An innovation diffusion perspective of e-consumers' initial adoption of self-collection service via automated parcel station

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An Innovation Diffusion Perspective of E-Consumers' Initial Adoption of Self-Collection Service via Automated Parcel Station

Abstract

Purpose - As an application of Self-Service Technology (SST), Automated Parcel Station (APS) is emerging as a logistics innovation to address the inefficiency and delivery failure in conventional home delivery. However, the long term viability of APS depends on consumers' acceptance of such concept. In response, a behavioural study on consumers' adoption of self-collection service via APS is conducted.

Design/methodology/approach - By synthesising theoretical insights from innovation diffusion literature and attitude theories, a conceptual model is developed and empirically validated. Perceived characteristics of APS are present to directly influence consumers' adoption intention, or indirectly through attitude. A total of 170 valid responses are collected from a survey conducted in Singapore and the data are analysed using Structural Equation Modelling (SEM).

Findings – Consumers' favourable attitude and perceived relative advantage of APS directly lead to stronger adoption intention. On the contrary, consumers' perceptions on compatibility and trialability and on complexity indirectly influence their adoption intention via attitude, in a positive and in a negative way respectively. Additionally, attitude is found to be the most influential factor contributing to consumers' adoption intention.

Research limitations/implications - The scope of this paper is limited to e-consumers' initial adoption decision. Future research should examine consumers' adoption behaviour further down the innovation adoption process, such as continuance and commitment.

Originality/value - This research conceptualises and validates consumers' adoption behaviour of APS from a synthesised view of innovation diffusion and attitude theories, theoretically and empirically contributing to the field of study on logistics innovations from consumers' perspective.

Keywords: Last-mile deliveries; Innovation diffusion theory; Logistics innovation; Consumer behaviour; Self-collection; E-commerce.

1. Introduction

Innovative self-service technologies (SSTs) are dramatically changing the way how business services are conceived, developed and delivered (Meuter et al., 2005). By offering various self-services, companies are able to increase productivity and efficiency at a lower labour cost without compromising service standards (Bitner et al., 2002). Consumers are able to dictate time, pace, location, desired interactivity, and ultimately the outcome of the service, thereby overcoming many of the restrictions of a full service channel (Collier and Kimes, 2012). In this regard, the consumers are important contributors to firms' productivity by taking a co-production role, portrayed as "co-creators of value" (Vargo and Lusch, 2008).

A promising innovative SST is found in e-commerce last-mile logistics, whereby the option of technology-based self-collection service, otherwise known as Automated Parcel Station

(APS), gradually prevails over conventional home delivery (Morganti et al., 2014a). APS empowers consumers to self-collect parcels from centralised APS at their convenient time and location (Collins, 2015). It represents a fundamental shift in the nature of e-commerce logistics as compared to conventional deliveries that entail many carriers making home deliveries to fragmented destinations of end consumers and cost hours of consumers' waiting time for parcel reception. However, the feasibility of any innovative service provisions should always be balanced against the perceptions and behavioural responses of the consumers (Collier and Kimes, 2012). Therefore, this study aims to investigate the adoption behaviour of APS from the consumers' perspective.

According to Diffusion of Innovation (DOI) Theory, an innovation is an idea, practice, or object that is perceived as new by an individual or group (Rogers, 1995). In this regard, the concept of self-collection via APS can be safely qualified as an innovation in logistics as it is a combination of a practice (self-collection) and an object (APS) that is new to the consumers. In the field of logistics, innovation studies have not attracted much attention (Flint et al., 2005), despite the emergence of many innovative concepts and technologies in the past decades, such as Containerisation, Electronic Data Interchange (EDI), Cross-Docking, Radio Frequency Identification (RFID), Collaborative Planning Forecasting and Replenishment (CPFR), and more recently, mobile tools enabled services in e-supply chain management (Cagliano et al., 2015; Cagliano et al., 2017; Fu, 2016; Fu et al., 2015; Grawe, 2009). Grawe (2009) developed a model of logistics innovation by reviewing prior logistics literatures and Hazen et al. (2011, 2012) examined the diffusion of logistics innovation in a supply chain context with a strong emphasis on the innovative practice of reverse logistics. However, their studies were mostly conducted from the organisations' perspective aiming to establish the relationship between innovation logistics practices and organisations' competitive advantage. Consequently, consumers' receptivity, which is crucial to the success of the innovation, has not been addressed. Furthermore, while the issue of consumers' receptivity has been discussed in some literature specifically concerning the logistics innovation of APS (Dablanc et al., 2015; Morganti et al., 2014a; Morganti et al., 2014b; Xu et al., 2008), they are largely of descriptive nature and little emphasis is placed on the behavioural component of consumers' adoption decision of APS. Indeed, last-mile delivery is a consumer-oriented service with a strong behavioural element (Colins, 2015). Of interest are the motivations that drive the uptake of the APS option over conventional home delivery. Thus, key factors that motivate consumers' adoption of APS remain to be explored.

Theoretically, a common theme underlying various research streams in adoption study is the inclusion of perceived characteristics of the service system as key independent variables (Agarwal and Prasad, 1997). Among others, DOI literature and attitude theories, such as Theory of Reasoned Action (TRA), emerge as two major schools of thoughts (Hanafizaden et al., 2014). Therefore, viewing APS as a logistics innovation, this study proposes and empirically validates a framework to explain consumers' adoption of APS by synthesising theoretical insights from innovation diffusion literature and attitude theories. While TRA broadly regards individual's behaviour as a direct consequence of behavioural intention which is in turn influenced by one's attitude toward the behaviour (Fishbein and Ajzen,

1975), innovation diffusion literature (Rogers, 1995) supplements TRA by providing a set of attitudinal beliefs in the specific context of consumers' adoption of APS.

The remainder of the paper is organised as follows. The current status of adoption on APS among the e-commerce consumers worldwide is first reviewed, and a conceptual model is then developed. The model is tested using data collected from e-commerce consumers in Singapore and the data are analysed using Structural Equation Modelling (SEM). The paper concludes with academic and managerial implications as well as suggestions for future work.

2. Literature review on APS adoption

In the field of last-mile e-commerce delivery, a clear distinction has to be made between the two options of self-collection service i.e. attended or unattended (Savelsbergh and Van Woensel, 2016; refer to Allen et al., 2007 for a detailed comparison of last-mile delivery alternatives). Attended self-collection option is built on the concept of "shop-in-shop" where the parcels are delivered to a store, a petrol station, a convenience store or a post office, and consumers can pay, collect or return their parcels. Unattended self-collection facility, on the other hand, usually takes the form of an automated locker system often with camera surveillance (Dablanc et al., 2015; Weltevreden, 2008). Consumers will be notified when their parcels are emplaced in the lockers and a system-generated password and a barcode are simultaneously sent to the consumers for parcel collection. For the purpose of this study, the focus is on the adoption of technology-based self-service, that is unattended self-collection, which refers to APS. Due to the inherent flexibility of unattended operations, APS automates and simplifies the process of parcel collection and drop-off on a 24/7 basis (DHL, 2015). Prominent examples of APS are ByBox in UK, PackStation in Germany (Dablanc et al., 2015), InPost in Poland (Iwan et al., 2016), and POPStation in Singapore (Choo, 2016).

In the ever-growing e-commerce market, the conventional last-mile delivery i.e. home delivery imposes heavy societal costs (e.g., road congestion, noise and air pollution) (Mangiaracina et al., 2016), and is further compounded by the problem of failed first time delivery (Edwards et al., 2010; Song et al., 2013). These negative externalities have severe impact on traffic safety, quality of life and urban economic competitiveness (Savelsbergh and Van Woensel, 2016), and are becoming critical concerns for many major cities. From an operational perspective of the whole supply chain, the last-mile delivery is also a costly phase. It is estimated that 28% of the total transportation cost is generated from the last leg of delivery (Muñoz-Villamizar et al., 2015), which is disproportionally heavy given the small part of transportation time it takes. In absolute terms, a study in the UK estimated that in 2012, the cost of home delivery inefficiency and failures amounted to £850 million with approximately 12% of home deliveries failed at the first attempts (Francke and Visser, 2015).

In contrast, as an alternative e-commerce logistics solution, self-collection via APS is considered beneficial from both societal and operational perspectives. It not only allows for more consolidated delivery, and also eliminates the need for re-delivery (due to failed first

time delivery in the case the consumer is not at home to receive the parcel), leading to more efficient delivery scheduling, higher utilisation of the delivery vehicles and lower traffic volume (Morganti et al., 2014b; Savelsbergh and Van Woensel, 2016; Punakivi et al., 2001). In fact, according to Edwards et al. (2010), in a best case scenario, up to 83% reduction in carbon emission could be achieved if consumers collect their parcels from self-collection facilities, which can be translated into significant environmental improvement as well as substantial operating cost reduction. As further commented by Augereau & Dablanc (2008), self-collection plays a decisive role in the re-organisation of last-mile logistics activities and will become a key feature of the strategy of e-commerce and transport players.

Although the potential benefits of successful incorporation of APS are enticing, it cannot be realised unless consumers themselves embrace the innovative service concept (self-collection in this case), which often involves a significant behaviour change and alternation of service consumption pattern (Meuter et al., 2005). The push for adoption of APS has been particularly strong in some European countries given the proliferation of e-commerce market there. For example, in France, self-collection is a well-established alternative to home delivery with a presence covering urban, suburban and rural areas, which accounts for approximately 20% of parcels delivered to the households (Morganti et al., 2014b). A similar situation is found in Germany where self-collection represents a delivery option chosen by 7% of the consumers (Morganti et al., 2014a). On the other hand, Xu et al. (2008) found that consumers in UK do not perceive self-collection as favourably as reported elsewhere in Europe, with most consumers being against self-collection and predominantly preferring the conventional delivery to the consumer's home.

