomic and context variables. Analysis result shows that occupation is the most influential predictor (Figure 3). Housewives mostly staying home choose the news/weather information most frequently. Commuters choose all kinds of information. Students engaging in diverse activities other than the main activity (school) choose information about traffic and public modes' schedules, but did not choose POI information. The employed with lower income choose more frequently traffic and facility/transfer information, whereas those with higher income choose news/weather information and public transport schedules more often. Socioeconomic characteristics are strongly related to information type choice, while time of the day is the only important predictor of the dynamic decision contexts. Overall, it is shown that service provision of information type provision requires context- as well as socioeconomic-segmentation.

2.3. Choice of service medium

The service media choice (internet/TV/radio, personal/portable, on street/transportation, combination) is tested against the set of potentially influential socioeconomic and context variables, and the information type chosen. The result shown in Figure 4 shows that activity/transport mode at the moment of information use is the most influential predictor explaining the choice of service medium. When engaging in activities other than being on the move, people staying at a location tend to use more often the internet, TV and radio, and also a combination of different media. On the other hand, people on the move rarely use the internet, TV and radio. The difference between people in the bus and people in other modes than bus is that the former do not use internet, TV and radio at all.

Among people in the bus, females use more often the information displayed in the street and at transportation facilities, whereas males use a combination of different media. Among people travelling in public modes other than bus, the employed use more often the information displayed in the street and at transportation facilities and also

personal and portable devices, whereas housewives and students use a combination of different media more. It should be noted that the choice of information service medium has more dynamic context predictors than the choice of information type. This implies that the choice of medium is more decision-context dependent than the choice of information type..

2.4. Activity-pattern characteristics of information use

The CHAID-classified subpopulations with respect to information type choice (see Figure 2) were compared in terms of their average characteristics of the activity-travel patterns. Table 5 shows the result of the comparison of mean values of activity-travel pattern characteristics between information use groups. Group 1 consisting of housewives choosing news and weather information, conduct more activities than any other group but fewer outdoor activities and trips; they have shorter travel times and waiting durations, indicating that the activities conducted are mostly housekeeping activities at home. Group 2 (of students choosing traffic and service schedule information), Group 4 (employed people with lower income choosing traffic and transfer information during and after work) and Group 5 (employed people with lower income choosing traffic and news and weather information before work), on the other hand, conduct the least activities in total but more outdoor activities, trips, transfers and public mode uses; furthermore, they have longer travel time and waiting duration. Group 3 (employed people with higher income) is in the middle. In general, for this group, a day includes more in-home activities and fewer out-of-home activities. A higher total number of activities therefore is associated with lower number of outdoor activities and all related indicators. Housewives conduct mostly in-home activities and use news and weather information more frequently, whereas students and employed people with lower income conduct more out-of-home activities and use traffic, service schedule and transfer information more often.

5. Conclusions and discussion

This study has been motivated by the fact that the rapidly increasing availability of travel information and rapid increase in different communication sources increase the challenges of information providers who need to decide which travel information to provide and which communication media to use such that most people are reached at the

lowest costs. Any answer to this research question requires an analysis of travel information acquisition and the choice of communication medium.

The results of this study suggest that both socioeconomic and contextual variables are important to better understand information use behavior, and particular combinations of socioeconomic and contextual variables that constitute a decision context. The results have important implications for market segmentation. Conventionally, market segmentation is defined by a pre-defined set of fixed characteristics of selected socioeconomic variables of the users. This study, however, suggests that information use is strongly affected by non-fixed, daily varying combinations of decision contexts. An intelligent information service system would detect the specific decision context the user faces and provide the user with more appropriate information at the moment of the information use. Target group or market segments should therefore be defined in terms of significant combinations of particular levels of relevant context variables, such as for example 'situational segments' or 'contextual segments,' potentially derived by some evolutionary decision support system..

