



Perceived innovativeness of drone food delivery services and its impacts on attitude and behavioral intentions: The moderating role of gender and age

Jinsoo Hwang^a, Jin-Soo Lee^b, Hyunjoon Kim^{c,*}

^a The College of Hospitality and Tourism Management, Sejong University, South Korea

^b The School of Hotel and Tourism Management, The Hong Kong Polytechnic University, Hong Kong

^c The Department of International Tourism, The College of Business Administration, Dong-A University, South Korea

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ABSTRACT

Drone food delivery services refer to services that use drones to deliver food to customers as the role of services becomes more important in the food service industry, because drone food delivery services are not affected by traffic, so they can deliver food quickly. However, there is still a lack of research about drone food delivery services. Thus, this study examined the importance and necessity of drone food delivery services using the concept of perceived innovativeness. In Korea, a total of 324 samples collected in order to test the proposed model including fifteen hypotheses. The data analysis results showed that perceived innovativeness has a positive influence on attitude toward using drone food delivery services and behavioral intentions including intentions to use and word-of-mouth intentions. In addition, the attitude played an important role in the formation of behavioral intentions. Lastly, this study found the important moderating role of gender and age.

1. Introduction

A drone is an unmanned aerial vehicle without human control, and its role in the era of the fourth industrial revolution has attracted a great deal of attention. Since the drones were primarily used for military purposes at first, drones were very expensive and not popular (Dronethusiast, 2018). According to National Defense (2017), the world market for drones will surge from about US 4.2\$ billion to US 10.3\$ billion in 2026. One of the important reasons for this is the diversity of drone uses. For example, in Japan, drones spray pesticides on farms and take photographs in the air to check crop status (The Japan Times, 2018). In addition, in Australia, drones played an important role in rescuing two children in the sea (The Straits Times, 2018).

The role of drones in the food service industry is also attracting much attention, and many companies are making great efforts to develop and utilize drone food delivery services. Drone food delivery services have the advantage of being able to deliver quickly, avoiding traffic congestion and deliver anywhere regardless of location. For instance, Yogiyo, one of the largest food delivery service companies in Korea, successfully completed a food delivery test using drones (Digital Daily, 2016). In addition, in Reykjavik, Iceland, Tel Aviv-based drone supplier Flytrex started to provide a service for customers to deliver food using drones without having to visit an actual store (New York Post, 2017). At Kite Beach, Dubai in 2017, Costa Coffee began

delivering ice coffee to customers on the beach using drones (The National, 2017). UberEats, a US food delivery service company, also announced that it will launch a service to deliver food to customers using drones from 2021 (Forbes, 2018). Drone food delivery services are automatic, which are not based on manual adjustments but on a computer system (Drone, 2018). In other words, the computer designates the path the drones follow before delivering food, so the risk associated with air traffic or accidents is very low. Although drone food delivery services are currently limited in certain areas, it is anticipated that drone food delivery services will be activated in many areas in the future.

Innovativeness that consumers perceive from a new product/service like drone food delivery services is very important for the success of the product/service because it has a significant impact on the adoption behavior for new technologies (Leckie et al., 2017; Yang, 2005). That is, if consumers perceive high levels of innovativeness from a new technology, they are more likely to use the new technology. From a consumer standpoint, perceived innovativeness is considered a corporate effort to meet the needs of consumers to crave something new (Stock, 2011). In particular, perceived innovativeness has a profound effect on the profitability of a company, so companies are necessary to understand how consumers perceive innovativeness from their products (Banerjee and Soberman, 2013; Eisend et al., 2016). However, despite the importance of perceived innovativeness, there is a lack of clarity

* Corresponding author.

E-mail addresses: jhwang@sejong.ac.kr (J. Hwang), jinsoo.lee@polyu.edu.hk (J.-S. Lee), hyunjoon@dau.ac.kr (H. Kim).

about its role in the context of drone food delivery services.

Additionally, it is widely known that the adaptation of a new technology can be different based on gender and age, so companies need to develop different strategies according to gender and age (Koenigstorfer and Groeppel-Klein, 2012; Lin et al., 2017). For instance, if companies that provide drone food delivery services understand gender differences in adopting a new technology, they can provide suitable services for male and female customers, respectively, which leads to high levels of customer satisfaction. In particular, establishing a customer database according to personal characteristics such as gender and age is simple and easy (Yelkur and Chakrabarty, 2006), so it is meaningful to explore the moderating role of gender and age, which helps to effectively and efficiently manage customers in the context of drone food delivery services.

In summary, this study explored the importance and necessity of perceived innovativeness in the context of drone food delivery services. More specifically, the objectives of this study are to identify (1) the influences of perceived innovativeness on attitude toward using drone food delivery services, (2) the effect of attitude on behavioral intentions including intentions to use and word-of-mouth intentions, and (3) the moderating role of gender and age in this process. This study is theoretically meaningful because it is the first study about perceived innovativeness in the context of drone food delivery services. In addition, the results of this study are expected to play an important role in developing marketing strategies for companies that are preparing to implement drone food delivery services.

2. Literature review

2.1. Explanation of each concept

2.1.1. Perceived innovativeness

Perceived innovativeness has received significant attention in academic research related to the adoption of a new technology (e.g. Fu and Elliott, 2013; Johnson et al., 2001; Kaplan, 2009). Perceived innovativeness is defined as “the degree to which consumers believe that the product possesses important attributes of innovation such as newness and uniqueness” (Watchravesringkan et al., 2010, p. 266). Perceived innovativeness indicated that the product itself reflecting the novelty of the technology and the consumer aspect indicating the uniqueness in the market (Kleinschmidt and Copper, 1991). Furthermore, perceived innovativeness plays an important role in distinguishing a company from other companies, which helps to build competitive advantages (Ahlstrom, 2010; Seebode et al., 2012). It is necessary to distinguish between consumer innovativeness and perceived innovativeness, because they have different meanings to each other. The former is a consumer’s innovative tendency (Roehrich, 2004), while the latter is the characteristic of the innovative product that consumers perceive (Falkenreck and Wagner, 2011). It is widely accepted that consumers who have high level of innovativeness are more likely to try new services and products (Hirschman, 1980; Im et al., 2007). In other words, such consumers are more concerned with a level of product innovativeness.

Perceived innovativeness is a prerequisite for a company to be competitive as it has a great influence on the growth and development of the company (Ottenbacher and Harrington, 2009; Phau et al., 2015). In addition, when consumers perceive high levels of innovativeness from a certain company, they have more confidence in the company (Aaker, 2007; Keller, 1993). Many empirical studies also showed a significant relationship between perceived innovativeness and firm performance. For example, Kleinschmidt and Cooper (1991) argued that highly innovative products increase return on investment better than moderately innovative products. Danneels and Kleinschmidt (2001) reported that when consumers perceive high levels of innovativeness from a certain product/service, they are more likely to use the product/service in the future. In addition, Lafferty and Goldsmith

(2004) also suggested that perceived innovativeness enhances consumers’ motivation to purchase and use a product. Langerak and Hultink (2006) also showed that perceived innovativeness is a critical factor affecting the adoption of a product.

2.1.2. Attitude

Many previous studies have focused on the concept of attitude in the field of consumer behavior for a long time and suggested that it is an important factor in predicting individuals’ decisions or behaviors (Ajzen, 1985, 1991; Bagozzi et al., 2003; Fishbein and Ajzen, 1975; Kiatkawsin and Han, 2017a). Attitude is defined as “the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior” (Ajzen, 1991, p. 188). That is, attitude is considered an evaluative response to conducting instrumental actions, reflecting a tendency to react in a manner that is favorable or unfavorable for a particular behavior (Eagly and Chaiken, 1993), so this study defined attitude as an individual’s psychological disposition of liking or disliking of using a new technology. The importance of attitude has been studied in technology research. A representative study of attitude is the theory of the technology acceptance model (Davis, 1989). According to the theory, there are two important predictors of attitude, which are perceived usefulness and perceived ease of use. Perceived usefulness can be defined as “the degree to which a person believes that using a particular system would enhance his or her job performance,” while perceived ease of use refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). More importantly, the theory suggests that attitude plays a critical role in the formation of intention to use a new technology. That is, when consumers have a favorable attitude toward a certain new technology, they are more likely to use the new technology in the future.