Seemingly, despite its rapid growth in the e-commerce delivery market, APS has yet to establish a strong presence that is comparable to its home delivery counterpart. It appears that consumers are hesitant to embrace APS which is a major drawback retarding its growth and further development. The conventional deliveries are under considerable pressure as consumers are now demanding for "anytime, anywhere" service with an omni-channel logistics offering (DHL, 2015). Herein, a clear understanding of end consumers' behaviour in response to innovative logistics service offerings (APS in this case) becomes relevant. However, it remains largely unclear which specific attributes of the APS would appeal to the consumers or discourage the consumers from adopting it. The critical issues as to what are the attributes of a self-collection service that are most attractive to potential consumers remain to be found.

More importantly, while the adoption literature can be broadly classified into descriptive studies, comparative studies and relational studies (Hanafizadeh et al., 2014), almost all the extant literature on consumers' adoption of APS is of a descriptive nature (Weltevreden, 2008). No studies, to our best knowledge, have attempted to conceptualise the consumers' adoption behaviour of APS by exploring the theoretical relationships among the various factors influencing consumers' decision choice in last-mile delivery service. These are the major knowledge gap that shall be addressed by this study.

According to Rogers (1995), adoption process typically involves consumers' decision on initial adoption behaviour (pre-adoption) and continuance behaviour (post-adoption). This study, as an initial attempt to unveil consumers' adoption of APS, focuses only on the pre-adoption stage, i.e., the trial decision that motivates consumers to use the self-service for the first time (Meuter et al., 2005). In countries like Singapore where the development of APS is still at its early stage, consumers' hesitation in adopting self-collection practice is especially obvious. A study conducted in Singapore shows that approximately 80% of the respondents preferred home deliveries over self-collection, citing convenience and other logistical considerations on their preference (Tan, 2016). Such preference on home delivery is understandable given that home delivery has been a readily available option for Singapore e-consumers for years, whereas APS self-collection service is only recently established locally on a considerable scale in 2015 (Singpost, 2015). In fact, although official figures are not available, a case study of Ninja Van (a Singapore-based last-mile logistics service provider) revealed that only 5.5% of all parcel deliveries are made to various self-collection points (Choo, 2016). With the recent development of APS systems by several commercial operators, consumers are largely at the pre-adoption stage in deciding whether to try out the new alternative or stay with the conventional home delivery. Consistent with the research objective which focuses on consumers' pre-adoption behaviour, Singapore thus provides an ideal experimental setting for the study.

3. Conceptual framework

Theoretically, Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) theory are two widely applied theories in explaining consumers' adoption of service innovations (Hanafizaden et al., 2014). While TAM broadly regards "perceived ease of use" and "perceived usefulness" as the two major constructs (Davis, 1989), DOI argues for a wide range of perceived characteristics of the innovation, such as the relative advantage of a given technology over its predecessor, the compatibility of the innovation with existing systems and technologies, the barriers to trying and observing an innovation, and the complexity of a technology (Rogers, 1995). Comparing the two models, it is obvious to note that two constructs from DOI, i.e., perceived complexity and perceived relative advantage share great similarities with the ones espoused in TAM (Moore and Benbasat, 1991). Indeed, TAM is considered nested within DOI and a more comprehensive set of innovation characteristics can potentially add significant prediction power to the adoption model (Plouffe et al., 2001). This is especially true given that DOI includes the constructs of perceived observability and perceived trialability that are related to consumers' trial consideration in the pre-adoption stage, which aligns well with our research objective. Furthermore, as pointed out by Reinders (2008), the majority of studies in the field of SSTs concern the different types of technology-based self-services instead of the technology themselves. It is the consumers' acceptance of the innovative concept of self-service (self-collection) that matters, whereas technology is only the necessary enabling tool. TAM, though intensely applied, is a model designed specifically to explain individual's acceptance on technology and its generalisation

to a wider context of innovation adoption should always be treated with caution. Therefore, DOI is considered a more appropriate theory for the current study.

3.1 Theoretical premise

Since very limited studies can be found with a special focus on consumers' adoption behaviour of self-collection via APS, the current paper turns to the broader literature on consumers' adoption of SSTs and innovations to build its conceptual framework.

A rich body of theoretical research has accumulated in the field of consumers' adoption behaviour. Drawn from social psychology, the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), along with its extension Theory of Planned Behaviour (TPB) (Ajzen, 1991), is one of the most influential theories of human behaviour, which serves as a theoretical foundation of many consumer behaviour studies. In this regard, consumers' behaviour is theorised as a psychological process on deciding to adopt or reject certain actions. In both theories, behavioural intention is presented as the most immediate predictor of individual consumer's behaviour. This intention – behaviour association can be explained by cognitive dissonance theory (Festinger, 1957), which argues that perceived discrepancies between behavioural intention and actual behaviour cause a psychological tension (cognitive dissonance) and individuals tend to align their behaviour with intention to minimise such psychological tension. To a certain extent, the association between intention and behaviour has been taken as granted and the focus is on understanding adoption intention as a predictor of actual behaviour (Bhattacherjee, 2001; Jeyaraj, et al., 2006). Therefore, the construct of intention is to be used in this study, instead of actual behaviour.

In particular, TRA posits that an individual's attitudes toward an object are determined by his/her readily accessible beliefs, and attitudes in turn are one of the main antecedents of an individual's behavioural intention (Fishbein and Ajzen, 1975). In fact, the causality of "belief-attitude-intention" is reflected in the DOI literature as well. To illustrate, innovation diffusion theory views an individual's adoption as a social construct with the individual possessing different degrees of willingness to adopt an innovation (Hanafizadeh et al., 2014). In his seminal work on innovation diffusion, Rogers (1995) proposed a five-step adoption process consisting of knowledge, persuasion, decision, implementation and confirmation. While the focus of the present study is on the pre-adoption behaviour, the first three stages are especially relevant. More specifically, knowledge occurs when an individual gains an understanding of how the innovation works, which forms the basis of the individual's perception on the innovation. Next, built upon the perceptions, a persuasion stage occurs when an individual forms a favourable or unfavourable attitude toward the innovation. Finally, a decision as to adopt or reject the innovation is made. Herein, an association with consumers' belief (perception of the innovation) leading to attitude (favourable or unfavourable attitude) and ultimately to behaviour (adoption or rejection decision) are clearly presented. Therefore, using intention as a predictor of actual behaviour, the theoretical structure as characterised by "*perception (belief)–attitude–intention"* is reinforced (see Figure 1). In fact, the "*perception (belief)–attitude–intention*" causality is well reflected in

most adoption literature of consumer studies and its explanatory power has been consistently demonstrated (Davis, 1989; Jeyaraj, et al., 2006; Karahanna et al., 1999; Taylor and Todd, 1995). Hence, the current paper treats the causality of "belief-attitude-intention" as the underlying theoretical premise.

<INSERT FIGURE 1 HERE>

Additionally, some innovation diffusion studies omit the construct of attitude and posit a direct relationship between the attitudinal belief and individual's intention. Empirical evidence can be found in Agarwal and Prasad (1997) and Choudhury and Karahanna (2008). A possible explanation is that the different perceived characteristics of innovation vary in terms of their strength and impact. For example, intuitively, one would favour APS if it is easy to use (complexity), but would not use it simply due to its simplicity. Rather the APS has to be useful (relative advantage) so as to motivate intention. In other words, while some perceptions contribute to consumers' attitude formation, others are directly invoking adoption intention. Supporting evidence can be found in SST studies as well which asserts the overarching principle that various beliefs of the SSTs directly, or indirectly through attitude, influence individuals' intention to use the SSTs (Collier et al., 2014; Curran and Meuter, 2005; Mortimer et al., 2015; Lin and Filieri, 2015). To build in flexibility, both direct and indirect relationships are considered in the model.

Thus the following hypotheses are proposed as two base hypotheses of this study.
Hypothesis 1: Consumers' beliefs of APS directly influence their intention toward initial adoption of the APS or indirectly via their attitude.
Hypothesis 2: Consumers' attitude toward initial adoption of the APS positively influences their initial adoption intention.

3.2 Dimensions of perceptions

While TRA provides the underlying theoretical structure of this study, it is silent on the specific beliefs that may affect individual's attitude and intention. As a supplement, the innovation diffusion literature provides a theoretically based set of beliefs concerning the perceived characteristics of innovation (Karahanna et al., 1999), which effectively decomposes the monolithic attitudinal belief in the original TRA (Taylor and Todd, 1995). By surveying several thousand innovation studies, Rogers (1983,1995) identified five characteristics of an innovation, namely, relative advantage, compatibility, complexity, observability and trialability. Building on Rogers' works, Moore and Benbasat (1991) shifted the focus to the **perceived** characteristics of innovation, instead of the primary characteristics of the innovation itself. It is rationalised that primary attributes are intrinsic to an innovation independent of their perception by potential adopters, whereas the attitude of individuals is predicted by how they perceived these primary attributes. Consistent with this proposition, consumers' perceptions are distinguished into the following five dimensions.

Perceived compatibility is the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters (Rogers, 1995). It assesses the extent of congruence between an innovation and various aspects of the consumer and the situation where the innovation applies (Karahanna et al., 2006). In the context of APS adoption, perceived compatibility may vary among different consumers. For example, busy working professionals may perceive self-collection via APS as highly compatible with their lifestyle as they do not have time to wait for the parcel to be delivered to their homes at office hours, whereas they can conveniently collect the parcel from APS on their way home without engaging in any extra trip. A housewife, on the other hand, may well favour home delivery as she can engage in house works while waiting for the home delivery, which is more compatible with her lifestyle. Compatibility represents intrinsic motivators (Vallerand, 1997). When APS self-collection is compatible with a consumer's need, value and lifestyle, it creates intrinsic motivation and makes the consumer more inclined toward adoption. Therefore, the following hypothesis is proposed.