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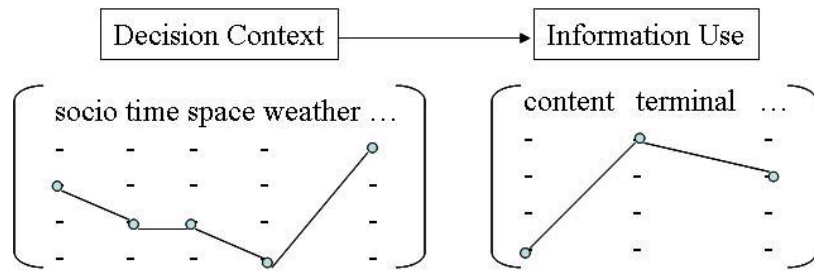


Figure 1. A schematic view of information use behavior



Figure 2. Study area

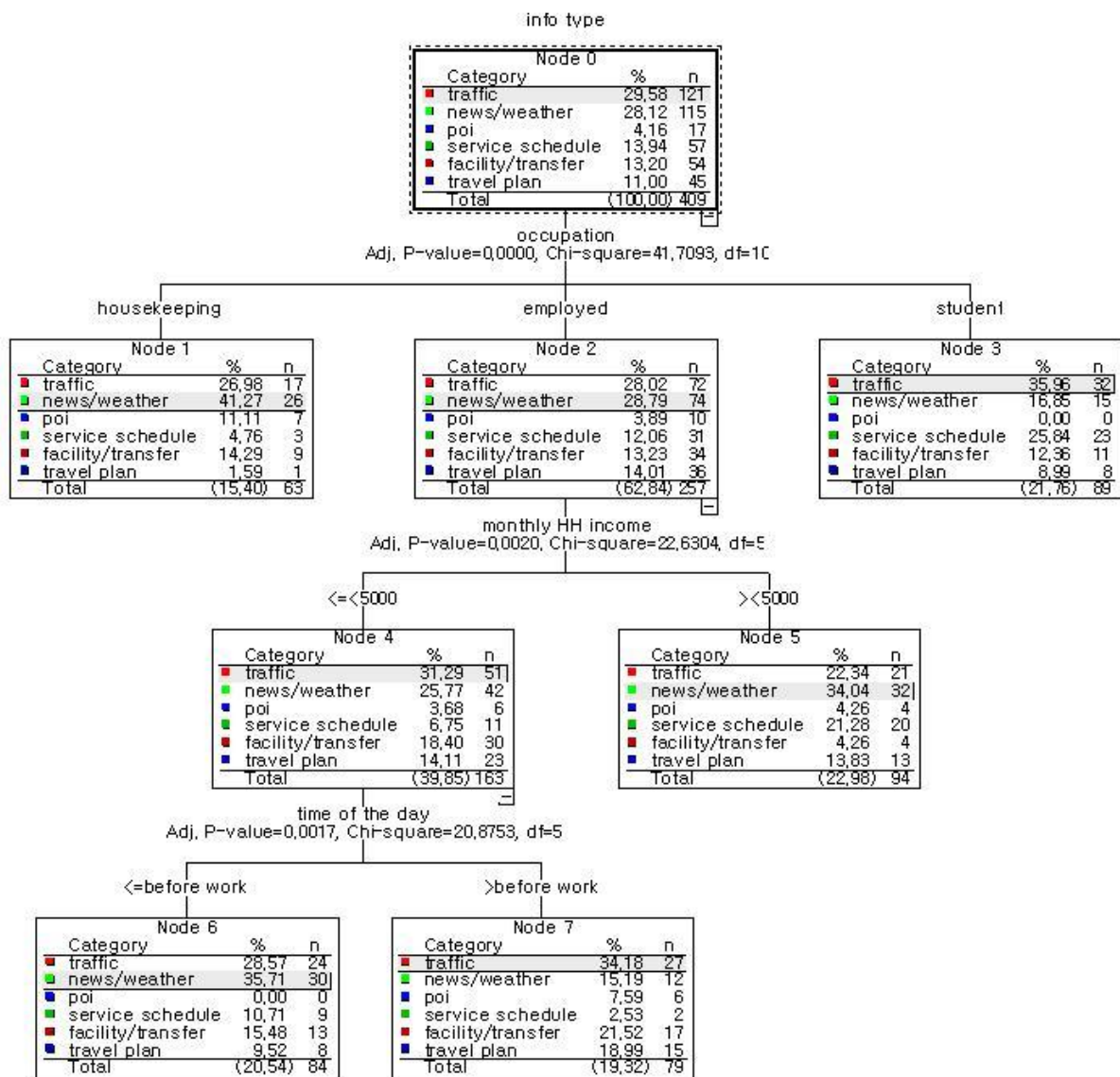


Figure 3. CHAID tree of information type chosen

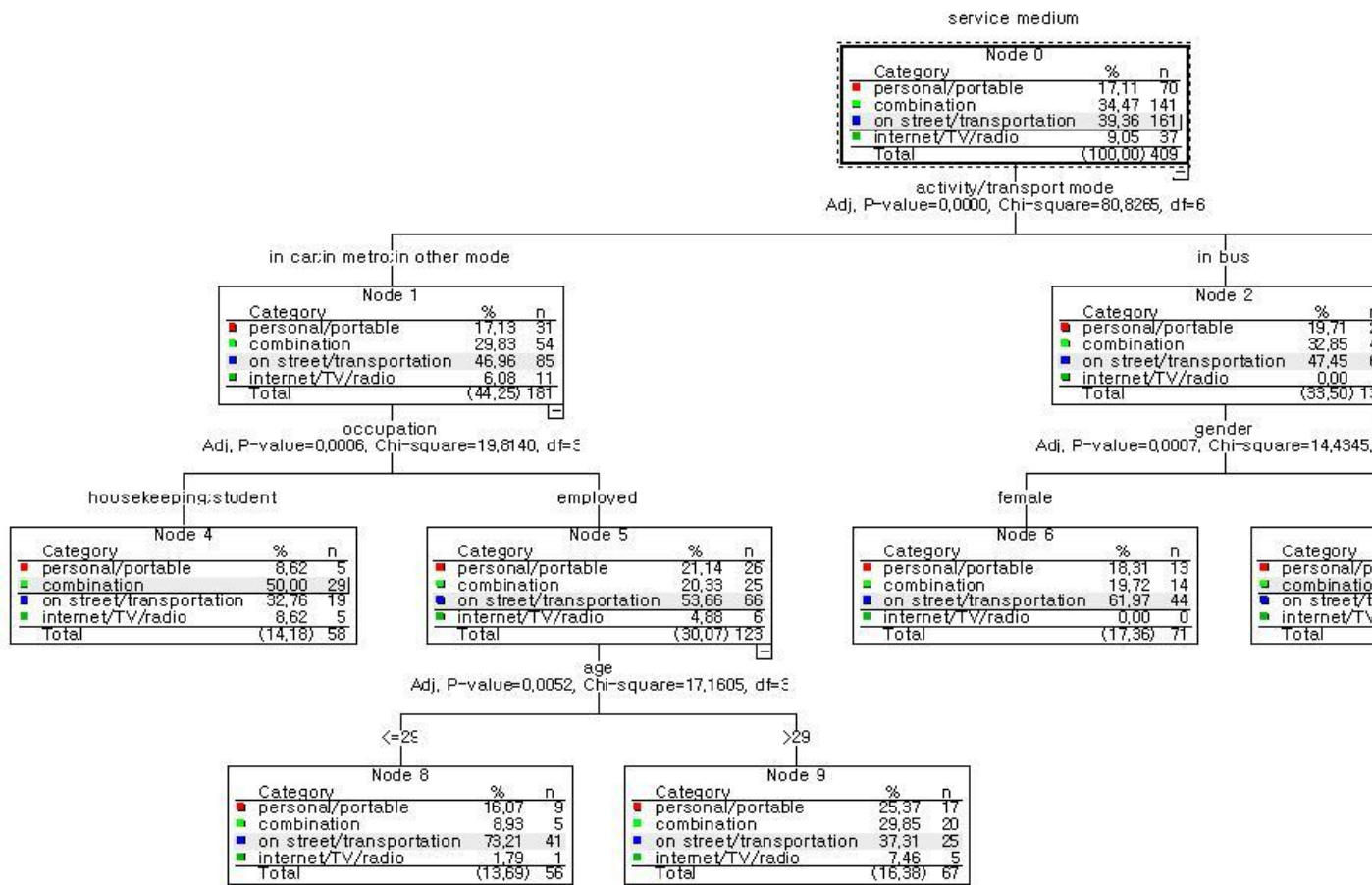


Figure 4. CHAID tree of service medium used

Table 1. Socioeconomic characteristics of respondents

variable	Statistics
age	average 31.29 (std = 7.626; min = 20; max = 48)
gender	male 26 (31.3), female 57 (68.7)
occupation	employed 50 (60.2), housewife 17 (20.5), student 16 (19.3)
driving license	have 57 (68.7), have not 26 (31.3)
car	have 29 (34.9), have not 54 (65.1)
household head	yes 23 (27.7), no 56 (67.5)
care-need person	have 11 (13.3), have not 72 (86.7)
residential location	Seoul 51 (61.4), Gyeonggi 32 (38.6)
housing type	apartment 49 (59.0), other multi 26 (31.3), detached 8 (9.6)
house ownership	own 57 (68.7), rent 26 (31.3)
HH income	<2000\$ 7 (8.4), <3000\$ 17 (20.5), <4000\$ 20 (24.1), <5000\$ 20 (24.1), <7000\$ 14 (16.9), >7000\$ 5 (6.0)
number of HH cars	average 0.95 (std = .539; min = 0; max = 3)

Table 2. Decision contexts at the moment of the information use

