



The association between spatial attributes and e-shopping in the shopping process for search goods and experience goods: Evidence from Nanjing



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ABSTRACT

The proliferation of e-shopping has implications for shopping travel and commercial land use. Using data collected from adult internet users in Nanjing, China in 2015, this study develops trivariate probit models to explore the influence of spatial attributes on shopping channel choices at the pre-purchase and purchase stages in the shopping process for both search goods (books) and experience goods (clothing). We find that those who live and work in suburban areas are more likely than others to shop at traditional stores to conduct pre-purchase and purchase activities for books and clothing, likely because of the slow diffusion of e-shopping in these areas. On the other hand, travel time to stores is positively associated with online shopping for books but not for clothing, and onerous travel modes are associated with pre-purchase activities on the internet. Thus, shopping accessibility negatively affects e-shopping. However, its effects vary by shopping stage and product type.

1. Introduction

As e-shopping proliferates, its impacts on transportation and land use have become an important issue. In 2015, the number of online shoppers in China grew to 460 million, 21% more than in 2014; annual internet sales reached 3.83 trillion Yuan (about 577 billion US dollars), an increase of 36%. Furthermore, more than half of total internet sales (2.02 trillion Yuan) occurred via mobile phones in 2015 (CECRC, 2015). In 2015, e-shopping accounted for 12.7% of total retail sales in China. Not surprisingly, e-shopping has put enormous pressure on traditional retailers, especially for search goods such as books and digital products. For example, Xinhua bookstore, the most well-known bookstore in China, had a 17.5% decrease in sales between 2010 and 2013, and many bookstores began to offer customer perks such as coffee, music, and cultural and creative products to survive competition from e-shopping (Zhang, 2015). Accordingly, e-shopping instead of shopping at traditional stores may change the operation patterns of brick-and-mortar stores, their geographic distribution, and land use patterns more broadly.

Some empirical studies shed light on the influence of geographic context on the adoption and frequency of e-shopping (Cao et al., 2013; Farag et al., 2006b; Krizek et al., 2005; Ren and Kwan, 2009). Three gaps have emerged in the literature. First, previous studies often focus

on e-shopping as a transaction (purchase) channel, but have yet to explore the influence of spatial attributes on other (pre-purchase) elements of the shopping process (Mokhtarian and Tang, 2013) and its implications for land use and transportation planning. On the other hand, some studies examine the correlates of pre-purchase and purchase stage choices (Cao, 2012; Mokhtarian and Tang, 2013; Schröder and Zaharia, 2008; Zhai et al., 2017), but not from a spatial perspective. Studies that bring the spatial perspective together with a focus on the entire shopping process are scarce (Mokhtarian and Tang, 2013).

Second, although product type may moderate the influence of spatial attributes on e-shopping, a limited number of studies have differentiated product type. Farag et al. (2006a,b) found that the effect of geographic context on purchase activity varies by product category. Therefore, it is important to do a comparative analysis given that different kinds of products (such as books and clothing) have distinct qualities (search qualities and experience qualities) (Nelson, 1970). For search goods, pre-purchase and purchase activities at stores may decline as shopping travel distance increases, because of the low risk associated with substitution by e-shopping (Couclelis, 2004). However, for experience goods, pre-purchase and purchase activities at stores may not show the same pattern because the benefits of shopping at stores may exceed the disutility of shopping travel (Bloch and Richins, 1983).

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Third, the geographic representation of previous studies is limited as most studies were conducted in the Netherlands and the USA. Although a number of studies have assessed online shopping attitudes and behavior in China from the marketing perspective (Fang et al., 2016; Liu et al., 2008; Yoon, 2009), we did not locate any that focus on the influence of spatial attributes. In urbanizing China, shopping establishments are evolving (Zhang, 2010); for example, the Dalian Wanda Group alone has six commercial complexes in Shanghai. Shopping travel mode choices are also distinct from those in developed countries because of relatively lower car ownership in China (Zhen et al., 2016).

Using data collected from 963 adult internet users in Nanjing in 2015, we developed trivariate probit models to explore the associations between spatial attributes and shopping channel choices in the shopping process for search goods (books) and experience goods (clothing). Following Mokhtarian and Tang (2013), this study classifies the channel choices of the shopping process into three binary variables: pre-purchase at stores, pre-purchase through the internet (both, either, or neither of which may occur), and purchase channel (store versus internet). It aims to answer two central research questions: (1) How are spatial attributes associated with the channel choices of pre-purchase and purchase activities? (2) How do the associations differ by product type? It is one of a few studies that focus on the influences of spatial attributes on the shopping process (specifically, from first awareness of products, information search, product trial, to transaction), and it compares and contrasts influences for a search good and an experience good in a developing country. The paper is organized as follows. The second section reviews the literature on the relationship of spatial attributes and e-shopping, and studies of the shopping process. Section 3 presents the methodology, including the data, variables and modeling approach. Section 4 discusses the results. The key findings and implications are summarized in the final section.