Hypothesis 1a: Consumers' perceived compatibility of APS is positively related to their attitude toward initial adoption of APS.

Perceived complexity assesses the degree to which an innovation is perceived as being difficult to use (Rogers, 1995). In the broader innovation adoption literature, perceived complexity, or its parallel construct on perceived ease of use in TAM, is a recurrent construct to predict consumers' attitude towards adoption (Chen et al., 2002; Davis, 1989; Weigel et al., 2014). For APS adoption, complexity arises when users interact with the APS system for parcel retrieval. To ensure security, various stages of identity check are designed into the system by scanning barcode, keying in password and parcel series numbers, etc., which impose extra efforts on the users. While some consumers may perceive the extra efforts as only marginal, others may feel it burdensome and thus forming unfavourable attitude toward self-collection via APS. Hence, the following hypothesis is proposed.

Hypothesis 1b: Consumers' perceived complexity of APS is negatively related to their attitude toward initial adoption of APS.

Perceived trialability refers to the degree to which an innovation is perceived to be trialable before adoption **and perceived observability** concerns the degree to which the results of an innovation are perceived to be observable to others (Rogers, 1995). According to Tornatzky and Klein's (1982) meta-analysis, perceived trialability and perceived observability fail to demonstrate consistent relationships with consumers' adoption behaviour. Such result might be due to the inclusion of various stages of adoption into the same analysis, as the perceived trialability and observability act differently in different adoption stages. Trialability connotes "risk-free exploration" of the innovation during the pre-adoption stage, whereas in post-adoption stage it becomes no longer relevant as consumers have already familiarised themselves with the innovation. In essence, perceived trialability is an important consideration by consumers only for initial adoption but not for sustained usage (Agarwal and Prasad, 1997). Similarly, the same reasoning would be applied to perceived

observability. As the research focus is on initial adoption of APS, these two factors are included in the conceptual model.

Adoption self-collection via APS is not only about using APS to retrieve parcels, but also about engaging in the self-collection experience, or even changing of travel behaviour. In this regard, the trials provide a safe environment for experimenting with the new behaviour and the consumers can gain a taste of new behaviour that they are curious about (Stromberg et al., 2016). The unanticipated trial experiences may lead to positive surprises that contribute to the formation of favourable attitude toward the adoption.

While trialability is about trial interactions with APS, observability is about learning how to interact with APS by observing other users. In fact, both perceived trialability and perceived observability influence consumers' attitude formation in a similar way, that is, by providing a sense of confidence to the consumers prior to engaging in actual usage. In a recent meta-analysis, Weigel et al. (2014) concluded that both trialability and observability are positively related to consumers' adoption propensity. Therefore, the following two hypothesises are proposed.

Hypothesis 1c: Consumers' perceived observability of APS is positively related to their attitude toward initial adoption of APS.
Hypothesis 1d: Consumers' perceived trialability of APS is positively related to their attitude toward initial adoption of APS.

Perceived relative advantage is defined as the degree to which an innovation is perceived as being better than its precursor. Perceived relative advantage, or perceived usefulness in TAM, is consistently the best predictor of consumers' adoption of innovation (Agarwal and Prasad, 1997; Jeyaraj et al., 2006; Plouffe et al., 2001; Rogers, 1995). A significant difference exists between perceived relative advantage and other innovation characteristics. While other characteristics are concerned with the innovation itself, perceived relative advantage is a comparative term stressing the degree to which using the innovation is better than the practice it supersedes (Rogers, 1995). A high level of perceived relative advantage means the innovation is considered a better option than its alternative based on an overall assessment made by the consumer. Under such circumstance, a rational consumer would directly form a strong adoption intention as the old practice is no longer optimal. Herein, we argue that perceived relative advantage is a second tier perception, comparable to the attitude construct, built upon a comprehensive assessment of the innovation and directly contributing to consumers' adoption intention. Empirical evidence also suggests a direct relationship between perceived relative advantage and consumers' adoption intention (Choudhury and Karahanna, 2008; Duan et al., 2010). Therefore, the following hypothesis is proposed.

Hypothesis 1e: Consumers' perceived relative advantage of APS is positively related to their intention toward initial adoption of APS.

The conceptual framework of this study is illustrated in Figure 2.

<INSERT FIGURE 2 HERE>

4. Methodology

4.1 Experiment context and survey design

There are several APS offerings in Singapore (such as POPStation, Ninja Box, Ta-Q-Bin, etc.), of which POPStation is the dominant system operated by Singpost, the national postal service provider in Singapore. Each POPStation consists of a number of lockers with varied sizes. Figure 3 shows a typical POPStation with 7 columns of lockers. Currently, 140 POPStations are distributed around Singapore, with the majority being located within the major shopping malls, tertiary institutions, sport complexes, and post offices. Unlike conventional home delivery, the freight operator will emplace the e-commerce parcel in one of the lockers of the POPStations of the consumer's choice, and a notification message (containing a four-digit password, a barcode and the location of the POPStation) will be sent to the consumer via a registered hand-phone number, informing that the parcel is ready for collection. By keying in the consumer's hand-phone number (or scanning the provided barcode) and the matching password at the system interface of the POPStation, the locker containing the consumer's parcel will open automatically and the consumer can then self-collect the parcel (https://www.mypopstation.com).

<INSERT FIGURE 3 HERE>

A random street intercept survey was conducted to empirically validate the conceptual framework, targeting the online consumers who are either current users of APS (adopters) or are non-users (non-adopters). To ensure a good representation of the overall population, the survey was conducted at selected locations in different parts of Singapore (east, south, west, north and central areas) and for several time periods of the day/week (morning, afternoon and evening; weekday and weekend).

More specifically, the survey consists of four sections. Section one consists of a brief introduction of the APS regarding its working mechanism and availability in Singapore. Given the dominant presence of POPStation in Singapore, a picture of POPStation and its operational concept is used as an illustration on the cover page of the survey questionnaire. In order to ensure that every respondent (particularly non-adopters) is completely clear with the concept of APS, the surveyors are instructed on the detailed working mechanisms of APS during the training process, and in turn they are requested to verbally brief the respondents on the collection process using the illustration on the cover page before the respondents start to answer the survey questions. Section two contains two streaming questions with question one disqualifying respondents who have never shopped online and question two directing adopters and non-adopters to subsequent sections designed separately for them. While the adopters are asked in a way to recall their motivations for trying out the APS for the first few

times, non-adopters are asked to answer based on their overall understanding. Section three and section four are the main parts of the survey with section three asking questions regarding consumers' perceptions, attitude and intention of initial adoption of APS and section four collecting data on respondents' personal attributes such as demographic information, online shopping habit and household composition.

4.2 Measurements and pre-testing

Measurements based on existing validated scales are considered in operationalising the constructs being proposed, which are to be subsequently reworded to fit the context of APS adoption. Measurements for perceived characteristics of APS (4 items for perceived compatibility, 5 items for perceived relative advantage, 6 items for perceived complexity, 4 items for perceived observability, and 5 items for perceived trialability) are adapted from Moore and Benbasat (1991) and Meuter et al. (2005). A seven-point Likert scale from strongly disagree (1) to strongly agree (7) is used. In addition, following conventional practice, three items measuring attitudes towards initial adoption of APS use a seven-point sematic differential scale with end points of bad / good, unpleasant / pleasant, dislike / like. Similarly, three items measuring initial intention to adopt APS also use a seven-point semantic differential scale with end points of unlikely / likely, impossible / possible, not probable / probable (Appendix A).

As the adjusted measurements have never been applied in the context of APS adoption, to ensure their applicability to the present study, three round of pre-testing were conducted. Ajzen and Fishbein (1980) suggested that in order to elicit salient beliefs for each new context, population, and behaviour, free-response format interviews shall be conducted asking the interviewees about the consequences of the behaviour in question without any probing by the interviewer. To apply this procedure, short interviews were first conducted with 40 randomly selected adopters of APS. By doing this, the criterion validity is preliminarily confirmed showing that salient beliefs of APS by consumers could be captured in the proposed measurement items. Secondly, a group of 4 researchers in the related field (2 adopters and 2 non-adopters of APS) were asked to complete the questionnaires. Feedback was obtained about the length of the questionnaire, the format of the scales, construct validity and questionnaire ambiguity; necessary adjustments were made to the instrument accordingly. Thirdly, the survey was pre-tested on 56 undergraduate students. An exploratory factor analysis (EFA) was conducted and four items were removed for further analysis due to low factor loadings or cross loading issue (1 item measuring perceived compatibility, 2 items measuring perceived complexity and 1 item measuring perceived trialability). Another EFA test was conducted with the modified measurement items and the result showed that each item was loaded as expected on its respective construct (see Appendix B). The coefficient alpha for each construct measure was also calculated and all measurements showed an acceptable level of reliability with Cronbach's Alpha greater than 0.70 (Nunnally and Bernstein, 1994).