variable	context
weather condition	cloudy 25.9, rainy 72.9, sunny 1.2
activity/transport mode	activity 22.2, in car 6.6, in bus 33.5, in metro 31.3, in other mode 6.4
time of the day	before work 42.3, during work 30.1, after work 27.6
location	home 11.7, out-home 88.3
travel party	alone 78.7, with someone 21.3
trip purpose	personal care 16.8, eat 11.9, work 44.1, education 5.9, HH keeping 2.4, shopping 4.1, leisure 14.9
activity/travel duration	average 61.2 min (std 92.03)
waiting duration	average 3.3 min (std 3.23)
weather of the day	unstable 49.1, steadily rainy 50.9

Table 3. Information type acquired and medium used

information type acquired	
service schedule info	Service schedule of public modes
facility/transfer info	Transfer, Parking, Call-Taxi call number, Facilities for children at station/stop, Facilities for pedestrians at station/stop
travel plan info	Available lines/fares from origin to destination, Expected time to destination, Nearest station/stop to origin
traffic info	Real time bus location and expected arrival time, Delay, Road congestion, Accident and construction
POI	POI of buildings in the area, POI of park in the area
news/weather	News, Weather
information medium used	
internet/TV/Radio	Internet, TV, Radio
personal/portable	ARS, Mobile handset, DMB, Navigation
on street/transportation	Information board, Electric information board at station/stop, Information terminal at station/stop, In-bus/metro information terminal
Combination	Combination of these

Table 4. Information use

variable	information use
information type	travel 11.0, schedule 13.9, transfer 13.2, traffic 29.6, POI 4.2, news/weather 28.1
service medium	internet/TV/radio 9.0, portable 17.1, on street 14.2, in the transport 25.2, combination 34.5

Table 5. Activity-travel patterns associated with information types chosen

user type	# acts	# outacts	# trips	# transfer	# pubuse	trav_dur	wait_dur
1 (63)	15.8	<u>1.6</u>	<u>1.3</u>	<u>0.1</u>	<u>0.6</u>	<u>33.1</u>	<u>3.3</u>
2 (89)	<u>10.1</u>	4.4	2.9	0.8	1.4	106.5	9.9
3 (94)	<u>9.7</u>	3.9	2.3	0.7	1.3	103.7	7.8
4 (79)	<u>9.6</u>	4.7	3.2	0.7	1.4	116.5	10.9
5 (84)	<u>9.8</u>	4.2	3.1	0.6	1.5	116.8	10.2
total (409)	10.7	3.9	2.6	0.6	1.3	98.6	8.7

Note: The figure of the parenthesis denote the number of cases of information use belonging to the corresponding information type choice group.