2.1.3. Behavioral intentions

According to Oliver et al. (1997), behavioral intentions can be defined as “a stated likelihood to engage in a behavior” (p. 28). It is widely accepted that behavioral intentions include the following three concepts (e.g. Han et al., 2009; Lee et al., 2010): intentions to use and word-of-mouth intentions. First, the concept of intentions to use refers to “the degree to which a person has formulated conscious plans to perform or not perform some specified future behavior” (Warshaw and Davis, 1985, p. 214). Intentions to use are formed after a customer’s favorable evaluation of the product/service (Al-Qeisi et al., 2014; Byun and Jang, 2018; Han et al., 2017). More importantly, since intentions to use directly affects actual consumption, several previous studies have sought to find the predictors of intentions to use (e.g. Han and Hyun, 2017a; Jeon et al., 2018). In addition, word-of-mouth intentions are defined as “informal, person to person communication between a perceived noncommercial communicator and a receiver regarding a brand, a product, an organization or a service” (Harrison-Walker, 2001, p. 63). Consumers tend to trust information from acquaintances more than commercial ads, so word-of-mouth intentions play a significant role in reducing the risk in selecting a new product/service (Fan and Miao, 2012; Yi and Gong, 2008).

2.2. Hypotheses development

2.2.1. Effect of perceived innovativeness on attitude and behavioral intentions

First, this study hypothesized the effect of perceived innovativeness on attitude toward using drone food delivery services based on the following theoretical background. More importantly, although consumers have no experience using a certain product/service, an attitude can be formed through their knowledge or information about the product/service (Oliver et al., 1997). Ajzen and Fishbein (2000) also argued that an attitude toward a certain object can be generated by subjective values and beliefs. Therefore, it can be inferred that perceived innovativeness reflecting consumers’ subjective values and

beliefs plays a significant role in the formation of attitude. Previous studies also showed a positive relationship between perceived innovativeness and attitude. For example, [Watchravesringkan et al. \(2010\)](#) examined the effect of perceived innovativeness on attitude using 268 undergraduate students in the context of technological fashion products. They suggested that perceived innovativeness positively affects attitude toward using technological fashion products. In addition, [Boisvert and Ashill \(2011\)](#) analyzed a sample of 664 respondents in order to identify the relationship between perceived innovativeness and attitude in the service industry. They found that perceived innovativeness is an important predictor of attitude. In addition, many previous studies have showed that there is a positive relationship between perceived innovativeness and behavioral intentions. For instance, [O’Cass and Carlson \(2012\)](#) investigated how consumer perceptions of a website’s innovativeness affect website loyalty using 370 consumers. They found that consumer perceptions of a website’s innovativeness aids to form website loyalty. [Slade et al. \(2015\)](#) developed a research model in order to identify the relationship between innovativeness and behavioral intentions using 268 consumers in the context of remote mobile payments. They suggested that innovativeness positively affects behavioral intentions to use remote mobile payments. Based on the literature review, this study proposes the following hypotheses:

H1. Perceived innovativeness positively affects attitude toward using drone food delivery services.

H2. Perceived innovativeness positively affects intentions to use.

H3. Perceived innovativeness positively affects word-of-mouth intentions

2.2.2. Effect of attitude toward using drone food delivery services on behavioral intentions

Next, this study hypothesized the relationship between attitude toward using drone food delivery services and behavioral intentions based on the following theoretical and empirical backgrounds. Many existing theories have demonstrated a significant relationship between attitude and behavioral intentions, such as the technology acceptance model, the theory of reasoned action, the theory of planned behavior, and the theory of repurchase decision-making ([Ajzen, 1985](#); [Davis, 1989](#); [Fishbein and Ajzen, 1975](#)). They suggested that attitude plays a critical role in the formation of behavioral intentions. Empirical studies also supported the relationship between attitude and behavioral intentions. For instance, [Hung et al. \(2006\)](#) investigated the effect of attitude on behavioral intentions in terms of the public’s acceptance of e-Government services using 1099 usable responses. They found the effect of attitude on behavioral intentions. In addition, [Fu and Elliott \(2013\)](#) collected data from 312 customers who had purchased a new technology product in order to identify the relationship attitude and behavioral intentions. The data analysis results revealed that when customers have a favorable attitude toward using a new technology product, they are more likely to use the product. [Wu and Ke \(2015\)](#) also examined how behavioral intentions are enhanced in the online shopping industry using total sample of 2631. They suggested that when customers have a positive attitude, they tend to show positive behavioral intentions. [Han and Hyun \(2017b\)](#) investigated the effect of attitude on behavioral intentions using 429 tourists in the context of an environmentally responsible museum. The data analysis indicated that attitude aids to enhance behavioral intentions. [Munoz-Leiva et al. \(2017\)](#) analyzed 103 regular users of electronic banking and showed that attitude is an important factor affecting behavioral intentions. Based on the theoretical and empirical backgrounds, it is expected that attitude toward using drone food delivery services has a positive impact on behavioral intentions.

H4. Attitude toward using drone food delivery services positively affects intentions to use.

H5. Attitude toward using drone food delivery services positively affects word-of-mouth intentions.

2.3. Moderating role of gender

Gender is defined as a set of characteristics that distinguish between males and females ([Faqih and Jaradat, 2015](#)). The gender schema theory firstly suggested the important role of gender in consumer behavior ([Bem, 1981](#)). Theoretically, gender does not simply act as biological sex, but as psychological construct ([Bem, 1981](#)). Earlier studies have suggested that male and female have different kinds of socially constructed cognitive structures, so they show different decision-making processes ([Ahuja, 2002](#); [Venkatesh and Morris, 2000](#)).

A host of previous studies have also tried to explore gender differences in adopting new technology in order to manage the development and utilization of new technology in diverse fields (e.g. [Alksasbeh, 2012](#); [Chou et al., 2011](#); [Terzis and Economides, 2011](#); [Venkatesh et al., 2000](#)). Their results were different from each other and can be summarized as follows. First, males were more interested in adopting new devices than female. For example, [Van Slyke et al. \(2002\)](#) investigated gender differences in perceptions of Web shopping using 511 customers. They suggested that male customers are more favorable than females in perceptions of Web shopping. [Ong and Lai \(2006\)](#) analyzed data collected from 156 respondents including 89 male and 67 female in order to find gender differences in perceptions of e-learning acceptance. They showed that male respondents prefer to use e-learning compared to females. [Wang and Wang \(2010\)](#) collected data from 343 customers in order to identify the moderating role gender in the mobile internet industry. They found the moderating role of gender in the relationship between perceived value and behavioral intention to use mobile internet and suggested that if male mobile users have high levels of perceived value, they are more likely to use mobile internet than female mobile users. [Chen et al. \(2015\)](#) examined the moderating role of gender in the relationship between perceived benefit and re-purchase intention using 484 online shoppers. They found that gender plays a significant moderating role in the relationship between the two constructs. That is, males are more likely to have re-purchase intentions than females when they perceive high levels of benefit from online shopping.

On the contrary, the results of other previous studies have suggested that females are more likely to prefer to adopt new technology. For instance, [Venkatesh et al. \(2003\)](#) tested the moderating role of gender in the relationship between effort expectancy and behavioral intention using the partial least-squares (PLS) regression method. They found that gender moderates the relationship between effort expectancy and behavioral intention. That is, females are more likely to use information technology than males when they have high levels of effort expectancy. [González-Gómez et al. \(2012\)](#) examined gender differences in e-learning teaching using data collected from 1185 students who took online class. They suggested that female students are more satisfied with e-learning teaching than male students. [Fan and Miao \(2012\)](#) collected data from 116 customers who have electronic word-of-mouth (hereafter eWOM) experiences in order to find the moderating role of gender in the relationship between perceived eWOM credibility and eWOM acceptance. The data analysis results showed that females are more likely to have eWOM acceptance than males when they perceive high levels of eWOM credibility. [Joiner et al. \(2012\)](#) investigated gender differences in the use of the Internet using 501 respondents. Their results indicated that females are more likely to use the Internet for communication and social network than males.

