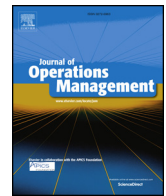




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Designing crowdsourced delivery systems: The effect of driver disclosure and ethnic similarity

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ABSTRACT

Crowdsourced delivery is a service operations model that has proliferated in recent years, bringing unique opportunities and challenges to online retail operations. In particular, new technology enabled features, such as the disclosure of delivery drivers' identities, introduce a social dimension prior to delivery service encounters that might influence customers' service quality expectations and ultimately impact their attitudes towards the retailers. Building on premises of social identity theory, this research investigates effects of various crowdsourced delivery system designs related to driver disclosure and ethnicity on customers' attitudes towards the drivers and retailers. Using data from a scenario-based experiment with 761 participants across two studies, we find that crowdsourced delivery designs that disclose drivers' identity increase customers' trust, satisfaction, and repurchase intentions only when customers perceive the drivers to be similar to them, particularly with regard to ethnicity. The designs that offer driver choice options are also found to be highly regarded by customers. In addition, the similarity effects of crowdsourced delivery designs differ depending on certain customer characteristics. Overall, our research shows crowdsourced delivery - as a technology-driven phenomenon - may portend unexpected and challenging social dilemmas for operations managers. Our findings contribute to emerging research on the intersection of service design, technology management, and the sharing economy.

1. Introduction

A significant trend impacting contemporary business is the growth of the sharing economy (Zervas et al., 2017). Defined as “peer to peer activity of obtaining, giving, or sharing access to goods and services via online technology platforms” (Hamari et al., 2015, p.1), the sharing economy has been characterized as one of today's fastest growing and most innovative business segments. Business ventures rooted in the sharing economy are projected to reach \$335B in revenue by 2025 (PricewaterhouseCoopers, 2015) with a sizable portion of such growth involving crowdsourced delivery and physical distribution services (PDS).

Often referred to as the “uberization” of PDS, due to an operational similarity to the ride-sharing service company Uber, crowdsourced delivery (illustrated in Fig. 1) involves the outsourcing of last mile PDS to a mass of marketplace actors through technology-based coordination infrastructures (Mehmann et al., 2015). While crowdsourced delivery still reaches only a small percentage of the U.S. market - 10% among millennials and 3% among non-millennials (Ivory and Barker, 2016) - the potential growth opportunities have attracted many new

marketplace entrants. Crowdsourcing-based service providers such as UberEats, Amazon Flex, Deliv, Deliveroo, Instacart, JoyRun, Dada, Zipments, DoorDash, and Postmates have emerged in recent years, making crowdsourced delivery a viable tactic for designing and managing last mile PDS operations. This idea is notably represented by retailers such as Amazon, which estimates a 30% reduction in costs using crowdsourced delivery (Kitroeff, 2016), and China's JD Daoja, which reported higher repeat customer purchasing rates due to service enhancements associated with crowdsourced delivery (Perez, 2016).

Though crowdsourced delivery is growing in use, operations managers must acknowledge a number of differences from traditional delivery services. If not designed and managed effectively, these differences could have a negative impact on customers' performance and quality evaluations (Heim and Field, 2007; Heim and Sinha, 2001b). In particular, several unique service-oriented features offered by crowdsourcing technologies, such as real time GPS-based package/driver tracking, direct communication with drivers via phones/texts, and disclosure of driver identification specifics such as name and photo, provide a different customer experience before, during, and after service encounters. Moreover, because crowdsourcing technology allows

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Fig. 1. Crowdsourced delivery process.

for the contracting of services from individuals drawn from a heterogeneous pool of providers that are independent of the crowdsourcing firm, the identities of drivers are not neutralized, as with “a UPS or FedEx delivery driver,” but instead are more explicit, as “Scott” or “Tracy,” for example.

