Tradeoffs between Time and Monetary Attributes for Consumers' Shopping Channel Choices

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1. INTRODUCTION

Since 1980s, consumers' shopping channels have greatly changed. In addition to physical store shopping, by using ICT (information and telecommunications technology), teleshopping such as online shopping and mobile shopping has become an important channel for consumers to conduct shopping activities. Literature on online shopping are numerous, most of which falls into two categories. One is concerned about consumers' cognition and feelings towards online shopping environment, such as Liao and Cheung (2001), Miyazaki and Fernandez (2001), Clemes et al. (2014), Park et al. (2015), etc., and the other about consumers' cognition and feelings towards shopping websites such as D'Ambra and Rice (2001), Kowtha and Choon (2001), Aladwani and Palvia (2002), Cebi (2013), Yang et al. (2015), etc.

In the field of transportation planning, researchers are more concerned about how these new shopping channels may influence transportation demand (Mokhtarian &Meenakshisundaram, 1999; Gould & Golob, 1997). From the viewpoint of transportation, the most obvious difference between online shopping and physical store shopping is about the trip generation. If consumers adopt physical store shopping, they have to go out and generates shopping trips. If they adopt online shopping, they don't generate personal shopping trips, but the later product delivery generates freight transportation. Moreover, some consumers may search for a product online and check it out in-store, but finally buy it online. Alternatively, they may search for a product and check it out online, but finally buy it in-store. All these hybrid or mixed types across different shopping channels actually complicate their influence on transportation demand.

Consumers' shopping decision-making behavior is complex. Most of the well-known classical consumer decision-making models were developed in the 1960s and 1970s. These consumer decision-making models are known as 'Grand Models' which defines the stages of the consumer decision-making process by a step-by-step sequential structure: (1)need recognition, (2)information search, (3)evaluation of alternatives, (4)purchase decision, and (5)post-purchase behavior (Blackwell et al., 2006). Salomon and Koppelman (1988) proposed an analytical framework which divided consumer shopping process into two main steps: shopping and purchase. First, consumers decide which channel to conduct their shopping; e.g., in-store or online, to gather information on products. Second, they decide which channel to make the purchase, re-evaluate (re-gather information), or quit (cancel their shopping decision). Salomon and Koppelman (1988) also believe that shopping activities are important for consumers in two aspects: (1)economics aspect: consumers spend time and money gathering information on products in order to reduce the risk of purchase and improve their utility; (2)psychological aspect: shopping activities offer consumers with fun and pleasure (Tauber, 1972; Bellenger & Korgaonkar, 1980; Marmorstein et al., 1992).

In the economics aspect, the most important attributes are the time and monetary expenses by which consumers try to achieve their maximum utility by the allocation of time and income resources. The time resource, however, is very different from the monetary one in that money can be saved for future

use while time cannot, which makes it difficult for one to estimate the monetary value of time. In an empirical study on teleshopping, Manski and Salomon (1987) incorporated the time and cost attributes into the indirect utility function and estimate the values of shopping time which ranges from $0.34 to $1.62 per hour. This is believed to be the first study which estimate the value of shopping time. In addition, Gould and Golob (1997) divided the time consumers spent in shopping into three parts: travel time to and from the store, in-store shopping and purchase time, and product delivery time after purchase. In their empirical study, they collected data by using the multiday activity diary which kept respondents' record about their activities for two days long, including travel time to and from the store and in-store shopping and purchase time, and investigate how respondents used the saved travel time when they adopted teleshopping.

For the psychological aspect, the attributes on consumers' cognition and feelings towards online shopping are not easy to measure. A majority of empirical studies; e.g., Koppelman et al. (1991) and Liao and Cheung (2001), used rating scale to measure these psychological attributes. Following the idea of Salomon and Koppelman (1988), Koppelman et al. (1991) reduced the major shopping attributes into three facets: attributes about shopping channels, attributes about products, and consumers' personal characteristics. Koppelman et al. (1991) also pointed out the necessity for researchers to simplify the empirical model in exploring consumer shopping behavior.

The main purpose of this study is to investigate consumers' online shopping behavior from the viewpoint of economics. To simplify the model, we concern the time and cost (monetary expense) attributes which may influence consumers' choices among different shopping channels. We will follow the idea of Gould and Golob (1997) by dividing the shopping time into three parts: the travel time to and from the store, in-store shopping and purchase time, and product delivery time after purchase. Then by building the utility maximum problem, we will derive how consumers evaluate these three parts of time. Time and income are the two most important resources consumers possess. Any attributes related to these two resources will have critical impact on consumer choice behavior. This is especially true in today's cyber society where online shopping has greatly changed how people reallocate their time and income resources.

2. UTILITY MAXIMIZATION PROBLEM FOR CONSUMERS' SHOPPING CHANNEL CHOICES

In this section, we will use the utility theory to build utility maximization problem for consumer choices among different shopping channels.

2.1 Time and Monetary Attributes for Consumers' Shopping Behavior

Given that there are two shopping channels for consumers to choose from: physical store shopping (channel s) and online shopping (channel n), we divide the shopping time into different parts:

1. **Traveling To and From the Store:** For physical store shopping, consumers have to go out for their shopping activity, which accrues spend travel time (t_t) and travel cost (c_t); but for online shopping, $t_t=0$ and $c_t=0$.
2. **Shopping/Information Gathering:** After arriving at the store, consumers decide how much time they will spend in shopping or information gathering (t_a); for online shopping, t_a can also refer to time for online information gathering.

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