Although previous research has shown different results, they commonly argued the important moderating role of gender in adopting new technology. Therefore, based on the theoretical and empirical backgrounds, this study proposed the following hypotheses.

H6a. The effect of product innovativeness on attitude toward using

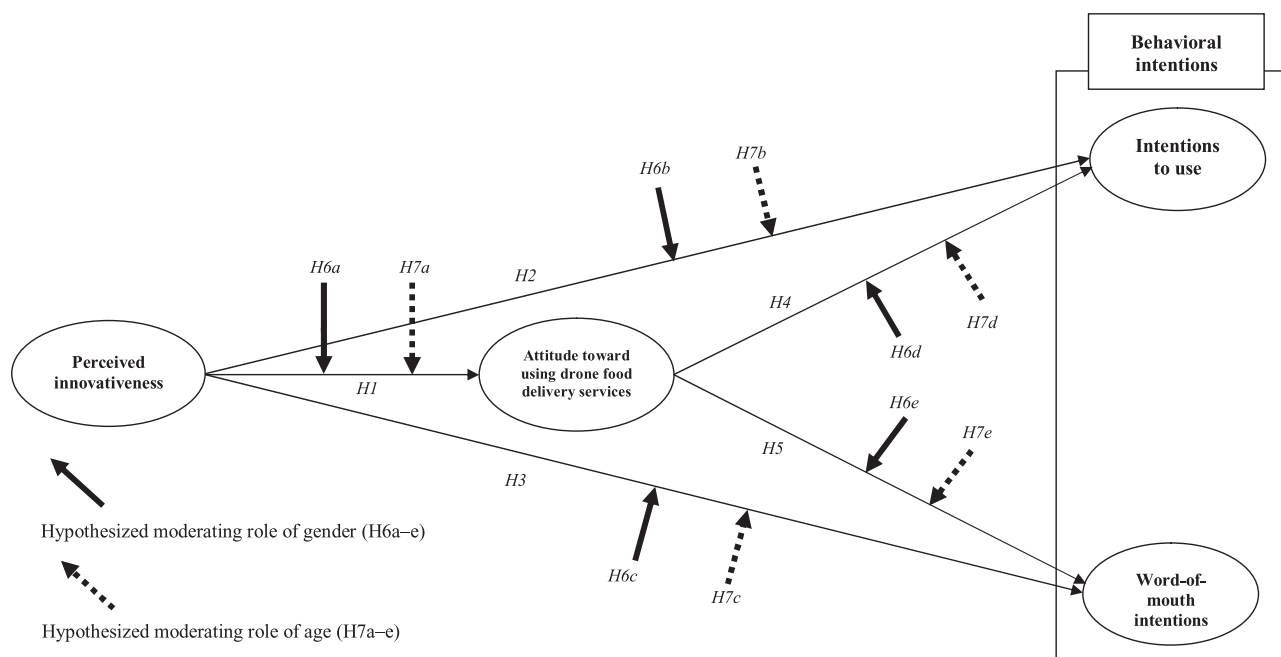


Fig. 1. Proposed conceptual model.

drone food delivery services is moderated by gender.

H6b. The effect of product innovativeness on intentions to use is moderated by gender.

H6c. The effect of product innovativeness on word-of-mouth intentions is moderated by gender.

H6d. The effect of attitude toward using drone food delivery services on intentions to use is moderated by gender.

H6e. The effect of attitude toward using drone food delivery services on word-of-mouth intentions is moderated by gender.

2.4. Moderating role of age

Age is another critical demographic factor that plays an important role in explaining consumer behavior (Lian and Yen, 2014; Nosek et al., 2002). It is widely known that younger people tend to be more enterprising and adventurous than older people (Koenigstorfer and Groeppel-Klein, 2012; Yousafzai and Yani-de-Soriano, 2012). In addition, younger people are fairly good with technological devices, so they are more likely to accept to use new technologies (Porter and Donthu, 2006; Wang et al., 2009).

Most previous studies have proved age differences in adopting new technology, suggesting that a negative relationship between increasing age and intention to adopt a new technology. For example, Zhou et al. (2014) investigated age differences in acceptance of new functions of mobile phones using 351 mobile phone users. Based on the data analysis results, they concluded that young people are more likely to adopt new functions of mobile phones than old people. Lian and Yen (2014) collected data from 820 customers in order to explore differences between younger and older customers in intention to use online shopping. The data analysis results revealed a significant difference in online shopping intention, suggesting that younger customers prefer to use online shopping than older customers. Kucukusta et al. (2015) examined an important role of age in the use of the Internet for booking online travel products using 213 online users. They suggested that when compared to old people, young people are more likely to use the Internet for booking online travel products because they felt that using internet to book online tourism product makes the book easier and is

easy to learn. Harris et al. (2016) tested age differences using 960 mobile bank customers. The results of the data analysis indicated that young customers are more interested in using mobile banking, while old customers prefer to use traditional, physical-based banking.

In summary, several previous studies suggested that young people are trying to accommodate more new technology, so it can be inferred that there are age differences in terms of using drone food delivery services. Based on the above theoretical background, the following hypotheses can be made:

H7a. The effect of product innovativeness on attitude toward using drone food delivery services is moderated by age.

H7b. The effect of product innovativeness on intentions to use is moderated by age.

H7c. The effect of product innovativeness on word-of-mouth intentions is moderated by age.

H7d. The effect of attitude toward using drone food delivery services on intentions to use is moderated by age.

H7e. The effect of attitude toward using drone food delivery services on word-of-mouth intentions is moderated by age.

2.5. Proposed model

Based on the hypotheses presented in the literature review part, this study proposes a research model as shown in Fig. 1.

3. Methodology

3.1. Measurement

In this study, each concept was measured based on the items that were proven to be reliable and valid in previous studies. First, perceived innovativeness was measured with three items adapted from Fu and Elliott (2013) and Watchravesringkan et al. (2010). Attitude was measured with three items used by Bagozzi et al. (2003) and Kiatkawsin and Han (2017b). Intentions to use were measured with three items borrowed from Zeithaml et al. (1996). Word-of-mouth intentions were

measured using three items cited from Hennig-Thurau et al. (2002). The above-mentioned measurement items were translated from English to Korean for data collection in Korea. All items except for attitude were measured using a 7-point Likert's type scale, which was anchored from strongly disagree (1) to strongly agree (7). Attitude was measured using a bipolar semantic-differential scale, such as Negative [1] – and Positive [7].

3.2. Data collection

In order to check the reliability of the measurement items, a pretest was conducted with 50 actual restaurant patrons using an online questionnaire survey in Korea. Respondents began the survey after watching a video related to the drone food delivery services for about 2 min and 30 s. The video was designed to make it easy for anyone to understand the overall system and operation of the drone food delivery services (see the Appendix). The data analysis results showed the values of Cronbach's alpha for all of the constructs exceeded 0.70, suggesting high levels of reliability (Nunnally and Bernstein, 1978).

For the main survey, data were collected using an online company in Korea. In the same way as the pretest, respondents were shown videos related to drone food delivery service before the survey. An email survey was distributed to 2794 respondents who have used food delivery services within the last six months, 346 of which responded. Among them, 22 outliers were excluded after checking multivariate outliers. Finally, statistical analysis was performed based on 324 samples.

