



Measurement of intention to travel: Considering the effect of telecommunications on trips

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ABSTRACT

Mobility, one of the key concepts to evaluate the effect of a transportation policy such as TDM and mobility management as well as to analyze the problems such as social exclusion, must be measured by how much of an intention to make a trip can be realized, not merely by how many trips are available. The advent of new communication tools such as the Internet and mobile phones has allowed one to accomplish certain tasks that previously required a trip. This new situation has brought up a discussion over the necessity to incorporate telecommunications as an aspect of mobility. Aware of such discussions, we analyzed the relationship between the number of trips and telecommunications based on the data we collected on trips, telecommunications, and activities, and found some significant correlations. Our study which used an ordered regression model found several significant relationships between the individual attributes and the number of trips/telecommunications. We formulated a model which assumes the latent factors among the trips and telecommunications. In addition, we found that the latent factors construable as intentions to trips and telecommunications could be measured better by e-mails than by trips. These results indicate that measuring mobility requires the inclusion of information about telecommunications.

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1. Introduction

1.1. Background of this study

Information and communications technology (ICT) has evolved substantially and impacted on urban residents' everyday life dramatically in the last decade. The rapid development and spread of mobile telecommunication technologies have caused significant changes in the relationships among communications, marketing, distribution and transportation (Salomon, 2000). As mobile technologies diminish time–space constraints, and the meaning of time–space constraints itself has been essentially changed by mobile telecommunication, they are prompting the emergence of new urban behavioral life-styles (e.g. Graham and Marvin, 1996; Zimmerman et al., 2001). One example is how rendezvous places are determined. Before the 1990s, fixing the time and the place of rendezvous place was essential, but no longer: one can be in a book store reading or shopping until they get a call from the person they are meeting. Also, the Internet has become a common tool for shopping now. The Internet enables one to get commodities delivered by the distribution system within a couple of days without individual trips, and to collect information about alternative commodities. Today, Internet shopping is used mainly for accommodation reservations, and shopping for books and CDs (Farag et al., 2005). In past research, the role of

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telecommunication for travel behavior was categorized into three main effects: substitution effect, complement effect, and synergetic effect (Salomon, 1986, 2000; Mokhtarian, 2000; Golob, 2000). The modification of shopping behavior by diffusion of online shopping is one of the examples of substitution effect of telecommunication on travel behavior. Pioneer research into the effect of ICT on daily life focused on teleworking and e-commerce, based on the substitution effect of transportation (Mokhtarian, 1990, 1998; Salomon, 1986). In the transportation field, researchers have examined the substitution effects from the early 1990s to solve transportation problems caused by traffic congestion (Koppelman et al., 1991; Koenig et al., 1996). However, still now, it is said that traffic congestion was rarely solved by the substitution effect, and that additional trips were said to be generated by teleworking (Martens and Korver, 2000).

In fact, categorizing behavior such as fixing a rendezvous place by three categories is difficult, because they were defined in the age of telephone and facsimile. Mokhtarian (2003) suggests that the ultimate question is not the substitution effects, but the net outcome of all the effects we can identify. Recently, research of such total effects on individual daily life is increasing (Anderson, 2004; Kenyon and Lyons, 2004) along with the accelerating speed of ICT use and the quick change in technology. Now the effects of ICT tools have become more complex due to the changes such tools have brought to daily life.

1.2. The outline and framework of this study

In this study, we focus on the relationship between mobile telecommunications and trip generation to propose an alternative approach to mobility analysis/measurement.

A large part of personal trips are made for face-to-face communication, but some of them can be substituted by telecommunications. One such possible substitution is shopping trips, though people also enjoy shopping trips themselves. What should be noted regarding the substitution of shopping trips by telecommunications is that to understand the total effect of telecommunications on traffic, we must count the number of the trips for delivery by logistics trucks which is not recorded in person trip surveys. Regarding the complement effect and the synergetic effect, we must take into account the flow of information on activities because telecommunication is essentially the exchange of information. Because of these telecommunication effects, we must reconsider the concept of mobility. A common definition of mobility is “an index of the ability and willingness to move”. Generally, the mobility of a person is measured by the number of trips per day. This measurement is based on the idea that the infrastructure and personal circumstance constrain the latent intention of travel. If the infrastructure was to improve, the constraints would decrease and the number of trips should increase. Since the virtual space provided by the telecommunication has few constraints that transportation infrastructure has, a decision maker may use telecommunication instead of travel if it has less constraints. Considering the substitution effect of telecommunications for trips, the definition of mobility should be changed to include the ability and willingness to substitute with communication. With respect to that thought, geographical economics has begun to include the flow of information in the mobility and accessibility of a location (Pohl, 2001).

Activity analysis (Hägerstrand, 1970) provides an important framework that a trip is merely an instrument used only to accomplish another purpose. It suggests that one of the key determinants of activity is the coupled constraints, usually the geographical time–space constraints. Now, information largely determines one’s daily behavior since the activity choice is based only on the amount of information one has. Here, however, measuring the quality of information is hard, because no conclusive definition of the quality of information is available, though a means to measure the appropriate amount of information is. So far, one of the feasible ways to consider the quality and quantity of information would be to use the number of telecommunications as an index of quality and quantity. While the means of inter-person communication such as face-to-face meetings, fixed telephones, mailed letters and telegrams are often subject to various constraints of time–space domain, mobile telecommunications are not subjected to these constraints.

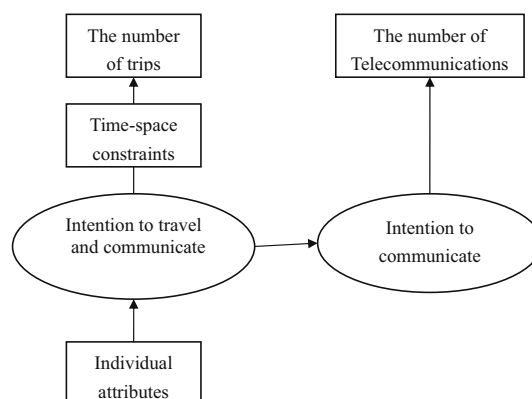


Fig. 1. Path diagram of the relationship between telecommunications and travel.

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