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Fostering unassisted off-hour deliveries: The role of incentives

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ABSTRACT

This paper describes the chief findings of research conducted to assess the willingness of receivers of supplies to accept unassisted off-hour deliveries (U-OHD), which are those conducted outside regular business hours and without the assistance of the receiving establishment staff. U-OHD have potential to increase economic competitiveness, reduce congestion, improve environmental conditions, enhance livability, and increase quality of life in urban areas. This study considers the role that public policy initiatives could play in fostering receivers' acceptance of U-OHD by analyzing survey data collected from potential U-OHD adopters. The paper describes the survey conducted, performs descriptive analyses of the data, analyzes the respondents' stated willingness to participate in unassisted off-hour deliveries, estimates discrete choice models to gain insight into receivers' decision-making processes, and analyzes the effectiveness of alternative policy scenarios. It is found that a number of policy levers can foster U-OHD: (1) public sector provision of a one-time incentive, a public recognition program, and business support services; (2) carriers providing shipping discounts to receivers of U-OHD; and (3) the creation of a Trusted Vendor Certification Program.

1. Introduction

Increasing urban congestion puts great pressure on decision makers and transportation agencies that must also be responsive to citizens' desires for vibrant urban economies, enhanced livability, and high quality of life. This quest has led to the identification, design, and testing of a number of initiatives designed to foster greater efficiency of freight systems. One type of initiatives are the receiver-centered Freight Demand Management (FDM) measures which attempt to change the nature of the demand for cargo. These policies take advantage of the fact that the receivers—by virtue of being the primary customers in the economic transaction, or the ones that create the demand—have a great deal of power over vendors and carriers, who must respect their wishes if they want to stay in business. Examples of FDM include encouraging receivers to reduce the number of deliveries they get, or to retime some or all deliveries (Holguín-Veras and Sánchez-Díaz, 2016).

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Regrettably, the potential role of FDM has been largely overlooked. This, in turn, presents a unique opportunity to reduce congestion and improve economic competitiveness, by developing and implementing FDM programs (Holguín-Veras and Sánchez-Díaz, 2016). Achieving this goal requires gaining insight into the behavioral underpinnings of the urban freight system, and how best to influence it to minimize its negative externalities, without detracting from its contributions to the economy and quality of life.

In recent years, there has been an increase of interest in Off-Hour Deliveries (OHD), a particular form of FDM where the main intent is to induce receivers to accept deliveries outside regular business hours. To some extent, the interest in OHD is the result of its successful pilot testing and implementation in New York City (NYC), which demonstrated that the use of incentives and collaborative private-sector engagement could induce large numbers of receivers to accept OHD. Without doubt, OHD is an attractive option, that: can be implemented in partnership with the private sector; does not require large expenditures in capital programs; reduces conflicts with other road users (e.g., pedestrians, bicyclists, and buses); facilitates the implementation of bike lanes and Bus Rapid Transit by reducing the need for loading spaces at the curb; improves economic productivity; reduces pollution and congestion; and enhances livability and quality of life.

However, as is typical of a new concept, multiple aspects deserve further research, including the behavioral response of receivers to OHD adoption under the influence of public-sector policies. This paper seeks to contribute to the nascent field of FDM through the behavioral investigation of factors that could foster receivers' acceptance of unassisted OHD, (U-OHD). Unassisted OHD is a form of OHD whereby the receiving establishment has no staff present at the time of delivery. To this effect, the authors collected stated preference data to estimate behavioral models and ascertain the role that public-sector policies could play in fostering acceptance of U-OHD. The paper has four sections in addition to this introduction. Section 2 summarizes the background of this research. Section 3 briefly describes the survey conducted, and provides a descriptive analysis of the data. Section 4 presents the behavioral models estimated. Section 5 discusses policy implications and provides concluding remarks.

2. Background

OHD programs have been shown to help urban economies reach their most efficient outcomes, providing greater supply chain efficiencies, as well as environmental and quality of life benefits. There is indeed ample evidence—see Yannis et al. (2006) and Holguín-Veras et al. (2011)—to indicate that the economic welfare of urban areas would improve if the market share of OHD increases. Estimates suggest that for New York City the optimal amount of staffed OHD (S-OHD) is in the range of 14–21% of the total number of deliveries, depending on the composite value of time and the traffic composition (Holguín-Veras et al., 2011). In the case of U-OHD, optimal participation is probably around 40% (Holguín-Veras et al., 2012). These numbers stand in contrast with the current market share of OHD of about 4–5% in New York City area (Holguín-Veras et al., 2007) and the Spanish cities of Santander and Barcelona (Domínguez et al., 2012). Thus, public-sector intervention is needed to increase OHD, especially U-HOD, as a market failure prevents the system from reaching the most efficient outcome (Holguín-Veras, 2011).

In acknowledging the potential merit of greater OHD market share, it is important to identify the conditions that are preventing its wider acceptance. A combination of factors is to blame. In most urban freight markets, receivers have a great deal of power in their dealings with carriers and vendors. As established in Holguín-Veras (2008) and Holguín-Veras (2011), receiver opposition—together with the power that receivers have in determining delivery times, and the inability of carriers to compensate the receivers—act together to create the market failure that prevents an increase in OHD market share.

A number of approaches can be considered to remove the market failure: regulations banning deliveries in the congested hours of the day, freight road pricing (e.g., cordon time of day tolls, time-distance pricing), charging receivers for deliveries received in the congested hours, and providing incentives to receivers to induce them to accept OHD (Holguín-Veras, 2008; Holguín-Veras et al., 2011, in press). The first two are carrier-centered, while the last two are receiver-centered approaches.

Regulations could be used to promote OHD, as practiced in a number of Chinese cities (Changsha Bureau of Public Security, 2013; Shenzhen Bureau of Public Security, 2013; Beijing Traffic Management Bureau, 2014). In these cases, public-sector agencies issued regulations requiring selected industry sectors to perform OHD. Experience has shown that these programs are frequently counterproductive. The receivers oppose the mandate, because it forces them to accept OHD and pay for either the additional staff costs, or accept additional risk without any form of compensation. Although carriers stand to benefit from the OHD operations, they tend to dislike the mandate because it puts them in an untenable situation. In Beijing, for instance, carriers complain that the receivers exert pressure on them to make deliveries in the regular hours, in violation of the mandate, causing them to get numerous fines (Beijing Traffic Management Bureau, 2010). In fact, managers of parcel delivery companies admit that they use passenger vehicles to make deliveries during the day hours. This decision leads to higher congestion levels because multiple passenger vehicles are needed to do the deliveries that a single truck could transport. This situation illustrates a key limitation of regulatory approaches: they are blunt policy instruments. Requiring that broad segments of the industry perform OHD will impact numerous receivers for which OHD is not the best outcome. Forcing receivers to comply reduces the net economic benefits of the program, as receivers must either absorb the extra costs, or force carriers to make deliveries in smaller vehicles (and even passenger vehicles) or simply absorb extra fines. Although there are social benefits in terms of congestion and pollution reductions, this suboptimal regulation produces unintended negative effects, a government failure, that make things worse.

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