4. Data analysis

4.1. Profile of the samples

Table 1 presents profile of the samples. Of the 324 respondents, 57.7% ($n = 187$) were male and 42.3% ($n = 137$) were female. The majority of respondents were 20 s (38.0%, $n = 123$), followed by 30 s (30.6%, $n = 99$), 40 s (21.0%, $n = 68$), and over 50 s (10.5%, $n = 34$). Their average age was 34.98 years old. With regard to participants' monthly household income, 22.8% ($n = 74$) reported that their income

Table 1
Profile of the samples ($n = 324$).

Variable	n	Percentage
Gender		
Male	187	57.7
Female	137	42.3
Age		
20 s	123	38.0
30 s	99	30.6
40 s	68	21.0
Over 50 s	34	10.5
Mean age = 34.98 years old		
Monthly household income		
\$6001 and over	60	18.5
\$5,001-\$6,000	36	11.1
\$4,001-\$5,000	48	14.8
\$3,001-\$4,000	51	15.7
\$2001-\$3000	74	22.8
\$1,001-\$2,000	43	13.3
Under \$1,000	12	3.7
Marital status		
Single	185	57.1
Married	136	42.0
Widowed/Divorced	3	.9
Education Level		
Less than high school diploma	33	10.2
Associate's degree	51	15.7
Bachelor's degree	190	58.6
Graduate degree	50	15.4

Table 2
Confirmatory factor analysis: Items and loadings.

Construct and scale items	Standardized Loading ^a
Perceived innovativeness (Cronbach's $\alpha = .935$)	
Drone food delivery services seem unique.	.935
Drone food delivery services seem new.	.936
Drone food delivery services seem creative.	.858
Attitude toward using drone food delivery services (Cronbach's $\alpha = .944$)	
Unfavorable – Favorable	.938
Bad – Good	.886
Negative – Positive	.885
Behavioral intentions	
Intentions to use (Cronbach's $\alpha = .954$)	
I will use drone food delivery services when ordering food.	.947
I am willing to use drone food delivery services when ordering food.	.904
I am likely to use drone food delivery services when ordering food.	.958
Word-of-mouth intentions (Cronbach's $\alpha = .953$)	
I am likely to say positive things about drone food delivery services to others.	.889
I am likely to recommend drone food delivery services to others.	.977
I am likely to encourage others to use drone food delivery services.	.946

Goodness-of-fit statistics: $\chi^2 = 117.928$, $df = 47$, $\chi^2/df = 2.509$, $p < .001$, NFI = 976, CFI = .986, TLI = .980, and RMSEA = .068.

Notes 1: ^a All factors loadings are significant at $p < .001$.

Notes 2: NFI = Normed Fit Index, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMSEA = Root Mean Square Error of Approximation.

was between \$2001 and \$3000. In addition, the majority of respondents were single (57.1%, $n = 185$). Lastly, in terms of education, a majority showed that they held a bachelor's degree (58.6%, $n = 190$).

4.2. Measurement model

The measurement model was initially evaluated prior to structural equation modeling (SEM) analysis. Table 2 shows measurement model results. Findings from the confirmatory factor analysis (CFA) indicated that the measurement model satisfactorily fits the data ($\chi^2 = 117.928$, $df = 47$, $\chi^2/df = 2.509$, $p < .001$, NFI = 976, CFI = .986, TLI = .980, and RMSEA = .068). All of the factor loadings were equal to or greater than .858, and all factor loadings were significant at $p < 0.001$.

Table 3 provides descriptive statistics and associated measures. A composite reliability was checked to investigate consistency among the measurement items for each construct. The values of all composite reliability were greater than 0.60 (Bagozzi and Yi, 1988), suggesting that measurement items in the proposed model were internally consistent and highly reliable for evaluating each variable. In addition, construct validity was confirmed as all AVE (average variance extracted) values were higher than cut-off of 0.50 (Fornell and Larcker, 1981). Lastly, AVE values exceeded the values of the squared correlations between a pair of variables, indicated that discriminant validity was statistically supported (Fornell and Larcker, 1981).

4.3. Structural model evaluation

SEM was used in order to assess the proposed model. The proposed model shows an acceptable fit to the data ($\chi^2 = 158.941$, $df = 48$, $\chi^2/df = 3.311$, $p < .001$, NFI = 954, CFI = .963, TLI = .949, and RMSEA = .081). Of the four proposed hypotheses, all were statistically supported at $p < .05$. Table 4 presents a summary of the hypotheses testing results. More specifically, the data analysis results indicated that perceived innovativeness positively affects attitude toward using drone food delivery services ($\beta = 0.642$, $p < .05$), intentions to use ($\beta = 0.208$, $p < .05$), and word-of-mouth intentions ($\beta = 0.265$, $p < .05$).

Table 3
Descriptive statistics and associated measures.

	No. of Item	Mean (SD)	AVE	(1)	(2)	(3)	(4)
(1) Perceived innovativeness	3	5.46 (1.41)	.829	.935 ^a	.633 ^b	.672	.676
(2) Attitude	3	4.34 (1.40)	.816	.401 ^c	.930	.724	.766
(3) Intentions to use	3	4.58 (1.38)	.877	.452	.524	.955	.784
(4) Word-of-mouth intentions	3	4.61 (1.38)	.879	.457	.587	.615	.956

Notes 1: SD = Standard Deviation, AVE = Average Variance Extracted.

Notes 2: a. Composite reliabilities are along the diagonal, b. Correlations are above the diagonal, c. Squared correlations are below the diagonal.

.05). In addition, the attitude played an important role in the formation of intentions to use ($\beta = 0.736, p < .05$) and word-of-mouth intentions ($\beta = 0.651, p < .05$).

4.4. Measurement-invariance assessment

A measurement invariance test was conducted before testing the moderating role of gender and age (Steenkamp and Baumgartner, 1998). First, respondents ($n = 324$) were separated by gender: male ($n = 187$) and female ($n = 137$). As shown in Table 5, non-restricted model ($\chi^2 = 186.115, df = 94, \chi^2/df = 1.979, p < .001, NFI = .963, CFI = .981, TLI = .974, \text{ and } RMSEA = .055$) and full-metric invariance model ($\chi^2 = 202.513, df = 106, \chi^2/df = 1.910, p < .001, NFI = .960, CFI = .980, TLI = .976, \text{ and } RMSEA = .053$) had satisfactory fit statistics. In addition, there is no significant difference between two models ($\Delta\chi^2 = 16.398 < \chi^2 = .01 (df = 15) = 16.810$), suggesting that full metric invariance was supported.

With regard to age, respondents ($n = 324$) were divided into two groups based on the median of 34 years old (a low age group = 164 and a high age group = 160). Two models including non-restricted model ($\chi^2 = 187.659, df = 94, \chi^2/df = 1.996, p < .001, NFI = .964, CFI = .981, TLI = .974, \text{ and } RMSEA = .056$) and full-metric invariance model ($\chi^2 = 203.075, df = 106, \chi^2/df = 1.915, p < .001, NFI = .961, CFI = .981, TLI = .976, \text{ and } RMSEA = .053$) had a good fit statistics. Furthermore, the chi-square difference tests showed that the two models were not significantly different. This can be interpreted such that full-metric invariance was supported for age.

4.5. Moderating role of gender and age

To empirically find the moderating role of gender and age, this study used multiple-group analyses. To evaluate the differential effects of moderator, the chi-square difference between the unconstrained and constrained models was assessed in terms of the difference in degrees of freedom (Byrne, 2001). First, gender played an important moderating role in the relationships between (1) product innovativeness and intentions to use ($\Delta\chi^2 = 5.207 > \chi^2 = .5(1) = 3.84, df = 1$) and (2) attitude toward using drone food delivery services and word-of-mouth intentions ($\Delta\chi^2 = 4.135 > \chi^2 = .5(1) = 3.84, df = 1$), supporting Hypothesis 6b and 6c. More specifically, both path coefficients for a female group were found to be greater than for a male group. However, Hypotheses 6a, 6c, and 6d were not statistically supported.

Table 4
Standardized parameter estimates for structural model.

