



Logistics impacts of student online shopping – Evaluating delivery consolidation to halls of residence [☆]



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ABSTRACT

Growth in online shopping has led to increased numbers of small delivery vehicles in urban areas leading to a range of negative externalities. Young people are significant generators of home deliveries and, when clustered in university halls of residence, can generate considerable freight traffic to one location. This paper explores the potential to consolidate these deliveries using an urban consolidation centre. Based on the case of Southampton, UK, data were compiled from three linked sources: a delivery audit of four halls of residence at the University of Southampton housing 5050 residents; annual package receipt records from Southampton Solent University halls (2294 residents); and an online shopping survey distributed to Southampton University students (486 responses). The results suggest that in cities with multiple higher education institutions (HEIs), where in excess of 8000 students live in halls, over 13,000 courier trips could be generated annually, delivering over 4000 m³ of packages. These could be consolidated onto fewer than 300 vehicles for an annual service cost of approximately £18 per student, reducing congestion, parking infringements and improving air quality. Analysis indicated student acceptance of a consolidated parcel service but operational challenges would include enforcement, performance risk, finance and delivery speed.

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1. Introduction

Freight transport makes up 16% of all road vehicle activity in UK cities, with lorries and vans performing 30% of their work load in urban areas (Department for Transport, 2015). Over the last ten years, van traffic has increased by almost a fifth while all other types have shown overall decreases (Browne et al., 2014; Department for Transport, 2015). A key reason for this is the growing demand for new ways of buying goods and fulfilling deliveries. Online shopping has grown from 3% of total UK retail sales in 2007 to over 16.8% in 2015 (Cherrett et al., 2012; Retail Research, 2016) and, alongside this, just-in-time procurement has resulted in increasingly less-efficient small-package flows (Ofcom, 2015). A key generator of this freight activity are younger age groups who now do proportionally more of their shopping online than any other with 42% of 18–24 year-olds declaring it as their major purchasing medium in 2014 (Statista, 2016). Given that around 27.5% of the

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1.4 million full-time UK undergraduate students live in halls during term-time (Higher Education Statistics Agency, 2015; Seock and Bailey, 2008), university student accommodation could be a significant freight generator in its own right. While studies have indicated a CO₂ advantage for home delivery compared to the traditional high-street shopping trip (Edwards et al., 2010; Goodchild et al., 2016), most emissions accrue during the 'last mile' (Edwards et al., 2010; Wiese et al., 2015). This could be eroded further where large numbers of customers residing in the same complex, such as a university hall of residence, can all order independently with no penalty for generating separate deliveries.

Urban Consolidation Centres (UCCs) have long been seen as a way for local authorities to alleviate the negative impacts of last-mile freight operations (Savelsbergh and Van Woensel, 2016) by grouping deliveries onto smaller numbers of less polluting vehicles. Results suggest that they have often failed to make the impact expected due to difficulties attracting clients and issues of longer term financial viability (Allen et al., 2012). Of interest in this research is whether a new market for UCCs exists in helping to better manage the movement of private deliveries to students living in halls of residence, particularly in cities where multiple higher education establishments exist.

With this in mind, we make three contributions in this paper: firstly, we quantify the scale of student e-retail activity through an audit of packages received across the halls of residence at the University of Southampton, UK, during the week after the 'Black Friday' retail event (27/11/15); secondly, we investigate the behaviour behind this activity through a structured questionnaire survey of students living in halls; finally, working with the operator of a UCC serving the city of Southampton, (Meachers Global Logistics), we use both studies and data from Southampton Solent University to propose how halls post could be consolidated and quantify the costs and issues associated with doing this via a UCC.

2. Background

2.1. Online purchasing habits and impacts on logistics

People are shopping and spending more online with the desire for convenience and monetary value (savings) resulting from longer working hours, less leisure time and/or lower disposable income; rising ownership of computers and mobile devices (e.g. smartphones and tablets) and improved internet connectivity (Mintel, 2015a, 2015b). Market surveys also indicate that young people, especially those aged between 18 and 34 years, make up a significant sector of online retail customers (ShopperVista, 2016) due to their preference for using the medium which fits with their recognised 'spur of the moment' purchasing and 'live for today' attitudes (Passport, 2013, 2015; Mintel, 2015a, 2016). Online shopping continues to disrupt the business models and logistics of the retail sector and is turning physical retail stores into 'showrooms' where people browse and inspect goods but do not necessarily purchase (Wenig and London, 2014). Moreover, online shopping is also pushing retailers to introduce innovative services that are either free of charge or highly desirable to their online customers, such as fast delivery services (e.g. same-day delivery), subscription for unlimited delivery (e.g. Asos's Premier Delivery), click-and-collect services, self-service lockers in convenient locations, or flexible return procedures for items bought online (Mintel, 2015b). Being able to choose delivery slots with no minimum spend is also becoming a common expectation of online shoppers (Mintel, 2016).

The UK courier and express services market generated approximately £9b in revenue across 11,765 companies during 2015 (Key Note, 2015). With approximately 1.065 billion parcels delivered across the UK, of which an estimated 260 million were handled during November and December (IMRG, 2015), the impacts of home delivery on logistics and personal travel could be considerable but are not well understood. It has been suggested that general fragmentation in the retail sector resulting from retailers offering ever more service variants to customers could lead to more freight vehicle movements, particularly where crowd-sourced couriers are employed. In contrast, more delivery options and mechanisms made available to customers (particularly the potential for unattended delivery) might result in changes in travel behaviour and fewer personal car journeys being made (Visser et al., 2014). Problems experienced by customers with online retail have been largely related to delivery with 15% stating that no-one was in to receive the item when it arrived, 13% reporting delays in delivery and 3% having to make a collection from a courier's depot in response to a failed first-time delivery (Eurobarometer, 2013; Morganti and Dabanc, 2014).

2.2. Urban consolidation centres and their role in reducing last-mile delivery impacts

Urban Consolidation Centres (UCCs) are secure warehouse or cross-dock facilities which allow multiple deliveries of consignments destined for various customers within an urban area to be consolidated together into fewer vehicles for the final leg of their journey (Browne et al., 2005). They have been in operation since the mid-1970s across Europe with over 114 schemes having been identified in the retail, office, residential and construction sectors (Allen et al., 2012). UCCs can be divided into three basic types (Allen et al., 2012; Triantafyllou et al., 2015): (i) UCCs serving all or part of an urban area (often instigated by a local authority and associated with the supply of retail and office products to specific urban districts suffering from transport-related problems); (ii) UCCs serving single-landlord sites (typically managing retail products and supplies for airports, shopping centres and hospitals where minimising the need for on-site storage to maximise retail/operational space is of primary importance). In this case, the UCC can either be 'suggested' by the landlord, where an incentive of additional storage space and services is given to those retailers signing up to use the UCC or 'demanded', as a condition of the rental

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