5. Results and discussions

During the survey period (October 24, 2016 to November 18, 2016), a total of 212 questionnaires were obtained, of which 12 were disqualified due to incomplete information provided and another 21 due to the inconsistency in the answers provided for reverse measurements. Among the remaining 179 questionnaires, 9 respondents indicated that they had no prior online shopping experience and were thus excluded from further analysis. Of the 170 valid responses, 131 were from potential adopters (non-users) of APS and 39 were from actual adopters (users) of APS. While some researchers have questioned the stability of SEM studies with sample size less than 200, Hazel et al. (2015) suggests that it is perfectly acceptable when examining a small number of well-established variables. In fact, a review of supply chain studies utilising SEM technique shows that 36% of SEM (covariance-based) articles have sample sizes below 200 (Hazel et al., 2015). Thus, the current sample size of 170 is considered acceptable. Table 1 benchmarks the survey sample distribution against the overall population distribution of Singapore (Singapore Department of Statistics, 2016). As the younger people are generally more internet-savvy and thus are more likely to have online shopping experience, they are specially targeted as survey respondents, which explains the major discrepancy on the age distribution between the survey sample and Singapore population as a whole. Except for the disparity on age distribution, all other descriptive statistics between survey respondents and Singapore overall population are largely consistent.

<INSERT TABLE 1 HERE>

5.1 Measurement model

A confirmatory factor analysis was conducted to determine the measurement model fit. With reference to Table 2 for the confirmatory factor analysis, the fit indices indicated that the measurement model was a good fit to the data ($\chi 2$=422.97, df=279, IFI=0.96, CFI=0.96, RMSEA=0.056, SRMR=0.058).

<INSERT TABLE 2 HERE>

The measurement model was also evaluated for reliability, convergent and discriminant validity. Table 2 shows the composite reliability (CR) of all seven constructs are above 0.7 indicating the measurements are reliable (Hair et al., 2010). The standardised factor loadings and average variance extracted (AVE) were analysed to assess the convergent validity (Hair et al., 2010). It is found that all standardised factor loadings and AVE values exceed the recommended value of 0.5, which indicate good convergent validity. As for discriminant validity, the assessment was conducted by comparing the AVE values with the squared correlations (Hair et al., 2010). As shown in Table 3, all AVE values are higher than the value of squared correlations. Hence, the discriminant validity is also supported.

<INSERT TABLE 3 HERE>

In addition, to test common method bias due to the survey technique deployed in this study, Harman's single factor test was used. A single factor model was adopted to redo the confirmatory factor analysis, which showed fit indices as follows: $\chi 2$=2,196.174, df=299, $\chi 2$/df=7.35, IFI=0.50, CFI=0.49, RMSEA=0.20, SRMR=0.15. As results indicate a considerable worse model fit, common method bias is unlikely to be a major issue in this study.

5.2 Structural model

Table 4 shows the results of hypothesis testing. Except for the path linking the constructs of perceived observability and consumers' attitude toward APS initial adoption, all other path coefficients are statistically significant, with 68.4% of variance in consumers' initial intention of APS adoption explained by the proposed model. With reference to the coefficients presented in Table 4, while perceived compatibility and perceived trialability are positively related to consumers' attitude toward initial APS adoption, perceived complexity has a negative relationship with consumers' attitude, which is consistent with H1a, H1b and H1d. Perceived relative advantage is directly associated with consumers' initial intention of APS adoption, whereas attitude toward initial adoption of APS is the strongest predictor of consumers' adopting intention, supporting H1e and H2. However, no evidence was found to support H1c, indicating that perceived observability is not a significant predictor of consumers' attitude towards APS adoption and thus H1c is not supported.

<INSERT TABLE 4 HERE>

Furthermore, to confirm the role of the construct of consumers' attitude toward initial adoption of APS as a mediator, the direct effects of the four perceived characteristics of APS (perceived compatibility, perceived complexity, perceived observability and perceived trialability) on consumers' adoption intention were also tested. Eight alternative models were structured by either adding additional direct paths between the four perceived characteristics and consumers' intention to adopt APS or replacing the original indirect linkages with direct linkages. For example, the original relationship of "Perceived compatibility → Attitude → Intention" was modified by 1) adding an additional direct path (Perceived compatibility → Intention) along the original linkage, and 2) replacing the original path with the direct one. However, no direct linkage was found to be significant for all the alternative models, which suggested that there were no direct relationships between the four above mentioned perceived characteristics and consumers' initial intention in adoption APS, further confirming the mediating role of the construct of attitude (see Appendix C).

5.3 Results discussions

Research findings reported in this study suggest that perceived relative advantage of APS is a direct predictor of consumers' initial intention to adopt APS self-collection service, whereas consumers' perceptions on APS's complexity, compatibility and trialability only indirectly influence consumers' adoption intention via attitude. To interpret, it shows that simplicity (as against complexity), compatibility and trialability of an APS system are perceived as attractive attributes that contribute to consumers' favourable attitude of toward the system,

but they are not sufficiently strong to invoke consumers' adoption intention. Instead, it's the favourable attitude that is formed on the overall perception of the APS system that determines consumers' adoption intention. On the other hand, perceived relative advantage of APS, i.e. the perception that APS self-collection service is a better alternative compared to home delivery, directly accounts for consumers' adoption intention of APS. Consumers' positive attitude towards APS and perception of APS as a better alternative collectively motivate consumers to adopt APS over conventional home delivery.

Contrary to the proposed hypothesis, perceived observability of APS does not turn out to be a significant predictor of consumers' attitude or consumers' adoption intention. It might be due to that the construct was not operationalised adequately and a similar result was reported in Kendall et al. (2001). Moore and Benbasat (1991) suggested dividing the construct of perceived observability into two constructs, i.e., visibility and result demonstrability. Another explanation is that the APS system interface is designed in a manner to protect users' privacy as confidential personal information is normally required to retrieve the parcels. Consequently, the detailed collecting procedures, especially how users interact with the system interface, are not directly observable by non-users unless they personally try the APS system. To a certain extent, it also implicitly explains why perceived trialability emerges as a significant predictor. In addition, it might be perceived as an invasion of privacy to "observe" others when they are collecting their parcels, so that, as a social norm, consumers' would consciously avoid observing the APS users. Hence, observability is generally not considered as a critical characteristic of APS. However, it is interesting to note that the path coefficient between perceived observability and attitude, though not statistically significant, shows a negative sign, which might indicate that potential adopters are deterred from using APS as they do not want to be observed by the public when collecting their parcels. This contradicts the original theory which posits that the more observable the subject in matter, the higher the chance it would be adopted. Future research may devote more attention to further explore in this direction.

6. Conclusion

By conceptualising and validating consumers' adoption behaviour of APS self-collection service, this study provides insights to the academic researchers and practitioners alike. Academically, it fills a knowledge gap about the consumers' adoption behaviour of APS, which is an unexplored area in the logistics innovation studies. Also, for the first time, various attitudinal beliefs are operationalised and their salience is empirically validated with respect to consumers' adoption behaviour of APS. Practically, by combining innovation diffusion literature and attitude theories, this study conceptualises end-consumers' choice behaviour of innovative service offering in the field of last-mile logistics. Herein, we answer the call from the major logistics service providers to better understand the needs of end-consumers of logistics service, or "logsumer", who have possessed more and more power to dictate how their last-mile needs are to be organised (Chu et al., 2016; DHL, 2013). A detailed discussion on theoretical contributions and managerial implications is provided as follows.

6.1 Theoretical contributions

Theoretically, this study contributes to the literature in several ways. This paper contextualises logistics consumers' adoption behaviour of a specific logistics innovation (APS) within the broad literature of innovation studies and conceptualises the framework in the field of innovation diffusion and consumers' reasoned action. By doing this, it not only provides a theoretical framework to study the e-commerce consumers' adoption of logistics innovations, but also enriches the innovation studies by incorporating the component of last-mile logistics, both of which are currently lacking in the extant literature. More specifically, this study focuses on the innovation applied to the context of last-mile logistics, which is often neglected in the innovation literature (Flint, 2005). By viewing self-collection service via APS as a logistics innovation, this study extends the theory of innovation diffusion in the field of last-mile delivery. Among a variety of widely referenced theories addressing consumers' adoption / acceptance behaviour, it is argued that innovation diffusion theory is a better theoretical framework to investigate consumers' pre-adoption behaviour of logistics innovations as it includes theoretical beliefs such as perceived trialability that is especially concerned with consumers' trial behaviour. Such argument is supported by the research findings showing that perceived trialability is a significant antecedent that affects consumers' adoption intention. Supporting evidence can also be found in a few recent meta-analysis reviews on innovation adoption, which all confirmed the important role played by perceived triability in influencing consumers' adoption intention (Hameed and Counsell, 2014; Weigel et al., 2014).

More importantly, this study integrates the theoretical insights from innovation diffusion literature and attitude theories, with the later forming the theoretical structure characterised by "belief-attitude-intention" and the former providing a set of theoretical beliefs of the subject matter. Herein, the theory concerning a macro diffusion process of innovation is well synthesised with the theory focusing on individuals' reasoned action. Collectively, they supplement each other and explain consumers' adoption behaviour of innovation service of self-collection via APS. Furthermore, this study provides better nomological understanding of how the perceived characteristics of an innovation influence consumers' adoption attitude and behaviour. While the innovation diffusion theory stresses the importance of the perceived characteristics of innovation as the critical factors shaping the innovation diffusion process (Jeyaraj et al., 2006), our study demonstrates that those perceptions affect consumers' choice decision differently. Perceived relative advantage is shown to be directly linked to consumers' adoption intention, whereas perceived complexity, compatibility and trialabiltiy indirectly influence the construct of intention via attitude. Attitude, in turn, acts as the most important factor that explains consumers' adoption intention of APS. Perceived observability, on the other hand, does not emerge as a significant contributor to consumers' adoption attitude nor intention. However, interestingly, it seems to suggest a negative relationship between perceived observability and consumers' adoption attitude. While perceived observability is normally perceived to encourage innovation adoption, the associated issue of social presence (being observed by others while using the innovation) may create

technological anxiety and negatively affect the adoption (Kinard et al., 2009). Herein, future research is encouraged to be directed in this interest.