			Coefficients	t-value	Hypothesis	
H1	Perceived innovativeness	→	Attitude	.642	11.883*	Supported
H2	Perceived innovativeness	→	Intentions to use	.208	4.165*	Supported
H3	Perceived innovativeness	→	Word-of-mouth intentions	.265	4.953*	Supported
H4	Attitude	→	Intentions to use	.736	12.825*	Supported
H5	Attitude	→	Word-of-mouth intentions	.651	10.628*	Supported

Goodness-of-fit statistics: $\chi^2 = 158.941, df = 48, \chi^2/df = 3.311, p < .001, NFI = .954, CFI = .963, TLI = .949, \text{ and } RMSEA = .081$.

Notes 1: * $p < .05$.

Notes 2: NFI = Normed Fit Index, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, and RMSEA = Root Mean Square Error of Approximation.

Second, the results of multiple-group analyses revealed that age moderated the relationships (1) perceived innovativeness and word-of-mouth intentions ($\Delta\chi^2 = 6.261 > \chi^2 = .5(1) = 3.84, df = 1$) and (2) attitude toward using drone food delivery services and word-of-mouth intentions ($\Delta\chi^2 = 5.768 > \chi^2 = .5(1) = 3.84, df = 1$), so Hypotheses 7c and 7e were supported. More specifically, both path coefficients for a low age group were found to be higher than for a high age group. Contrary to expectations, hypotheses 7a, 7b, and 7d were not statistically supported. Fig. 2 shows the results of the structural-invariance tests.

5. Discussion and implications

This study was designed to investigate the importance and necessity of perceived innovativeness in the context of drone food delivery services. More specifically, it was proposed that perceived innovativeness positively affects attitude toward using drone food delivery services. In addition, the attitude was hypothesized to influence behavioral intentions including intentions to use and word-of-mouth intentions. Lastly, the moderating role of gender and age was proposed during the theory-building process. The proposed hypotheses were tested using data collected from 324 samples in Korea. The results of the study have the following theoretical and practical implications.

5.1. Theoretical implications

First, perceived innovativeness was shown to significantly increase attitude toward using drone food delivery services ($\beta = .642, p < .05$), intentions to use ($\beta = .208, p < .05$), and word-of-mouth intentions ($\beta = .265, p < .05$). That is, when people perceive that drone food delivery services are innovative, they are more likely to (1) have a favorable attitude toward using the services, (2) use the services when ordering food, and (3) recommend the services to others. The result of this study largely agree with the results of previous studies related to new technologies (e.g. Boisvert and Ashill, 2011; O’Cass and Carlson, 2012; Watchravesringkan et al., 2010), suggesting that perceived innovativeness is an important factor affecting attitude and behavioral intentions. This study also found that, for the first time, perceived innovativeness has an important influence on attitude and behavioral intentions in the context of drone food delivery services. In this respect, this study expands the current literature by providing empirical evidence of the important role of perceived innovativeness in the

Table 5
Measurement-invariance models.

	Models	χ^2	df	NFI	CFI	TLI	RMSEA	$\Delta\chi^2$	Full-metric invariance
Gender	Non-restricted model	186.115	94	.963	.981	.974	.055	$\Delta\chi^2 (12) = 16.398, p > .01$ (insignificant)	Supported
	Full-metric invariance	202.513	106	.960	.980	.976	.053		
Age	Non-restricted model	187.659	94	.964	.981	.974	.056	$\Delta\chi^2 (12) = 15.416, p > .01$ (insignificant)	Supported
	Full-metric invariance	203.075	106	.961	.981	.976	.053		

Notes 1: NFI = Normed Fit Index, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, and RMSEA = Root Mean Square Error of Approximation.
Notes 2: $\Delta\chi^2 (12) = 16.810, p > .01$.

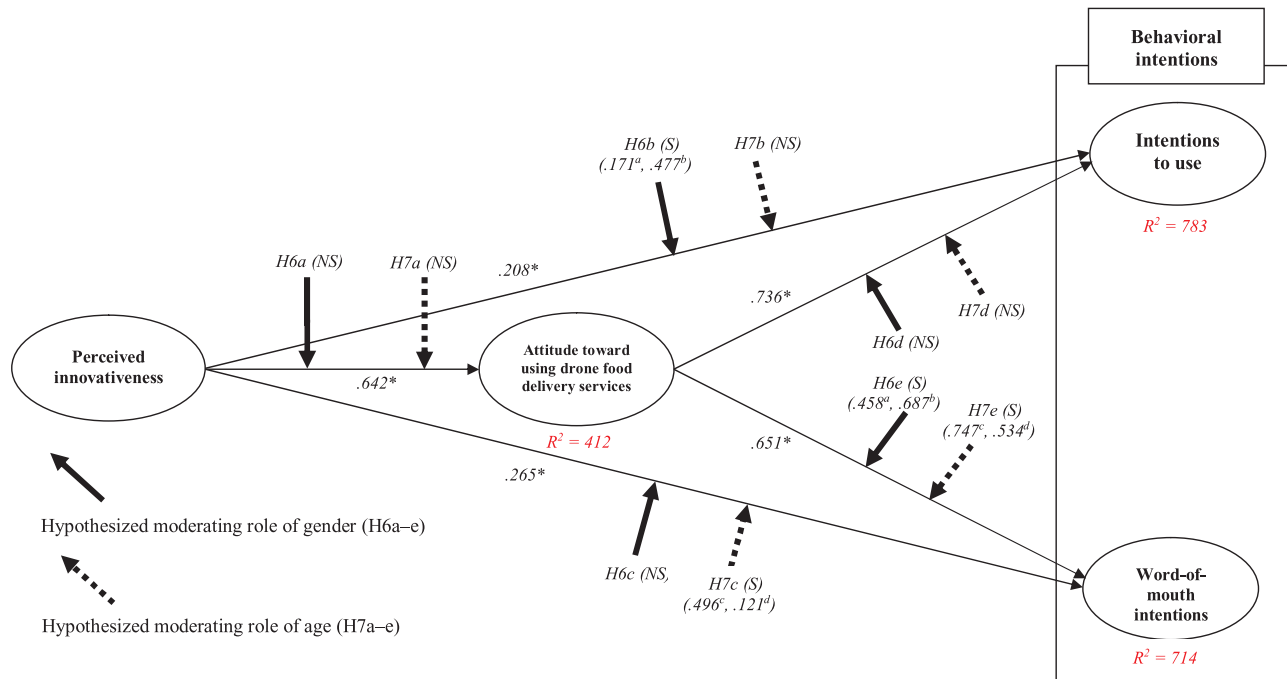


Fig. 2. Structural model results.

Notes 1: * $p < .05$.

Notes 2: S = Significant; NS = Not Significant.

Notes 3: a. Path coefficient for male respondents, b. Path coefficient for female respondents.

Notes 4: c. Path coefficient for a low age group, d. Path coefficient for a high age group.

formation of attitude and behavioral intentions in the context of drone food delivery services.

Second, the results indicated that attitude toward using drone food delivery services aids to increase two dimensions of behavioral intentions such as intentions to use ($\beta = .736, p < .05$) and word-of-mouth intentions ($\beta = .651, p < .05$). It can be interpreted that if consumers have a positive attitude toward using drone food delivery services, they are more likely to (1) use the services when ordering food and (2) recommend the services to others. As explained in the literature review section, a great seal of the existing research has consistently suggested that attitude is a critical predictor of behavioral intentions (e.g. Ajzen, 1985; Davis, 1989; Hung et al., 2006; Wu and Ke, 2015). This study is the first attempt to empirically test the relationship between attitude and behavioral intentions in the context of drone food delivery services. In this regard, this study makes a significant theoretical contribution the existing literature.