2. Literature review

Anderson et al. (2003) put forward two competing hypotheses for the influence of spatial attributes on e-shopping. Spatial attributes include the location of the residence (such as distance to the city center and whether or not it is located in an urban area) and neighborhood characteristics associated with the residence (such as shopping accessibility). The *diffusion of innovation hypothesis* speculates that residents who live in urban areas are more likely to be internet shoppers and/or have a higher online shopping frequency than those who live in exurban and rural areas. Generally, internet facilities are set up in urban areas first so urban residents enjoy a well-established network infrastructure system and fast internet connections (Farang et al., 2007). Also, urban residents tend to be better educated and equipped to master new technological skills compared to exurban and rural residents. Moreover, since urban residents are likely to be more open-minded than exurban and rural residents, new technologies have a higher usage probability and are likely to be accepted in urban areas quicker than in exurban and rural areas. On the other hand, the *efficiency hypothesis* states that people who live in areas with low shopping accessibility prefer online shopping because the internet can eliminate spatial and temporal barriers, providing an opportunity for consumers to shop anywhere and at any time via the internet. In addition, e-shopping can save individual travel time and offer a channel to those who have time constraints to shop at faraway stores.

Some studies examine the empirical connections between spatial attributes and e-shopping, and identify four relationships: no effect; favoring the diffusion of innovation hypothesis; supporting the efficiency hypothesis; and favoring both hypotheses (Cao, 2009). For example, Krizek et al. (2005) used 2003 survey data of adults from three US cities to test the impacts of spatial attributes (residential location; distance to central business district; retail accessibility; metropolitan dummy variables) on e-shopping. They found that these spatial

attributes were not significant in the binary logit model and concluded that spatial attributes have no effect on e-shopping. Using 2001 data on internet users in the Netherlands, Farag et al. (2006b) developed two binary logit models of shopping channel adoption and a linear regression model of online shopping frequency. The spatial variables include the number of shops within 10- or 20- or 30-min driving distance and several dummy variables indicating urbanization level. In contrast to Krizek et al. (2005), they found evidence for both hypotheses: all else equal, residents living in a (very) strongly urbanized area were more likely than others to search online and shop online, while those living in areas with low shopping accessibility made purchases online more frequently than others. Ren and Kwan (2009) employ a binary logit model to examine the effect of shopping accessibility (represented by the number (area) of shopping parcels within a certain driving distance) on the adoption of e-shopping using an internet activity-diary dataset. They conclude that lower accessibility was associated with online shopping, favoring the efficiency theory. Developing structural equation models with 585 internet users from the Minneapolis and Saint Paul, Minnesota, metropolitan area, Cao et al. (2013) found that living in urban areas and the number of retail jobs within five miles were positively associated with e-shopping frequency, supporting the diffusion of innovation hypothesis. However, they also found that in exurban districts, people living in low shopping accessibility areas tend to shop online more frequently than those in relatively high shopping accessibility areas. That is, the efficiency hypothesis was valid only in exurban areas. Other studies also offer evidence even though they were not specifically designed to test the diffusion of innovation and efficiency hypotheses (Farag et al., 2006a; Farag et al., 2005; Farag et al., 2007; Ferrell, 2005; Weltevreden and Rietbergen, 2007; Ding and Lu, 2017; Zhai et al., 2017).

Although these studies offer important insights, almost all regard shopping simply as the transaction activity rather than a multi-stage shopping process. This tells only a part of the story. A holistic shopping process includes, but is not limited to, first awareness, information search, product trial, transaction, distribution, and return (Mokhtarian, 2004). Although previous studies conclude a dominance of single-channel users among shoppers (Cao, 2012; Kim and Lee, 2008; Mokhtarian and Tang, 2013; Schröder and Zaharia, 2008; Zhai et al., 2017), researchers also note the fragmentation of the shopping process into hybrid or multi-channel forms. An example is location-based marketing (LBM), which pushes information about products in nearby stores to mobile device users based on the location of the devices. The widespread adoption of mobile phones enables retailers to influence individuals' shopping process directly (Shankar et al., 2010). In the literature, Soopramanien and Robertson (2007) integrate e-shopping adoption and browsing behavior and identify three types of shoppers: online buyers, those that browse online but make purchases at stores, and those that never browse or purchase online. Using 525 customers of a multi-channel retailer in Germany, Schröder and Zaharia, 2008 found that 33% of respondents use more than one channel in the shopping process. Based on 540 internet users in the Minneapolis-St. Paul metropolitan area, USA, Cao (2012) found that 17% searched for and/or experienced books through the internet but made purchases at stores, and 10% acquired information about and/or experienced books at stores but made purchases online.

Although sizable fractions of shoppers are multichannel, the dominant pattern appears to be adoption of the same channel for both pre-purchase and purchase stages (Schröder and Zaharia (2008). Accordingly, it is important to study the influence of spatial attributes on the shopping channel choice at pre-purchase stages since they will indirectly influence the purchase channel choice. As evidence of the "stickiness" of shopping channels, Cao (2012) found that channel choices at pre-purchase stages (first awareness, information search, and product trial) had a significant impact on the choice of purchasing channel for books. Following Cao (2012), using 952 internet users in two cities in Northern California, Zhai et al. (2017) reached similar

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