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# A New Process Model for Urban Transport of Food in the UK

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## Abstract

Urbanisation is increasing at a rapid pace and one of the consequences of this trend is that more people live in cities, more people demand more products, and above all, more food needs to be transported to and distributed within the cities. With the advancement of new technologies and widespread use of mobile devices in the population, more and more people prefer to shop online, not just books, electronics, or fashion products, but food products as well, in particular the groceries. In this work, we focus on this growing challenge of food distribution in the cities, from the viewpoint of this emerging channel: home deliveries of online food purchases. Especially in the UK which is the second biggest online grocery market over the world, retailers are offering online shopping to their customers and then fulfil the home delivery using their own fleet. This poses challenges to retailers in terms of increased costs from providing a non-core service of distribution and logistics to end-consumers and the life in the cities in general in terms of increased carbon emissions and traffic. We design models that propose appropriate incentives to retailers to collaborate for the distribution of home deliveries. For this purpose, we initially investigate the current market structure and operations. Then, we test our logistics sharing models with empirical data from a retailer based in London to show the relevance of collaboration. Our results suggest that it is theoretically possible to collaborate and reduce economic, environmental, and social costs arising from the uncoordinated case; however, implementation of these ideas still pose a great challenge due to the extremely competitive nature of the food retail market.

*Keywords:* Home Deliveries; Co-opetition Model; Reduction Cost; Shared Logistics

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## 1. Introduction

Logistics is a key factor for the competitiveness of the EU economy, as well as a key sector for the EU's economic integration. A considerable amount of research has been carried out to optimise the organisational and operational practices of logistics. Moreover, transport is the fastest growing sector with road transport subsector being the largest contributor to global warming, through the emissions of CO2. The negative consequences are more intense, especially in urban areas. In Europe, around 75% of the population lives in urban areas and it is foreseen to increase up to 80% by 2020 (EEA, 2010). Moreover, food products are among the most frequently delivered items to retail shops in city centres. They also require special distribution conditions owing to their perishable nature and quality requirements (Gebresenbet et al. 2011). In this work, we investigate the transport of food in urban areas, and especially in the area of London to identify possibilities for:

i) CO2 and emission factors such as CO, NOx and Hydro Carbons reduction,
ii) better and efficient fuel consumption,
iii) reduction on the operational cost for the transportation of food products, and
iv) mitigation the traffic nuisance.

The improvements would be arising from different logistics sharing practices; such as transport pooling and collaboration among retailers and 3PLs.

The market in the grocery retail sector in the UK is very competitive with major retailers such as Tesco, ASDA, Ocado, Sainsbury's. According to the IGD (2015), the total grocery market size in the UK was £174.5 billion in 2014 and estimated to be approximately £177.5 billion in 2015 and more than £200 billion in 2019. There is a continuous growth in the grocery market; however, the rate of growth is declining, leading to higher levels of competition among retailers. It is obvious that all retailers want to raise their customer base and their market share, without compromising their profitability (Murfitt, 2014). In fact, all retailers within this industry are confronted with extreme rivalry, resulting from aggressive price competition, due to the fact that customers have the opportunity to make comparisons among retailers about prices and quality of products (Barker, 2014), service level provided and convenience of the service. These comparisons are now feasible to do online as well, due to the significant technological growth (e.g. Internet, mobile apps) which provides the opportunity to (almost) anyone to search the market more easily than 10 years ago. The direct result of the latter is that the retail sector of groceries has a heavily competitive market, not only concerning the items' prices but also the service provision.

Many predictions have highlighted that the e-market would dominate the retail sector in the next few years, while the online shops would harm the traditional retailer shops (Doherty and Ellis-Chadwick, 2010). E-commerce introduces a new channel for fulfilling customer's needs more efficiently in order to gain market share and sustain growth of the business (Huang et al. 2013). Many people, especially the time pressured customers, seek a convenient shopping experience such as the online shops (McKinnon and Tallam, 2003) both for food and non-food purchases. Therefore, retailers across the world and also in the UK have started offering online shopping service to their end-consumers about fifteen years ago (Tedeschi, 2002).

We study the UK as our major case, due to the fact that it is the biggest online grocery market in the world in terms of size after the Chinese online grocery market (IGD, 2016). Although the share of the online UK grocery market is small with 4.3% of the total market for the year 2014 and estimated to be 5% in 2015 and 8.3% in 2019 (IGD, 2014), it still amounts to a significant size; £7.5 billion in 2014 (Mintel, 2015) and estimated to reach £16.9 billion in 2019 (IGD, 2014). Moreover, the online UK grocery retail market has seen a yearly growth of around 17%, while the total grocery market has an annual growth of less than 5% in the last 10 years (IGD, 2015). Note that, the online grocery market is completely competitive, where the four significant retailers (Tesco, Sainsbury's, ASDA and Ocado) possess around the 85% of the online grocery market for the past three years (IGD, 2015). Therefore, each retailer strives to obtain a significant share of this developing 'new market'.

Nowadays, it is common for online retailers to provide the following options to the consumers: home delivery with a delivery charge or click and collect services; i.e. collection from a predefined collection point such as the retail store. In the case of home delivery, the consumer selects a day and a time slot in order to have his grocery order delivered to his house, while in the second alternative, the retailer transports the consumer's order to a predefined collection point and the customer has to collect his order within a selected time interval on a selected day. In this work, we focus only on home deliveries of groceries and the transport challenges associated with it.