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Exploring the relationships between e-shopping attitudes and urban freight transport

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Abstract

Although the store shopping remains the predominant way to buy, internet is modifying the end consumer's behaviour. In fact, the advance of information and communication technologies have pushed more and more people to choose to shop on-line. This can have significant impacts on freight traffic in urban areas because purchases have to be delivered to customers (e.g. at homes) through delivery tours that cannot always be optimised. Besides, additional costs for repeated deliveries can occur. The paper begins focusing on demographic and socio-economic factors that mainly influence end-consumer purchase production and subsequent trips. Then, a new system of models for simulating shopping choices, including e-shopping, is presented. The models were obtained by using surveys carried out in Rome where about 800 households were interviewed. The system of models were used to assess the effects on shopping and goods delivering under future demographic and socio-economic changes in an urban area. The results indicate these effects can be significant and specific solutions have to be pointed out for improving city sustainability.

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Keywords: urban transport; urban goods distribution; city logistics; shopping demand; urban freight transport; end-consumer behaviour; e-shopping.

1. Introduction

End consumers undertake their shopping trips to satisfy their needs, they buy at a shop and hence their shopping choices influences the restocking flows. Therefore, shopping demand represents the input of restocking, and

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subsequently, modifications occurring on shopping have indubitably effects on restocking. Besides, the penetration of Information and Communication Technologies into human life has influenced personal activities and also the related travel. In fact, among the several activities that can be performed without travelling, shopping is one of these. On-line shopping has been increased dramatically during the last decade. In Italy, the total e-shopping sales is yearly increasing of about 18% (Osservatori, 2013) and in the USA in the last year it has increased of about 16% (Census, 2015). As suggested by Mokhtarian (2004), the potential impacts of on-line shopping include changes in volume of goods purchased, changes in per-capita consumption spending. Additionally, it creates goods delivering trips to residential areas, and influences end consumers' trips. The expected benefits of e-shopping on passenger transportation demand is the reduction of related trips. At the other hand, this change can have freight transportation impacts. First of all, the supply chain structures have to modify in order to include this segment of demand. The purchased products have to be delivered to end consumers (at home or at pick-up points), and the result can be the increasing of veh-kms of commercial vehicles due to the parcelling of deliveries and the possible missing deliveries (e.g. about the 12% of deliveries have to be delivered a second time, Visser *et al.*, 2014). Besides, traditional goods store distribution process have to be performed in order to integrate the needs of e-commerce. In fact, the growth in the home deliveries and the increase of services offered by retailers (such as click & collect) all lead to changes in the pattern of urban freight flows and vehicle movements in cities. These changes can be influenced by wider factors such as the adoption of new consumer technologies.

In city logistics analysis, in order to forecast the future characteristics of freight delivering distribution (i.e. both to shops and end consumers) in an urban area, a system of models is required that allows shopping mobility and freight restocking distribution to be considered in an integrated approach, with shopping demand models that allow to take shopping mode and end-consumer characteristics into account.

Few studies have investigated how end consumers make the choice between e-shopping versus store shopping, showing the need of more research on this topic, in particular, under the city logistics point of view. For example, Mokhtarian (2004) pointed out how e-shopping could replace, generate, or modify shopping trips. Farag *et al.* (2007) investigated the decision making of e-shopping and how factors such as attitudes, behaviour, and land use features can influence the shopping trip generation. Hsiao (2009) examined how consumers evaluate their time resource when they are facing a shopping mode choice between store shopping and e-shopping. Crocco *et al.* (2013) analysed the aspects mostly affecting consumer choices of purchasing goods on-line or in-store. Their findings show that social-economic factors, consumer attitudes, and shopping mode characteristics influence the usage of on-line shopping.

This paper focuses on the shopping demand and examines the relationship among shopping choices (including e-purchasing), demographic and socio-economic characteristics of end consumers. In fact, empirical studies have indicated that males, the more highly educated, and people in the higher-income groups are more likely to buy on-line than are females, the less-well-educated, and lower-income groups (Swinyard and Smith, 2003; Cao *et al.*, 2013). Few empirical studies have investigated the shopping choices. Studies concentrating on overall shopping trip generation report that females, people on high incomes, older people, and households with children tend to engage in shopping more often than do males, people on low incomes, younger people, and households without children (Srinivasan and Bhat, 2005). Households with one or more cars tend to make more in-store shopping trips than households without a car, possibly because they can transport more groceries at a time (Van and Senior, 2000 and Srinivasan and Bhat, 2005). According to the employment status, Comi and Nuzzolo (2014) showed that housewives undertake more trips than those in other types of employment, while young people travel less than elders, and males mainly for types of goods other than foodstuffs, hygiene and household, and clothing products. They also revealed that young consumers purchase on-line more than elders do, especially miscellaneous products (including electronics).

Starting from these literature results, the paper focuses on the effects that socio-economic changes can produce on shopping mode and on transportation impacts using a new system of demand models. The study is supported by a survey consisting of about 800 interviews with families living in the city of Rome. The presented models are the advancement on model calibration developed by the authors in the course of multi-year research.

The paper is organised as follows. The next section reviews the general modelling that can be used and upgraded in order to point out both in-store and on-line purchases and to estimate hence the production of shopping trips. Then, the new purchase choice models and their application to the city of Rome are presented. Finally, some conclusions are drawn in last section.