Understanding Switching Intention to E-commerce Drone Delivery: A Privacy Risk Hedging View

Emerging Research Proposal

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Abstract

Drone delivery is an innovative service at the early adoption stage. It is imperative to understand what it takes for the public to accept such innovative services. This study aims to know whether the advantages of delivery speed and environmental protection are strong enough to convince the public to switch from regular truck shipping to drone delivery services after understanding the potential privacy security risks. This study applies privacy calculus and protection motivation theories, and open-mindedness in innovation to develop a research model. An empirical survey and structural equation modeling analysis will be used to understand the hedging effect of relative advantages of drone delivery services and privacy security risks on the switching intention of e-commerce consumers. Theoretical and practical implications will be discussed from the findings of this study.

Keywords: drone delivery, security, risk

Introduction

Unmanned Aerial Vehicle (UAV), commonly known as a drone, is an autonomous aircraft without any human onboard (Austin, 2010). The introduction of militaries-originated drone technology into the civilian domain has been quickly adopted by various industries such as agriculture (Mogili & Deepak, 2018), disaster management (Tanzi et al., 2016), and healthcare (Yaprak et al., 2021). E-commerce industries also envision drones as a promising solution to the challenges associated with last-mile product delivery (Zhu et al., 2020; Leon et al., 2021). For example, due to the COVID, Amazon (2020) has started pilot-testing their "30 minutes or less Prime Air" drone delivery services to decrease disease transmission. However, the public has an increasing concern over the safety and security risks of the delivery method, e.g., damages to the products and buildings in delivery, privacy invasion, and illegal trespassing and destruction (Park et al., 2021). As an emerging technology and information system, the research on drone delivery is limited and in a nascent stage, especially on the understanding of its social and behavioral effects. This research asks what mechanism influences people's switching intention in e-commerce drone delivery services. The objective is to inform policy and regulation development for businesses and government to better prepare for the uptake of this emerging technology. In particular, this research aims to understand the hedging effect

of privacy risk and drone delivery advantages and the moderating effect of open-mindedness on the switching intention of e-commerce drone delivery technology.

Research Model

In our research, consumers' switching intention from a standard truck delivery to drone delivery is a function of the hedging effect of the relative advantages of the technology and associated privacy risks.

Privacy Calculus Theory and Switching Intention to Drone Delivery

Under the assumption of rational choice, privacy calculus theory posits that individuals act in ways that maximize expected positive outcomes and minimize expected negative ones (Vroom, 1964). As such, privacy calculus is much like the expected utility hypothesis of game theory in which individuals bet on outcomes that are a function of the probability and impact of positive and negative occurrences (Friedman and Savage, 1952). In reality, many human behaviors result from sizing up the advantages and disadvantages of actions. They are hardly products of "non-contrary" beliefs on behaviors. From the privacy calculus perspective, individuals will likely conduct the privacy risks and relative advantages of drone delivery services analysis and make switching choices.

Costs of Privacy Risks

Drone delivery introduces many possible security risks and costs during the delivery process (Alwateer & Loke, 2020). For example, a drone network is different from traditional wireless networks in that it transmits a more considerable amount of information (Clark, 2014). Data collected from flying over private properties can end up in the wrong hands. Or, malicious individuals can capture unauthorized information (Soffronoff et al., 2016). The private information can be potentially misused to trespass the air of properties. In a nutshell, the increased privacy risks can discourage users from switching to drone delivery services (Yoo et al., 2018).

Rogers (1975) proposed the protection motivation theory (PMT) to address fear. The PMT theory suggests that people will engage a cognitive appraisal mechanism to evaluate risks for protection when facing threats and risks. During threat appraisal, an individual evaluates the vulnerability and severity of a potential threat. *Vulnerability* refers to the susceptibility to or the likelihood of privacy vulnerability toward drone delivery services. *Severity* speaks of perceived privacy risk intensity toward drone delivery services. Since its introduction, the PMT has been one of the most potent explanatory theories for predicting individuals' intention to engage in protective actions (Anderson and Agarwal, 2010). Extant research in cybersecurity threat (Liang & Xue, 2010), mass media threat (Newwirth et al., 2000), online risks (Tsai et al., 2016), and mobile health adaptation (Sun et al., 2020) indicate that an individual's motivation to avoid threats and risks was significantly affected by a perceived threat. From the privacy protection motivation perspective, we propose that the privacy vulnerability and privacy risk severity negatively affect switching intention from standard truck delivery to drone delivery.