6.2 Managerial implications

This study provides insights on the management of APS from perspectives of both commercial operators and government agencies, which can be well generalised to management of broader logistics innovations. For commercial operators of APS, successful implementation of APS has the potential to bring in significant cost savings without compromising service level, whereas for government agencies, it represents an effective solution to the problematic last-mile issues which thus greatly reduces the negative externalities created by inefficient urban freight deliveries. However, the realisation of the operational and societal benefits is ultimately dependent on sufficient buy in from the consumers on the concept of APS self-collection. Hence, with great potentials lying ahead, both stakeholders should realise the challenges of implementing the APS self-collection service. In countries like Singapore, where the implementation of APS is still at its early stage, what motivates consumers to start using APS service is thus becoming an emerging question to be addressed.

The research results imply that compatibility, complexity and trialability are important considerations when consumers decide whether to adopt APS services. While the perception on compatibility depends on individual consumer's need, lifestyle and value orientation which is difficult to be enhanced in a systematic manner, possible actions could be taken to influence the perceived complexity and trialability of APS. In fact, during the pre-test stage, it was observed that people were curious about APS and intended to try out the system, but failed to do so as the system is not trialable. A demonstration video can be displayed constantly on the APS computer interface when it is idle. It can also be advertised on national television to ensure wider coverage for consumers who are less technology-savvy. To further facilitate consumers to try APS, a virtue trial mode can be programmed into the system for consumers to experiment with APS without actually using it for parcel collection. Naturally, perceived complexity would also be reduced with more trialable system. Trialability is especially important for APS implementation given that most APS systems are located within the main traffic points with a dense population flow. With a demonstration video screening, it not only creates awareness of the newly launched service, but also educates the consumers who are particularly concerned with the complex collection procedures. In addition, the trial mode may also attract passers-by to explore the system and may subsequently become interested to start using the service.

As affected by perceived compatibility, complexity and trialability, consumers' attitude is found to be the most direct and influential factor leading to consumers' adoption intention. Besides above mentioned methods to influence consumers' perception on complexity and trialability by APS operators, government agencies can also take an active role in shaping consumers' attitude toward APS adoption. On the one hand, government agencies can endorse APS self-collection service and position it as an environmentally-friendly way of parcel collection through advertisement, campaigns, and other initiatives. On the other hand,

government agencies can go one step further to collaborate with the commercial operators to develop the infrastructure which can be shared among not only the major operators, but also various SMEs. Acting as a strong influence factor on social norm and a coercive enforcer of various APS initiatives, government agencies are able to direct public attitude toward APS self-collection to foster a more positive adoption intention.

Furthermore, the results of this study also reveal that perceived relative advantage is a strong predictor that would directly invoke consumers' intention to adopt self-collection service via APS, whereas other perceptions of APS only indirectly affect consumers' intention. This implies that consumers might not be directly motivated to use the APS service simply because it offers "good" service (in terms of complexity, compatibility and trialability), rather it is the perception of being a "better" service that would create stimulus strong enough for consumers to try it. Therefore, in order to communicate such message to consumers, the APS operators should market the APS service by emphasising on its unique and advantageous features which are superior to conventional home delivery. For example, APS operators can stress the advantage of 24/7 accessibility of APS while restricting the delivery period of home deliveries to daytime in the workdays. Operators may also try to prioritise the delivery schedule of parcels for self-collection and send customised messages to consumers addressing them as customers with priority.

6.3. Limitations and Recommendations

Several limitations exist in this study, which offers opportunity for further research. First, behavioural response from older online consumers' is not well reflected in this study. Since face to face survey technique is used in the current study, the sampling strategy is in favour of younger consumers to be targeted as potential respondents because they are usually more internet-savvy and more likely to be online shoppers. As a result, the sample population consists largely of respondents who are less than 35 years old. Indeed, age is likely to be an important attribute of consumers' acceptance on APS, considering that the proportion of elderly people is growing and physical shopping can be a challenge task for them. How they perceive various delivery methods and how their perception differs from younger people will be a critical concern. Future work can be conducted based on boosted sample from older consumers. Special attention may be paid to compare the behavioural differences between younger and older online consumers with respect to their receptivity to innovative logistics service offerings.

Second, the scope of the current study is limited to initial adoption of APS service in the pre-adoption stage, i.e. to motivate consumers to start to use the service, whereas continuance intention is not addressed. While it is essential to understand the antecedents that lead consumers' to try out APS service, the long term economic viability of the APS system depends on consumers' continued usage. Equally important is to investigate on consumers' continuance behaviour of adoption APS or even to further compare the conceptual differences between consumers' initial adoption and continuance usage of APS. In addition, currently, APS is normally served as a reception facility of parcels which suffer from failed first time home delivery. Under such circumstance, consumers are forced to self-collect their

parcels from APS even when they indicate home delivery as their first choice. Herein, a situation of involuntary adoption of self-collection via APS emerges. An interesting area of research would be the consequences of involuntary adoption of APS with respect to consumers' continuance intention, which has never been examined before. Therefore, it is recommended to comprehensively examine consumers' behavioural responses on pre-adoption, post-adoption and involuntary adoption of APS, as well as their interactions.

Finally, behavioural intention instead of actual behaviour is modelled as dependent variable. Although it is a widely adopted practice to use behavioural intention as a predictor of behaviour, actual behavioural is arguably different from pure intention and some factors may lead to deviation of actual behaviour from the behaviour intention. For example, Theory of Planned Behaviour (TPB) argues that behavioural intention alone is not sufficient to predict actual behaviour and perceived behaviour control needs to be taken into consideration (Ajzen, 1991). It is understandable that if certain behaviour is not within the exercisable control of an individual, she / he would not be able to perform it even if she/he intends to do so. When applied to the context of APS adoption, it translates into a scenario that consumers may possess strong intention to adoption self-collection service via APS, but the APS is not conveniently accessible by the consumers. Consequently, the consumers would not adopt the APS service despite their strong intention. Hence, to better explain the actual adoption behaviour, additional constructs such as perceived behavioural control are recommended to be included in future studies.

Notwithstanding the aforementioned limitations, to the best of our knowledge, this study is among the first to address online consumers' adoption of a specific logistics innovation (APS) with a strong emphasis on behavioural components. By contextualising APS as an innovative application of SSTs in last-mile logistics, this study empirically investigated consumers' behavioural intention of adopting technology-based logistics innovation in the field of e-commerce last-mile delivery. Moreover, inspired by both innovation diffusion literature and attitude theories, this paper posits various perceived characteristics of APS and attitude together as major antecedents that lead to consumers' adoption intention. With an inter-disciplinary effort to integrate consumers' behavioural psychology in the context of last-mile e-commerce logistics, this study contributes to the theorisation and generalisation of consumers' adoption behavioural with respect to logistics innovations.

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References

Agarwal, R. and Prasad, J. (1997), "The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies", *Decision Science*, Vol. 28 No. 3, pp. 557-582 (Summer).

Ajzen, I. (1991), "The theory of planned behaviour", *Organizational Behavior and Human Decision Processes*, Vol. 50, pp. 179–211.

Ajzen, I., Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall inc., Englewood Cliffs, NJ.

Allen J., Thorne G. and Browne M. (2007), "BESTUFS Good Practice Guide on Urban Freight Transport", Available at http://www.bestufs.net/download/BESTUFS_II/good_practice/English_BESTUFS_Guide.pdf (accessed 29 December 2016)

Augereau, V., Dablanc, L. (2008), "An evaluation of recent pick-up point experiments in European cities: The rise of two competing models?", in Taniguchi, E. and Thompson, R.G. (Eds), *Innovations in City Logistics*, New York: Nova Science Publisher Inc., pp. 303–320.

Bhattacherjee, A. (2001), "Understanding information systems continuance: an expectation confirmation model", *MIS Quarterly*, Vol. 25 No. 3, pp. 351-370.

Bitner, M.J., Ostrom, A.L. and Meuter, M.L. (2002), "Implementing successful self-service technologies", *Academy of Management Executive*, Vol. 16 No. 4, pp. 96–109.

Cagliano A.C., De Marco A., Rafele C., Bragagnini A., and Gobbato L. (2015). "Analysing the diffusion of a mobile service supporting the e-grocery supply Chain", *Business Process Management Journal*, Vol. 21 No. 4, pp. 928-963.

Cagliano A.C., De Marco A. and Rafele C. (2017), "E-Grocery Supply Chain Management Enabled by Mobile Tools", *Business Process Management Journal*, Vol. 23 No. 1, pp. 47-70.

Chen, L., Gillenson, M.L. and Sherrell, D.L. (2002), "Enticing online consumers: an extended technology acceptance perspective", *Information & Management*, Vol. 39, pp. 705-719.

Choo, C. (2016), Impact of a Delivery Point Network for Urban E-Commerce Deliveries, Master Thesis, Singapore University of Technology and Design, Singapore.

Choudhury, V. and Karahanna., E. (2008), "The relative advantage of electronic channels: a multidimensional view", *MIS Quarterly*, Vol. 32 No. 1, pp. 179-200 (March).

Chu, Z., Wang, Q. and Lado, A.A. (2016), "Customer orientation, relationship quality, and performance", *International Journal of Logistics Management*, Vol. 27 No. 3, pp. 738-754.

Collier, J. E. and Kimes, S. E. (2012), "Only if it is convenient: Understanding how convenience influences self-service technology evaluation", *Journal of Service Research*, Vol. 16 No. 1, pp. 39-51.

Collier, J.E., Sherrell, D.L., Babakus, E. and Horky, A.B. (2014), "Understanding the differences of public and private self-service technology", *Journal of Services Marketing*, Vol. 28 No. 1, pp. 60–70.

Collins, A.T. (2015), "Behavioural Influences on the Environmental Impact of Collection/Delivery Points", *Green Logistics and Transportation,* Springer International Publishing, pp. 15-34.