Third, the results of multiple-group analyses indicated that gender moderates the relationships between (1) product innovativeness and intentions to use and (2) attitude toward using drone food delivery services and word-of-mouth intentions. These findings were consistent with the previous studies (e.g. Fan and Miao, 2012; González-Gómez et al., 2012; Venkatesh et al., 2003), suggesting females were more interested in adopting new devices than male. Overall, the present study implies that when females perceive that drone food delivery

services are innovative, they are more likely to use the services and say positive things about them to others than males. Our findings validated the particular nature of the moderating role of gender in the adoption of new technology by empirically finding providing empirical evidence of gender differences in the context of drone food delivery services.

Fourth, the data analysis results showed that age plays a significant role as a moderator in the relationships between (1) perceived innovativeness and word-of mouth intentions and (2) attitude toward using drone food delivery services and word-of mouth intentions. In other words, young consumers try to encourage others to use drone food delivery services when they perceive high levels of innovativeness and have a positive attitude toward using drone food delivery services. In the history of new technology research, scholars and practitioners have strongly argued that younger people prefer to adopt new technologies than older people (e.g. Harris et al., 2016; Kucukusta et al., 2015; Lian and Yen, 2014; Zhou et al., 2014). Unlike previous studies, this study revealed age differences for the first time in the context of drone food delivery services. Considering the findings, this study replicated and further expanded the current literature by identifying the moderating role of age in adopting drone food delivery services.

5.2. Managerial implications

From the standpoint of food service companies, it is important to

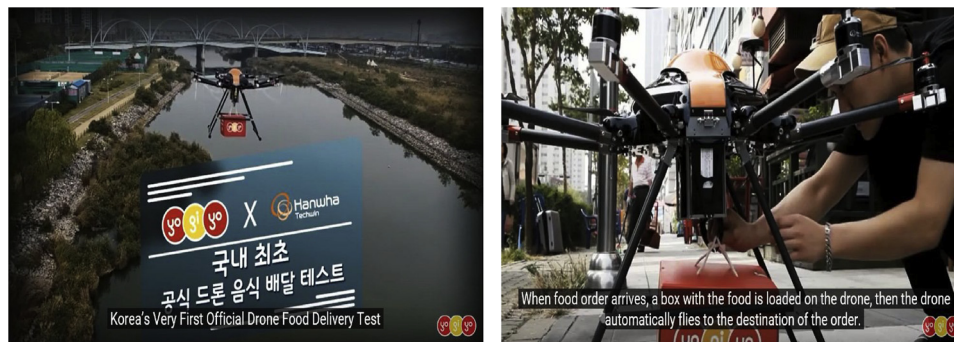


Fig. A1. Screenshot from videos.
Source from Yogiyo (2016)

emphasize the innovativeness of drone food delivery services through advertising and publicity in order to enhance attitude and behavioral intentions. For instance, it is recommended to emphasize that drone food delivery services are far superior to traditional delivery services in that they can avoid traffic congestion, delivering food more quickly. In addition, about 1500 people are injured and nearly 30 people die every year due to traffic accidents during delivery in Korea, and even more sadly, about 50% of victims who lose their lives are younger than 30 (Asia Economy, 2017). Therefore, it is necessary to inform that the introduction of drone food delivery services can reduce unfortunate victims. Lastly, most food service companies currently offer motorcycle or car delivery services, which have a significant impact on environmental pollution. As the drones are operated by electricity, drone food delivery services can also play an important role in protecting the environment (Goodchild and Toy, 2018), so food companies need to emphasize the role of environmental protection of drone food delivery services.

The results of this study revealed that gender and age differences in terms of drone food delivery services, suggesting the importance of focusing on a target market. A target market, a segment that needs to focus efficiently and effectively based on product characteristics, is considered an important marketing tool that has a significant impact on profits (Kotler et al., 2009; Lee et al., 2006). For example, food service companies are recommended to choose females as targets and promote drone food delivery services. By doing so, the companies would gain greater advertising effectiveness. In addition, it will be more efficient

and effective if food service companies first aim at younger people when designing advertising or promotional materials, which makes younger people have higher levels of word-of-mouth intentions than older people.

6. Limitations and future research

Although this study provides important theoretical and practical implications, the following limitations remain. First, this study was conducted in Korea. Thus, in order to validate the models presented in this study, future studies may need to collect data from other regions. Second, since the background of this study is drone food delivery services, it is rather difficult to apply the results of this study to other delivery industries. Third, according to the theory of the technology acceptance model (Davis, 1989), perceived usefulness and perceived ease of use are important predictors of attitude, so it will be worthy to use the two predictors in explaining attitude for future research. Lastly, consumers tend to have perceived risks when using new technology-based services (Im et al., 2008; Martins et al., 2014). Therefore, it would be good to study the perceived risks of consumers when using drone food delivery services in future studies.

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Appendix A

See Fig. A1.

References

- Aaker, D., 2007. Innovation: Brand it or lose it. *CA. Manage. Rev.* 50 (1), 8–24.
- Ahlstrom, D., 2010. Innovation and growth: how business contributes to society. *Acad. Manag. Perspect.* 24 (3), 11–24.
- Ahuja, M.K., 2002. Women in the information technology profession: a literature review, synthesis and research agenda. *Eur. J. Inf. Syst.* 11 (1), 20–34.
- Ajzen, I., 1985. From intentions to actions: a theory of planned behavior. *Action Control*. Springer, Berlin Heidelberg, pp. 11–39.
- Ajzen, I., 1991. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* 50 (2), 179–211.
- Ajzen, I., Fishbein, M., 2000. Attitudes and the attitude-behavior relation: reasoned and automatic processes. *Eur. Rev. Soc. Psychol.* 11 (1), 1–33.
- Alksasbeh, M.Z.S., 2012. Integrating Mobile Technology Quality Service, Trust and Cultural Factors into Technology Acceptance of Mobile Learning: a Case of the Jordan Higher Education Institution (Doctoral Dissertation). Universiti Utara Malaysia.
- Al-Queisi, K., Dennis, C., Alamanos, E., Jayawardhena, C., 2014. Website design quality and usage behavior: unified theory of acceptance and use of technology. *J. Bus. Res.* 67 (11), 2282–2290.
- Asia Economy, 2017. “Stop Fast, Now” ... Every Year 1548 Food Deliveries, Dead or Injured During Delivery. Retrieved from <http://www.asiae.co.kr/news/view.htm?idxno=2017092611430473709> (Accessed on 26 September 2017).
- Bagozzi, R.P., Yi, Y., 1988. On the evaluation of structural equation models. *J. Acad. Mark. Sci.* 16 (1), 74–94.
- Bagozzi, R.P., Dholakia, U.M., Basuroy, S., 2003. How effortful decisions get enacted: the motivating role of decision processes, desires, and anticipated emotions. *J. Behav. Decis. Mak.* 16 (4), 273–295.
- Banerjee, S., Soberman, D.A., 2013. Product development capability and marketing strategy for new durable products. *Int. J. Res. Mark.* 30 (3), 276–291.
- Bem, S.L., 1981. Gender schema theory: a cognitive account of sex typing. *Psychol. Rev.* 88 (4), 354.
- Boisvert, J., Ashill, N.J., 2011. How brand innovativeness and quality impact attitude toward new service line extensions: the moderating role of consumer involvement. *J. Serv. Mark.* 25 (7), 517–527.
- Byrne, B.M., 2001. Structural equation modeling: perspectives on the present and the future. *Int. J. Test.* 1 (3–4), 327–334.
- Byun, J., Jang, S.S., 2018. “To compare or not to compare?”: comparative appeals in destination advertising of ski resorts. *J. Destin. Mark. Manag.* 10, 143–151.
- Chen, Y., Yan, X., Fan, W., Gordon, M., 2015. The joint moderating role of trust propensity and gender on consumers’ online shopping behavior. *Comput. Hum. Behav.* 43, 272–283.
- Chou, C., Wu, H.C., Chen, C.H., 2011. Re-visiting college students’ attitudes toward the internet-based on a 6-T model: gender and grade level difference. *Comput. Educ.* 56 (4), 939–947.
- Danneels, E., Kleinschmidt, E.J., 2001. Product innovativeness from the firm’s