As these aspects of the crowdsourced delivery operations model suggest, the technology-enabled linkage between a crowdsourced agent (as a PDS provider) and a customer becomes an essential part of the delivery service triad (Li and Choi, 2009; Wynstra et al., 2015) with characteristics of a social interaction (Carbone et al., 2017; Frenken and Schor, 2017). The social nature of crowdsourced PDS can perhaps be best illustrated by the company Zipments, whose motto is “*make the delivery experience personal again.*” (Zipments, 2018). Zipments discloses contact information of its drivers pre-delivery, facilitates direct links between customers and drivers to set up appointments, and provides its delivery drivers with a social media page where customers can learn more about the identity, personal interests, and delivery history of drivers prior to delivery. While these service elements provide a more personal delivery experience, they also can make maintaining a consistent and effective customer experience more of a challenge for operations managers, given the influential role that individual differences may play in shaping customers' perceptions of PDS. This research explores these social dynamics by focusing on impacts of identity in crowdsourced delivery service design.

One aspect of identity that recent evidence suggests could potentially be problematic when disclosing drivers during crowdsourced PDS is driver ethnicity. Research suggests ethnicity, or race, is a key attribute that people use to categorize themselves and others, making race an influential factor shaping human attitudes and behaviors (Harrison et al., 1998; McPherson et al., 2001; Milliken and Martins, 1996). In fact, crowdsourcing platforms have been under fire recently due to alleged discriminatory practices based on ethnicity. For example, a Harvard study showed that ethnic minorities were charged more and were less likely to be approved for apartment rentals via the crowdsourced lodging company AirBnB (Edelman et al., 2017). Ridesharing crowdsourced platforms, such as Uber and Lyft, have seen increased cancellations when drivers are ethnic minorities (Ge et al., 2016). These developments were all based on the identity salience ubiquitous in crowdsourcing platforms, whereby name and face disclosures inherently stimulate social biases and perceptions.

This research investigates select implications of driver disclosure and ethnicity in the context of crowdsourced last mile delivery service design. The following research questions are addressed: (1) What are the effects of different crowdsourced delivery service system designs

related to disclosure and ethnicity of drivers on customers' perceptions of delivery services and repurchase intentions?, and; (2) Do the effects of such crowdsourced delivery service system designs differ across various customer segments and characteristics? To explore these questions, we draw on theoretical foundations of social identity theory (Tajfel, 1978) and insights from the service design and technology management literature. The conceptual model and associated hypotheses are tested through a series of online experiments across several customer panels.

We make contributions to several operations management (OM) research streams. First, the interface between technology and service operations has been understudied, with the current literature mainly focusing on impacts of technology capabilities and technology adoption on service performance (Karwan and Markland, 2006). This study showcases how technology platforms, and associated design elements, can impact service performance outcomes by exemplifying that PDS design may very well include the design of technology platforms, and vice versa. Our investigation of crowdsourced delivery system designs responds to Venkatesh's (2013) call for individual-level research that offers insights on how and why technology initiatives in the context of OM may fail to afford intended benefits.

This study also contributes to literature on PDS design by focusing on the pre-service encounter, illuminating the question of *how* aspects of the physical distribution process should be designed in emerging service solutions of crowdsourced delivery. PDS design research has mainly identified key attributes of delivery service encounters that impact customer satisfaction and loyalty (Heim and Field, 2007), leaving pre-encounter service issues unexplored. Considering that the expectations of customers prior to an actual service delivery encounter have been shown to be a critical factor of final customer satisfaction assessments (Anderson, 1973; Cardozo, 1965; Spreng and Mackoy, 1996), the lack of pre-service PDS research represents a major opportunity.

Furthermore, service design literature has primarily focused on services in professional settings, such as the strategic design of healthcare and legal services (Damali et al., 2016; Ding, 2015). Since these services typically do not involve engagement with customers in environments that might be interpreted as “personal” as opposed to “professional” - such as customers' private residences - biases and concerns that might be relevant when designing services for such “personal” customer contact environments have not been extensively explored. Lastly, by introducing and exploring ethnicity in PDS design, a final contribution of this research resides in specific technological features of crowdsourced delivery platforms that are inherently rooted

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