Curran, J.M. and Meuter, M.L. (2005), "Self-service technology adoption: comparing three technologies", *Journal of Services Marketing,* Vol. 19 No. 2, pp. 103–113.

Dablanc, L., Morganti, E. and Fortin, F. (2015), " Alternatives to home deliveries, final report", MF METROFREIGHT, Volvo Center of Excellence, available at: https://www.metrans.org/sites/default/files/MF14-52a_DeliveriesforOnlineShoppingFinalReport_052215_0.pdf (accessed 29 December 2016).

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319–340.

DHL (2013), "DHL Trend Research 2013. Logistics Trend Radar: Delivering Insight Today. Creating Value Tomorrow!", DHL Trend Research, Troisdorf, Germany.

DHL (2015), "DHL Trend Research 2015. Omni-channel logistics: a DHL perspective on implications and use cases for the logistics industry", available at: http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/dhl_trendreport_omnichannel.pdf (accessed 29 December 2016)

Duan, Y., He, Q., Feng, W., Li, D. and Fu, Z. (2010), "A study on e-learning take-up intention from an innovation adoption perspective-a case in china", *Computers & Education*, Vol. 55, pp. 237-246.

Edwards, J., McKinnon, A., Cherrett, T., McLeod, F. and Song, L. (2010), "Carbon dioxide benefits of using collection-delivery points for failed home deliveries in the United Kingdom", *Transportation Research Record: Journal of the Transportation Research Board*, No. 2191, Transportation Research Board of the National Academies, Washington, D.C., pp. 136–143.

Festinger, L.A. (1957), *A Theory of Cognitive Dissonance*, Row and Peterson, Evanston, IL

Fishbein, M. and Ajzen, I. (1975), "Belief, attitude, intention and behavior: an introduction to theory and research", Reading, MA: Addison-Wesley.

Flint, D.J., Larsson, E., Gammelgaard, B. and Mentzer, J.T. (2005), "Logistics innovation: a customer value-oriented social process", *Journal of Business Logistics,* Vol. 26 No. 1, pp. 113-47.

Francke, J. and Visser, V. (2015), *Internet Shopping and Its Impacts On Mobility*, KiM Netherlands Institute for Transport Policy Analysis, Ministry of Infrastructure and the Environment, The Netherlands.

Fu, H.P., Chang, T.H., Lin, A., Du, Z.J. and Hsu, K.Y. (2015), "Key factors for the adoption of RFID in the logistics industry in Taiwan", *International Journal of Logistics Management*, Vol. 26 No. 1, pp. 61-81.

Fu, H.P. (2016), "Comparing the factors that influences the adoption of CPFR by retailers and suppliers", *International Journal of Logistics Management*, Vol. 27 No. 3, pp. 931-946.

Grawe, S.J. (2009), "Logistics innovation: a literature-based conceptual framework", *International Journal of Logistics Management*, Vol. 20 No. 3, pp. 360-77.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2010), *Multivariate Data Analysis*, Prentice Hall, Upper Saddle River, NJ.

Hameed, M.A. and Counsell, S., (2014), "Establishing relationships between innovation characteristics and IT innovation adoption in organisation - a meta-analysis approach", *International Journal of Innovation Management*, Vol. 18 No.1, pp. 1-41(1450007).

Hanafizadeh, P., Keating, B.W. and Khedmatgozar, H.R. (2014), "A systematic review of internet banking adoption", *Telematics and Informatics*, Vol. 31 No. 3, pp. 492-510.

Hazen, B.T., Cegielski, C.G. and Hanna, J.B. (2011), "Diffusion of green supply chain management: examining perceived quality of green reverse logistics", *International Journal of Logistics Management*, Vol. 22 No. 3, pp. 373-389.

Hazen, B.T., Overstreet, R.E. and Boone, C.A. (2015), "Suggested reporting guidelines for structural equation modeling in supply chain management research", *International Journal of Logistics Management*, Vol. 26 No. 3, pp. 627-641.

Hazen, B.T., Overstreet, R.E. and Cegielski, C.G. (2012), "Supply chain innovation diffusion: going beyond adoption", *International Journal of Logistics Management*, Vol. 23 No. 1, pp. 119-134.

Iwan, S., Kijewska, K., Lemke, J. (2016), "Analysis of parcel lockers' efficiency as the last mile delivery solution–the results of the research in Poland", *Transportation Research Procedia*, Vol. 12, pp. 644-655.

Jeyaraj, A., Rottman, J.W. and Lacity, M.C. (2006), "A review of the predictors, linkages, and biases in IT innovation adoption research", *Journal of Information Technology*, Vol. 21, pp. 1-23

Karahanna, E., Agarwal, R. and Angst, C.M. (2006), "Reconceptualizing compatibility beliefs in technology acceptance research", *MIS Quarterly*, Vol. 30 No. 4, pp. 781-804.

Karahanna, E., Straub, D.W. and Chervany, N.L. (1999), "Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs", *MIS Quarterly*, Vol. 23 Np. 2, pp. 183-213.

Kendall, J.D., Tung, L.L., Chua, K.H., Hong, C., Ng, D. and Tan, S.M. (2001), "Receptivity of Singapore's SMEs to electronic commerce adoption", *Journal of Strategic Information Systems,* Vol. 10, pp. 223-242.

Kinard, B.R., Capella, M.L. and Kinard, J.L. (2009). "The impact of social presence on technology based self-service use: the role of familiarity", *Services Marketing Quarterly*, Vol. 30 No.3, pp.303-314.

Lin, Z. and Filieri, R. (2015), "Airline passengers' continuance intention towards online check-in services: The role of personal innovativeness and subjective knowledge", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 81, pp. 158-168.

Mangiaracina, R., Perego, A., Salvadori, G. and Tumino, A. (2016), "A comprehensive view of intelligent transport systems for urban smart mobility", *International Journal of Logistics Research and Applications*, pp. 1-14.

Meuter, M.L., Bitner, M.J., Ostrom, A.L. and Brown, S.W. (2005), "Choosing among alternative service delivery modes: an investigation of customer trial of self-service technologies", *Journal of Marketing*, Vol. 69, pp. 61–83 (April).

Moore, G.C. and Benbasat, I. (1991), "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation", *Information Systems Research*, Vol. 2 No. 3, pp. 192–222.

Morganti, E., Dablanc, L. and Fortin, F. (2014a), "Final deliveries for online shopping: The deployment of pickup point networks in urban and suburban areas", *Research in Transportation Business & Management*, Vol. 11, pp. 23-31.

Morganti, E., Seidel, S., Blanquart, C., Dablanc, L. and Lenz, B. (2014b), "The impact of e-commerce on final deliveries: alternative parcel delivery services in France and Germany", *Transportation Research Procedia*, Vol. 4, pp. 178-190.

Mortimer, G., Neale, L., Hasan, S.F.E. and Dunphy, B. (2015), "Investigating the factors influencing the adoption of m-banking: a cross cultural study", *International Journal of Bank Marketing*, Vol. 33 No. 4, pp. 545–570.

Muñoz-Villamizar, A., Montoya-Torres, J.R. and Vega-Mejía, C.A. (2015), "Non-collaborative versus collaborative last-mile delivery in urban systems with stochastic demands". *Procedia CIRP*, Vol. 30, pp. 263-268.

Nunnally, J.C. and Bernstein, I.H. (1994), *Psychometric Theory*, McGraw-Hill, New York, NY.

Plouffe, C., Hulland, J. and Vandenbosch, M. (2001), "Research report: richness versus parsimony in modeling technology adoption decisions – understanding merchant adoption of a smart card-based payment system", *Information Systems Research*, Vol. 12, pp. 208–222.

Punakivi, M., Yrjo¨la¨, H. and Holmstro¨m, J. (2001), "Solving the last mile issue: reception box or delivery box?", *International Journal of Physical Distribution and Logistics Management*, Vol. 31 No. 6, pp. 427–439.

Reinders, M.J., Dabholkar, P.A. and Frambach, R.T. (2008), "Consequences of forcing consumers to use technology-based self-service". *Journal of Service Research*, Vol. 11 No. 2, pp. 107-123.

Rogers, E.M. (1983), *Diffusion of innovations (3rd ed.),* New York: Free Press.

Rogers, E.M. (1995), *Diffusion of innovations (4th ed.),* New York: Free Press.

Savelsbergh, M. and van Woensel, T. (2016), "50th anniversary invited article-city logistics: challenges and opportunities", *Transportation Science*, Vol. 50 No. 2, pp. 579-590.

Singapore Department of Statistics (2016), "Population trends 2016", Available at http://www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/population_and_population_structure/population2016.pdf (accessed 29 December 2016)

Singpost (2015), "SingPost crosses 100th POPStation milestone: innovates parcel delivery further with P-POPS", Available at http://www.singpost.com/about-us/news-releases/singpost-crosses-100th-popstation-milestone-innovates-parcel-delivery-further-p-pops (accessed 20 February 2017)

Song, L., Guan, W., Cherrett, T. and Li, B. (2013), "Quantifying the greenhouse gas emissions of local collection-and delivery points for last-mile deliveries", *Transportation Research Record: Journal of the Transportation Research Board 2340*, Transportation Research Board of the National Academies, Washington, D.C., pp. 66–73.

Stromberg, H., Rexfelt, O., Karlsson, I.C.M. and Sochor, J. (2016), "Trying on change - trialability as a change moderator for sustainable travel behaviour", *Travel Behaviour and Society*, Vol. 4, pp. 60-68.

Tan J.M. (2016), Overcoming the Last-Mile Challenge. Graduating-Year Project Dissertation, Nanyang Technological University, Singapore.