- perspective: its dimensions and their relation with project selection and performance. *J. Prod. Innov. Manage.* 18 (6), 357–373.
- Davis, F.D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Mis Q.* 319–340.
- Digital Daily, 2016. Yogiyo, Drone Food Delivery Test Success. Retrieved from <http://news.naver.com/main/read.nhn?mode=LSD&mid=sec&sid1=105&oid=138&aid=0002045372> (Accessed on 24 November 2016).
- Drone, D.J., 2018. The 2018 Winter Olympics Close with Another Spectacular “Shooting Star” Drone Show From Intel. Retrieved from <https://dronedj.com/2018/02/25/2018-winter-olympics-shooting-star-intel-drone-show/> (Accessed on 1 February 2018).
- Dronethusiast, 2018. The History of Drones (drone History Timeline From 1849 to 2018). Retrieved from <https://www.dronethusiast.com/history-of-drones/> (Accessed on 1 December 2018).
- Eagly, A.H., Chaiken, S., 1993. *The Psychology of Attitudes*. Harcourt Brace Jovanovich College Publishers.
- Eisend, M., Evanschitzky, H., Gilliland, D.I., 2016. The influence of organizational and national culture on new product performance. *J. Prod. Innov. Manage.* 33 (3), 260–276.
- Falkenreck, C., Wagner, R., 2011. The impact of perceived innovativeness on maintaining a buyer–seller relationship in health care markets: a cross-cultural study. *J. Mark. Manag.* 27 (3–4), 225–242.
- Fan, Y.W., Miao, Y.F., 2012. Effect of electronic word-of-mouth on consumer purchase intention: the perspective of gender differences. *Int. J. Electron. Bus. Manage.* 10 (3), 175.
- Faqih, K.M., Jaradat, M.I.R.M., 2015. Assessing the moderating effect of gender differences and individualism–collectivism at individual-level on the adoption of mobile commerce technology: TAM3 perspective. *J. Retail. Consum. Serv.* 22, 37–52.
- Fishbein, M., Ajzen, I., 1975. *Belief, Attitude, Intention and Behavior: an Introduction to Theory and Research*.
- Forbes, 2018. Uber Plans to Launch Food-delivery Drones. Retrieved from <https://www.forbes.com/sites/lanabandoim/2018/10/23/uber-plans-to-launch-food-delivery-drones/#19447cf5e147> (Accessed on 1 October 2018).
- Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: algebra and statistics. *J. Mark. Res.* 18 (3), 382–388.
- Fu, F.Q., Elliott, M.T., 2013. The moderating effect of perceived product innovativeness and product knowledge on new product adoption: an integrated model. *J. Mark. Theory Pract.* 21 (3), 257–272.
- González-Gómez, F., Guardiola, J., Rodríguez, Ó.M., Alonso, M.Á.M., 2012. Gender differences in e-learning satisfaction. *Comput. Educ.* 58 (1), 283–290.
- Goodchild, A., Toy, J., 2018. Delivery by drone: an evaluation of unmanned aerial vehicle technology in reducing CO2 emissions in the delivery service industry. *Transp. Res. D Transp. Environ.* 61, 58–67.
- Han, H., Hyun, S.S., 2017a. Key factors maximizing art museum visitors’ satisfaction, commitment, and post-purchase intentions. *Asia Pacific J. Tour. Res.* 22 (8), 834–849.
- Han, H., Hyun, S.S., 2017b. Drivers of customer decision to visit an environmentally responsible museum: merging the theory of planned behavior and norm activation theory. *J. Travel Tour. Mark.* 34 (9), 1155–1168.
- Han, H., Hsu, L.T.J., Lee, J.S., 2009. Empirical investigation of the roles of attitudes toward green behaviors, overall image, gender, and age in hotel customers’ eco-friendly decision-making process. *Int. J. Hosp. Manag.* 28 (4), 519–528.
- Han, H., Meng, B., Kim, W., 2017. Emerging bicycle tourism and the theory of planned behavior. *J. Sustain. Tour.* 25 (2), 292–309.
- Harris, M., Cox, K.C., Musgrove, C.F., Ernstberger, K.W., 2016. Consumer preferences for banking technologies by age groups. *Int. J. Bank Mark.* 34 (4), 587–602.
- Harrison-Walker, L.J., 2001. The measurement of word-of-mouth communication and an investigation of service quality and customer commitment as potential antecedents. *J. Serv. Res.* 4 (1), 60–75.
- Hennig-Thurau, T., Gwinner, K.P., Gremler, D.D., 2002. Understanding relationship marketing outcomes: an integration of relational benefits and relationship quality. *J. Serv. Res.* 4 (3), 230–247.
- Hirschman, E.C., 1980. Innovativeness, novelty seeking, and consumer creativity. *J. Consum. Res.* 7 (3), 283–295.
- Hung, S.Y., Chang, C.M., Yu, T.J., 2006. Determinants of user acceptance of the e-government services: the case of online tax filing and payment system. *Gov. Inf. Q.* 23 (1), 97–122.
- Im, S., Mason, C.H., Houston, M.B., 2007. Does innate consumer innovativeness relate to new product/service adoption behavior? The intervening role of social learning via vicarious innovativeness. *J. Acad. Mark. Sci.* 35 (1), 63–75.
- Im, I., Kim, Y., Han, H.J., 2008. The effects of perceived risk and technology type on users’ acceptance of technologies. *Inf. Manag.* 45 (1), 1–9.
- Jeon, H.M., Ali, F., Lee, S.W., 2018. Determinants of consumers’ intentions to use smartphones apps for flight ticket bookings. *Serv. Ind. J.* 1–18.
- Johnson, J.D., Donohue, W.A., Atkin, C.K., Johnson, S., 2001. Communication, involvement, and perceived innovativeness: tests of a model with two contrasting innovations. *Group Org. Manage.* 26 (1), 24–52.
- Joiner, R., Gavin, J., Brosnan, M., Cromby, J., Gregory, H., Guillier, J., Maras, P., Moon, A., 2012. Gender, internet experience, internet identification, and internet anxiety: a ten-year followup. *Cyberpsychol. Behav. Soc. Netw.* 15 (7), 370–372.
- Kaplan, M.D., 2009. The relationship between perceived innovativeness and emotional product responses: a brand oriented approach. *Innov. Mark.* 5 (1), 39–47.
- Keller, K.L., 1993. Conceptualizing, measuring, and managing customer-based brand equity. *J. Mark.* 57 (1), 1–22.
- Kiatkawin, K., Han, H., 2017a. Young travelers’ intention to behave pro-environmentally: merging the value-belief-norm theory and the expectancy theory. *Tour. Manag.* 59, 76–88.
- Kiatkawin, K., Han, H., 2017b. An alternative interpretation of attitude and extension of the value–attitude–behavior hierarchy: the destination attributes of Chiang Mai, Thailand. *Asia Pac. J. Tour. Res.* 22 (5), 481–500.
- Kleinschmidt, E.J., Cooper, R.G., 1991. The impact of product innovativeness on performance. *J. Prod. Innov. Manage.* 8 (4), 240–251.
- Koenigstorfer, J., Groeppel-Klein, A., 2012. Consumer acceptance of the mobile Internet. *Mark. Lett.* 23 (4), 917–928.
- Kotler, P., Bowen, J.T., Makens, J.C., 2009. *Marketing for Hospitality and Tourism*. Prentice Hall.
- Kucukusta, D., Law, R., Besbes, A., Legohérel, P., 2015. Re-examining perceived usefulness and ease of use in online booking: the case of Hong Kong online users. *Int. J. Contemp. Hosp. Manag.* 27 (2), 185–198.
- Lafferty, B.A., Goldsmith, R.E., 2004. How influential are corporate credibility and endorser attractiveness when innovators react to advertisements for a new high-technology product? *Corp. Reput. Rev.* 7 (1), 24–36.
- Langerak, F., Jan Hultink, E., 2006. The impact of product innovativeness on the link between development speed and new product profitability. *J. Prod. Innov. Manage.* 23 (3), 203–214.
- Leckie, C., Nyadzayo, M.W., Johnson, L.W., 2017. Promoting brand engagement behaviors and loyalty through perceived service value and innovativeness. *J. Serv. Mark.* 32 (1), 70–82.
- Lee, G., Morrison, A.M., O’Leary, J.T., 2006. The economic value portfolio matrix: a target market selection tool for destination marketing organizations. *Tour. Manag.* 27 (4), 576–588.
- Lee, J.S., Hsu, L.T., Han, H., Kim, Y., 2010. Understanding how consumers view green hotels: how a hotel’s green image can influence behavioural intentions. *J. Sustain. Tour.* 18 (7), 901–914.
- Lian, J.W., Yen, D.C., 2014. Online shopping drivers and barriers for older adults: age and gender differences. *Comput. Hum. Behav.* 37, 133–143.
- Lin, X., Featherman, M., Sarker, S., 2017. Understanding factors affecting users’ social networking site continuance: a gender difference perspective. *Inf. Manag.* 54 (3), 383–395.
- Martins, C., Oliveira, T., Popovič, A., 2014. Understanding the internet banking adoption: a unified theory of acceptance and use of technology and perceived risk application. *Int. J. Inf. Manage.* 34 (1), 1–13.
- Munoz-Leiva, F., Climent-Climent, S., Liébana-Cabanillas, F., 2017. Determinants of intention to use the mobile banking apps: an extension of the classic TAM model. *Span. J. Market.-ESIC* 21 (1), 25–38.
- National Defense, 2017. Worldwide Military Drone Production to Swell Over Next Decade. Retrieved from <http://insideunmannedsystems.com/civilian-drone-market-worth-73-5-billion-2026/> (Accessed on 6 September 2017).
- New York Post, 2017. Drone Food Delivery Service is off the Ground in Iceland. Retrieved from <https://nypost.com/2017/08/24/drone-food-delivery-service-is-off-the-ground-in-iceland/> (Accessed on 24 August 2017).
- Nosek, B.A., Banaji, M.R., Greenwald, A.G., 2002. Harvesting implicit group attitudes and beliefs from a demonstration web site. *Group Dyn. Theory Res. Pract.* 6 (1), 101.
- Nunnally, J.C., Bernstein, I.H., 1978. *Psychometric Theory*.
- O’cass, A., Carlson, J., 2012. An empirical assessment of consumers’ evaluations of web site service quality: conceptualizing and testing a formative model. *J. Serv. Mark.* 26 (6), 419–434.
- Oliver, R.L., Rust, R.T., Varki, S., 1997. Customer delight: foundations, findings, and managerial insight. *J. Retail.* 73 (3), 311–336.
- Ong, C.S., Lai, J.Y., 2006. Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Comput. Hum. Behav.* 22 (5), 816–829.
- Ottenbacher, M.C., Harrington, R.J., 2009. The product innovation process of quick-service restaurant chains. *Int. J. Contemp. Hosp. Manage.* 21 (5), 523–541.
- Phau, I., Teah, M., Lim, A., Ho, R., 2015. A brief affair with underwear: uniqueness and innovativeness in male underwear brand purchase. *J. Glob. Fashion.* 6 (3), 222–235.
- Porter, C.E., Donthu, N., 2006. Using the technology acceptance model to explain how attitudes determine internet usage: the role of perceived access barriers and demographics. *J. Bus. Res.* 59 (9), 999–1007.
- Roehrich, G., 2004. Consumer innovativeness: concepts and measurements. *J. Bus. Res.* 57 (6), 671–677.
- Seebode, D., Jeanrenaud, S., Bessant, J., 2012. Managing innovation for sustainability. *R. & D. Manage.* 42, 195–206.
- Slade, E.L., Dwivedi, Y.K., Piercy, N.C., Williams, M.D., 2015. Modeling consumers’ adoption intentions of remote mobile payments in the United Kingdom: extending UTAUT with innovativeness, risk, and trust. *Psychol. Mark.* 32 (8), 860–873.
- Steenkamp, J.B.E., Baumgartner, H., 1998. Assessing measurement invariance in cross-national consumer research. *J. Consum. Res.* 25 (1), 78–90.
- Stock, R.M., 2011. How does product program innovativeness affect customer satisfaction? A comparison of goods and services. *J. Acad. Mark. Sci.* 39 (6), 813–827.
- Terzis, V., Economides, A.A., 2011. Computer based assessment: gender differences in perceptions and acceptance. *Comput. Human Behav.* 27 (6), 2108–2122.
- The Japan Times, 2018. Drones Playing Bigger Role in Japanese Crop Management. Retrieved from https://www.japantimes.co.jp/news/2018/02/22/national/drones-playing-bigger-role-japanese-crop-management/#.WqR_IHF619A (Accessed on 22 February 2018).
- The National, 2017. Watch: Drone Delivers Costa coffee on Kite Beach in Dubai. Retrieved from <https://www.thenational.ae/lifestyle/food/watch-drone-delivers-costa-coffee-on-kite-beach-in-dubai-1.661444> (Accessed on 25 September 2017).
- The Straits Times, 2018. Australia Life-saving Drone Rescues Two Boys in Rough Seas. Retrieved from <http://www.straitstimes.com/asia/australianz/australia-lifesaving-drone-rescues-two-boys-in-rough-seas> (Accessed on 1 January 2018).