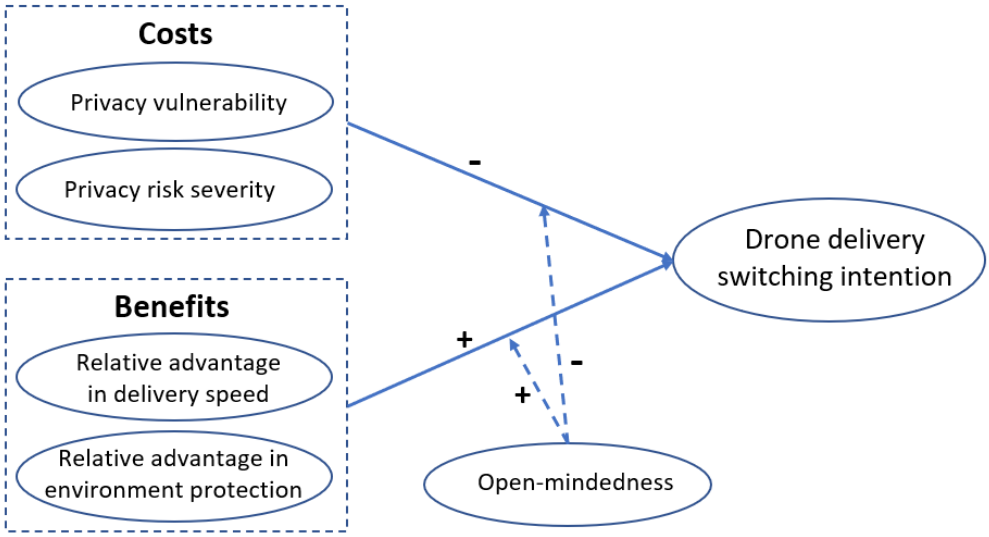
Benefits of Relative Drone Delivery Advantages

Although drone delivery services have these perceived privacy risks, many users are attracted to their relative advantages of delivery speed and environment protection (Kornatowski et al., 2018). Rogers (1983) asserts that the critical driver for diffusion of innovation is the relative advantages of the innovation. Previous research results indicate that the more the perceived advantages, the higher the likelihood of innovation adoption (Agarwal & Prasad, 1998; Kang et al., 2015). Studies and surveys suggest that drone delivery provides two significant benefits: delivery speed and environment protection. Customers perceive a faster than standard truck delivery as the main advantage because drones fly the optimal path and are not affected by road infrastructure or traffic congestion (Joerss et al., 2016). In addition, drone delivery is environmentally friendly because drones operate on batteries and thus emit no carbon (Lee et al., 2016; Soffronoff et al., 2016). Accordingly, this study argues that the perceived advantages in speed and environment protection will pull consumers into switching from standard truck services to drone delivery.

Regulating Open-mindedness

Sinkula et al. (1997) proposed open-mindedness (OM) as a willingness to consider ideas and opinions that are new or different. OM reorientated values, norms, or behaviors by changing the cognitive structures (Nystrom and Starbuck, 1984), mental models (Day and Nedungadi, 1994), dominant logics (Bettis and Prahalad, 1995), and core assumptions that guide behavior (Shaw and Perkins, 1991). Thus, OM implies unlearning and is the prerequisite and facilitator of innovation (Hernadez et al., 2010). Research suggests that changes in routine and procedures force people to reconsider old attitudes and thinking and identify outdated perceptions (Kegan & Lahey, 2001). Studies have demonstrated the positive effect of OM in innovation (Farrell, 2000; Keskin, 2006). This research hypothesizes that open-mindedness can increase the influence of relative advantages on switching intention. In addition, this study argues that OM people are also open or alert to privacy risks associated with innovative drone delivery services. Therefore, open-mindedness could also increase the negative impact of privacy risk on the intention to switch from standard truck delivery to innovative drone delivery. By applying OM as a regulating moderator, this study provides initial empirical evidence of OM in an emerging and innovative E-commerce drone delivery to our best knowledge.

The following graph demonstrates the research model for this study, with hypotheses.



Research Model

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