Taylor, S. and Todd, P. (1995), "Decomposition and crossover effects in the theory of planned behavior: a study of consumer adoption intention", *International Journal of Research in Marketing*, Vol. 12, pp. 137-155

Tornatzky, L.G. and Klein, K.J. (1982), “Innovation characteristics and innovation adoption-implementation: a meta-analysis of findings”, *IEEE Transactions on Engineering Management*, Vol. 29 No. 1, pp. 28-45 (February).

Vallerand, R.J. (1997), “Toward a hierarchical model of intrinsic and extrinsic motivation”, *Advances in Experimental Social Psychology*, Zanna, M.P., (ed.), Academic Press, New York, pp. 271-360.

Vargo, S. and Lusch, R. (2008), “Service-dominant Logic: Continuing the Evolution”, *Journal of the Academy of Marketing Science*, Vol. 36, pp. 1–10.

Weigel, F.K., Hazen, B.J., Cegielski, C.G. and Hall, D.J. (2014), “Diffusion of innovations and the theory of planned behaviour in information systems research: a meta-analysis”, *Communications of the Association for Information Systems*, Vol. 34, Article 31.

Weltevreden, W.J.J. (2008), “B2c e-commerce logistics: the rise of collection-and-delivery points in The Netherlands”, *International Journal of Retail & Distribution Management*, Vol. 36 No. 8, pp. 638–660.

Xu, M., Ferrand, B. and Roberts, M. (2008), “The last mile of e-commerce: unattended delivery from the consumers and eTailers' perspectives”, *International Journal of Electronic Marketing and Retailing*, Vol. 2 No. 1, pp. 20-38.

Appendix A: Construct, measurement items and sources

Constructs, measurement items and sources
Perceived compatibility (Source: Moore and Benbasat, 1991; Meuter et al., 2005)
CPA1: Using APS to self-collect my parcels would be compatible with my lifestyle
CPA2: Using APS to self-collect my parcels would be compatible with my needs
CPA3: Using APS to self-collect my parcels would be compatible with the way I like to receive parcels*
CPA4: Using APS to self-collect my parcels would be compatible with my current situation.
Perceived relative advantage (Source: Moore and Benbasat, 1991; Meuter et al., 2005)
RAD1: Using APS would improve my overall parcel reception experience compared to home delivery
RAD2: Using APS would make it easier to receive my parcels compared to home delivery
RAD3: Using APS would enable me to receive my parcel more quick compared to home delivery
RAD4: Using APS would be advantageous compared to home delivery
RAD5: Using APS is the best way to receive my parcels
Perceived complexity (Source: Moore and Benbasat, 1991; Meuter et al., 2005)
CPL1: Using APS to self-collect my parcels would be easy*
CPL2: Using APS to self-collect my parcels would be difficult
CPL3: I believe APS would be difficult to learn how to use*
CPL4: Using APS to self-collect my parcels would be frustrating
CPL5: I believe APS would be cumbersome to use
CPL6: Using APS to self-collect my parcels would require a lot of efforts
Perceived observability (Source: Moore and Benbasat, 1991; Meuter et al., 2005)
OBS1: I would have no difficulty telling others how I collect my parcels from APS
OBS2: I could communicate to others how I collect my parcels from APS
OBS3: I would have no difficulty explaining why using APS to self-collection my parcels is or is not beneficial
OBS4: The process of self-collection via APS is apparent to me
Perceived trialability (Source: Moore and Benbasat, 1991; Meuter et al., 2005)
TRI1: I feel it is easy to try out APS*
TRI2: I know where I can go to try out various functions of APS
TRI3: I am permitted to try out with APS for long enough period
TRI4: I am able to experiment with APS facilities when necessary
TRI5: APS is open to me adequately to allow me test various functions it offers
Attitude (Source: Collier et al., 2012)
ATT1: Semantic differential - Good-bad
ATT2: Semantic differential - Pleasant-unpleasant
ATT3: Semantic differential - Favorable - unfavorable
Intention (Source: Collier et al., 2012)
INT1: Semantic differential - Very likely-very unlikely
INT2: Semantic differential - Possible-impossible
INT3: Semantic differential - Very probable-not probable
* Items dropped out from further analysis due to cross loading or low factor loading

Appendix B: Results for Exploratory Factor Analysis (Pilot test)

	RAD	TRI	CPL	OBS	ATT	CPA	INT
RAD4	**.871**	.099	-.080	.040	.081	.002	.237
RAD5	**.830**	.110	-.230	-.094	.099	.162	.096
RAD1	**.781**	.108	-.086	.112	.126	.069	.057
RAD2	**.759**	.045	-.073	.154	.225	.088	.210
RAD3	**.640**	.039	-.126	.221	.351	.292	-.037
TRI4	.079	**.934**	.117	-.114	.122	.004	.067
TRI3	-.011	**.905**	.025	-.046	.196	.005	.075
TRI2	.100	**.813**	.198	-.054	.013	.103	.155
TRI5	.231	**.716**	.076	.086	.221	.069	.160
CPL4	.021	.083	**.932**	-.044	-.005	-.095	-.122
CPL2	-.166	.051	**.870**	-.206	.010	-.143	-.093
CPL6	-.139	.217	**.751**	-.151	-.106	-.062	-.048
CPL5	-.221	.053	**.744**	-.183	-.122	-.024	.083
OBS2	-.007	-.086	-.191	**.929**	.033	.107	.104
OBS3	.307	.024	-.144	**.753**	.139	.191	.014
OBS1	-.123	-.153	-.078	**.737**	.063	.242	-.115
OBS4	.208	.061	-.189	**.715**	.092	.187	-.062
ATT2	.267	.215	-.061	.112	**.874**	.150	.213
ATT1	.259	.257	-.063	.096	**.824**	.116	.313
ATT3	.219	.207	-.122	.171	**.803**	.149	.304
CPA2	.111	.087	.009	.249	.040	**.913**	.050
CPA1	.159	.044	-.204	.132	.111	**.834**	.021
CPA4	.103	.027	-.101	.259	.155	**.698**	-.044
INT3	.364	.111	-.119	-.016	.461	.041	**.757**
INT1	.426	.175	-.058	.007	.321	.016	**.718**
INT2	.067	.391	-.077	-.096	.281	-.041	**.714**
Construct reliability (Cronbach's Alpha)	.911	.928	.910	.892	.973	.894	.911

Extraction Method: Maximum Likelihood.

Appendix C: Test direct linkage between perceived characteristics and intention

Alternative model 1a: addition direct path CPA → INT

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	0.457***	<0.001	Yes
Direct (CPA)	Perceived compatibility → Intention	-0.095	0.211	No
H1b	Perceived complexity → Attitude	-0.246**	0.002	Yes
H1c	Perceived observability → Attitude	-0.150	0.128	No
H1d	Perceived trialability → Attitude	0.215**	0.008	Yes
H1e	Perceived relative advantage → Intention	0.272***	<0.001	Yes
H2	Attitude → Intention	0.739***	<0.001	Yes

Note: ** p<0.01, *** p<0.001; CFI=0.956, TLI=0.950, IFI=0.957, RMSEA=0.058, SRMR=0.068

Alternative model 1b:replacing CPA → ATT with CPA → INT

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	Replaced		
Direct (CPA)	Perceived compatibility → Intention	-0.077	0.253	No
H1b	Perceived complexity → Attitude	-0.281**	0.001	Yes
H1c	Perceived observability → Attitude	-0.071	0.449	No
H1d	Perceived trialability → Attitude	0.306***	<0.001	Yes
H1e	Perceived relative advantage → Intention	0.269***	<0.001	Yes
H2	Attitude → Intention	0.735***	<0.001	Yes

Note: ** p<0.01, *** p<0.001; CFI=0.956, TLI=0.950, IFI=0.957, RMSEA=0.062, SRMR=0.090

Alternative model 2a: addition direct path CPL → INT

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	0.454***	<0.001	Yes
H1b	Perceived complexity → Attitude	-0.244**	0.002	Yes
Direct (CPL)	Perceived complexity → Intention	-0.029	0.614	No
H1c	Perceived observability → Attitude	-0.149	0.131	No
H1d	Perceived trialability → Attitude	0.214**	0.009	Yes
H1e	Perceived relative advantage → Intention	0.213***	<0.001	Yes
H2	Attitude → Intention	0.703***	<0.001	Yes

Note: ** p<0.01, *** p<0.001; CFI=0.950, TLI=0.943, IFI=0.951, RMSEA=0.058, SRMR=0.069

Alternative model 2b:replacing CPL → ATT with CPL → INT

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	0.481***	<0.001	Yes
H1b	Perceived complexity → Attitude	Replaced		
Direct (CPL)	Perceived complexity → Intention	-0.037	0.510	No
H1c	Perceived observability → Attitude	-0.042	0.657	No
H1d	Perceived trialability → Attitude	0.211*	0.012	Yes
H1e	Perceived relative advantage → Intention	0.213***	<0.001	Yes
H2	Attitude → Intention	0.707***	<0.001	Yes

Note: * p<0.05, *** p<0.001; CFI=0.954, TLI=0.947, IFI=0.954, RMSEA=0.060, SRMR=0.079

Alternative model 3a: addition direct path OBS → INT

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	0.452***	<0.001	Yes
H1b	Perceived complexity → Attitude	-0.245**	0.002	Yes
H1c	Perceived observability → Attitude	-0.145	0.140	No
Direct (OBS)	Perceived observability → Intention	-0.053	0.637	No
H1d	Perceived trialability → Attitude	0.214**	0.009	Yes
H1e	Perceived relative advantage → Intention	0.249***	<0.001	Yes
H2	Attitude → Intention	0.715***	<0.001	Yes

Note: ** p<0.01, *** p<0.001; CFI=0.956, TLI=0.949, IFI=0.957, RMSEA=0.058, SRMR=0.068

Alternative model 3b: replacing OBS → ATT with OBS → INT

Hypotheses	Path	Coefficient	P-value	Supported ?
H1a	Perceived compatibility → Attitude	0.390***	<0.001	Yes
H1b	Perceived complexity → Attitude	-0.204**	0.006	Yes
H1c	Perceived observability → Attitude	Replaced		
Direct (OBS)	Perceived observability → Intention	-0.057	0.352	No
H1d	Perceived trialability → Attitude	0.179*	0.022	Yes
H1e	Perceived relative advantage → Intention	0.251***	<0.001	Yes
H2	Attitude → Intention	0.718***	<0.001	Yes

Note: * p<0.05, ** p<0.01, *** p<0.001; CFI=0.956, TLI=0.949, IFI=0.956, RMSEA=0.058, SRMR=0.070

Alternative model 4a: addition direct path TRI → INT

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	0.454***	<0.001	Yes
H1b	Perceived complexity → Attitude	-0.246**	0.002	Yes
H1c	Perceived observability → Attitude	-0.149	0.131	No
H1d	Perceived trialability → Attitude	0.211**	0.010	Yes
Direct (TRI)	Perceived trialability → Intention	0.047	0.429	No
H1e	Perceived relative advantage → Intention	0.205***	<0.001	Yes
H2	Attitude → Intention	0.699***	<0.001	Yes

Note: ** p<0.01, *** p<0.001; CFI=0.956, TLI=0.949, IFI=0.957, RMSEA=0.058, SRMR=0.069

Alternative model 4b: replacing TRI → ATT with TRI → INT

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	0.513***	<0.001	Yes
H1b	Perceived complexity → Attitude	-0.244**	0.003	Yes
H1c	Perceived observability → Attitude	-0.078	0.415	No
H1d	Perceived trialability → Attitude	Replaced		
Direct (TRI)	Perceived trialability → Intention	0.053	0.359	No
H1e	Perceived relative advantage → Intention	0.205***	<0.001	Yes
H2	Attitude → Intention	0.704**	<0.001	Yes

Note: ** p<0.01, *** p<0.001; CFI=0.955, TLI=0.948, IFI=0.955, RMSEA=0.059, SRMR=0.075

LIST OF TABLES & FIGURES

TABLES

Table 1: Profile of survey respondents

	Survey sample (Frequency)	**Survey sample (%)**	**Singapore population (%)**
Age (years old)			
Below 15	0	0	15
15 to 24	78	46	12
25 to 34	66	39	15
35 to 44	14	8	17
45 & over	12	7	41
Gender			
Female	92	54	51
Male	78	46	49
Type of housing			
Public housing	128	75	80
Condominium	21	12	14
Landed property	10	6	6
Others	11	6	0
Ave number. of household members	3.3		3.4

Table 2: Confirmatory factor analysis

Construct	Measure	Standardised factor loading	*t*-value	CR	AVE
CPA	CPA1	0.81	11.26	0.87	0.70
	CPA2	0.90	12.31		
	CPA3	0.79	**		
CPL	CPL1	0.75	**	0.89	0.68
	CPL2	0.74	9.77		
	CPL3	0.87	11.68		
	CPL4	0.91	12.22		
OBS	OBS1	0.86	11.56	0.90	0.69
	OBS2	0.89	12.07		
	OBS3	0.81	10.82		
	OBS4	0.76	**		
TRI	TRI1	0.83	**	0.90	0.70
	TRI2	0.82	12.31		
	TRI3	0.84	12.72		
	TRI4	0.87	13.33		
RAD	RAD1	0.81	12.05	0.92	0.70
	RAD2	0.86	13.23		
	RAD3	0.80	11.82		
	RAD4	0.88	13.61		
	RAD5	0.81	**		
ATT	ATT1	0.94	22.27	0.96	0.89
	ATT2	0.97	24.55		
	ATT3	0.92	**		
INT	INT1	0.90	22.44	0.94	0.84
	INT2	0.87	19.82		
	INT3	0.97	**		

Notes: Model fit statistics: $\chi 2$=422.973, df=279, $\chi 2$/df=1.52, IFI=0.96, CFI=0.96, RMSEA=0.056, SRMR=0.058; ** denotes a constrained relationship to 1.00 in order for identification

Table 3: Construct correlation, squared correlation and AVE

	Mean	SD	1	2	3	4	5	6	7
1. CPA	4.85	1.24	0.70[a]	0.12[c]	0.27	0.15	0.31	0.23	0.17
2. CPL	3.22	1.09	-0.34[b]	0.68	0.19	0.06	0.18	0.14	0.12
3. OBS	5.04	1.06	0.52	-0.44	0.69	0.18	0.23	0.10	0.06
4. TRI	4.81	1.18	0.39	-0.24	0.43	0.70	0.16	0.13	0.14
5. RAD	4.49	1.28	0.56	-0.43	0.48	0.40	0.70	0.32	0.32
6. ATT	4.97	1.29	0.48	-0.37	0.31	0.36	0.57	0.89	0.62
7. INT	4.61	1.46	0.41	-0.34	0.24	0.38	0.57	0.79	0.84

Notes:
[a] Average variance extracted values are along the main diagonal.
[b] Correlations between constructs are below the main diagonal.
[c] Squared correlations between constructs are above the main diagonal.

Table 4: Results of hypothesis testing

Hypotheses	Path	Coefficient	P-value	Supported?
H1a	Perceived compatibility → Attitude	0.453***	<0.001	Yes
H1b	Perceived complexity → Attitude	-0.246**	0.002	Yes
H1c	Perceived observability → Attitude	-0.149	0.131	No
H1d	Perceived trialability → Attitude	0.214**	0.009	Yes
H1e	Perceived relative advantage → Intention	0.223***	<0.001	Yes
H2	Attitude → Intention	0.709***	<0.001	Yes

Note: ** p<0.01, *** p<0.001; CFI=0.96; TLI=0.95, IFI=0.96, RMSEA=0.058, SRMR=0.069

FIGURES

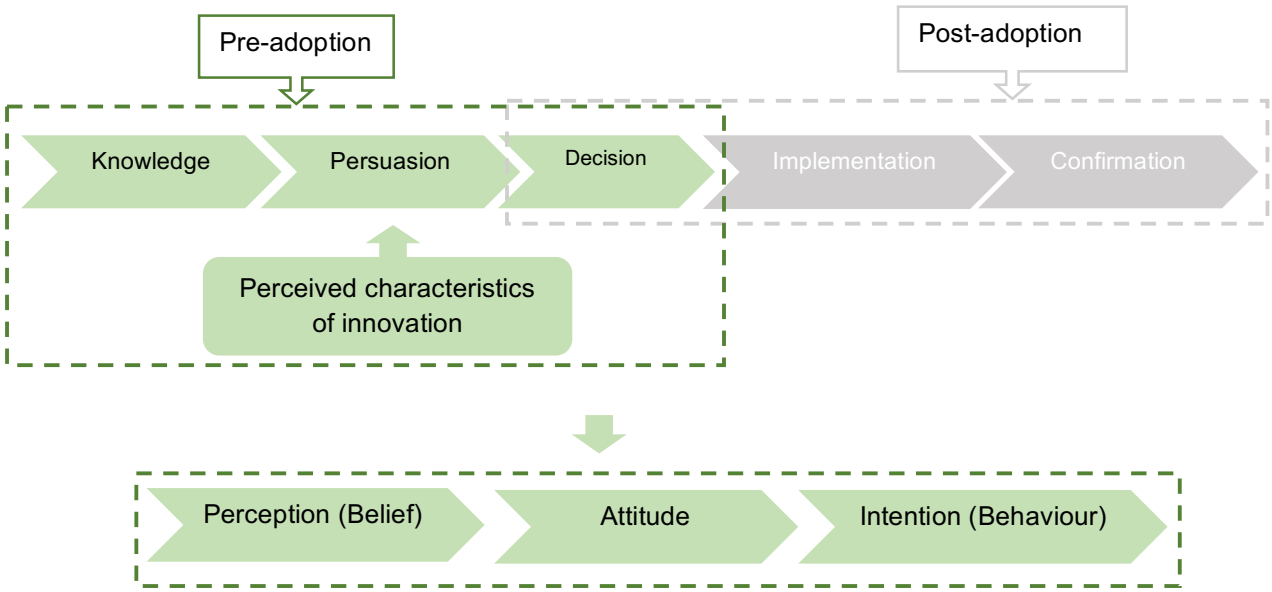
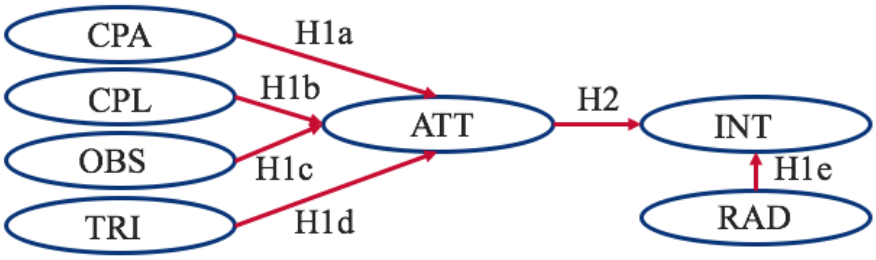


Figure 1: Theoretical premise



Note: CPA: perceived compatibility; CPL: perceived complexity; OBS: perceived observability; TRI: perceived trialability; RAD: perceived relative advantage; ATT: attitude toward adoption; INT: intention toward adoption

Figure 2: Conceptual framework

Figure 3: Set-up of a typical POPStation