- Van Slyke, C., Comunale, C.L., Belanger, F., 2002. Gender differences in perceptions of web-based shopping. *Commun. ACM* 45 (8), 82–86.
- Venkatesh, V., Morris, M.G., 2000. Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *Mis Q.* 24 (1), 115–139.
- Venkatesh, V., Morris, M.G., Ackerman, P.L., 2000. A longitudinal field investigation of gender differences in individual technology adoption decision-making processes. *Org. Behav. Hum. Decis. Process.* 83 (1), 33–60.
- Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D., 2003. User acceptance of information technology: toward a unified view. *Mis Q.* 27 (3), 425–478.
- Wang, H.Y., Wang, S.H., 2010. User acceptance of mobile internet based on the unified theory of acceptance and use of technology: investigating the determinants and gender differences. *Soc. Behav. Personal. Int. J.* 38 (3), 415–426.
- Wang, Y.S., Wu, M.C., Wang, H.Y., 2009. Investigating the determinants and age and gender differences in the acceptance of mobile learning. *Br. J. Educ. Technol.* 40 (1), 92–118.
- Warshaw, P.R., Davis, F.D., 1985. Disentangling behavioral intention and behavioral expectation. *J. Exp. Soc. Psychol.* 21 (3), 213–228.
- Watchravesringkan, K., Nelson Hodges, N., Kim, Y.H., 2010. Exploring consumers' adoption of highly technological fashion products: the role of extrinsic and intrinsic motivational factors. *J. Fash. Market. Manage. Int. J.* 14 (2), 263–281.
- Wu, W.Y., Ke, C.C., 2015. An online shopping behavior model integrating personality traits, perceived risk, and technology acceptance. *Soc. Behav. Personal. Int. J.* 43 (1), 85–97.
- Yang, K.C., 2005. Exploring factors affecting the adoption of mobile commerce in Singapore. *Telemat. Inform.* 22 (3), 257–277.
- Yelkur, R., Chakrabarty, S., 2006. Gender differences in service quality expectations in the fast food industry. *Serv. Mark. Q.* 27 (4), 141–151.
- Yi, Y., Gong, T., 2008. The effects of customer justice perception and affect on customer citizenship behavior and customer dysfunctional behavior. *Ind. Mark. Manage.* 37 (7), 767–783.
- Yogiyo, 2016. Korea's Very First Official Drone Food Delivery Test. Retrieved from <https://www.youtube.com/watch?v=-BxAqGSgs1Y> (Accessed on 23 November 2016).
- Yousafzai, S., Yani-de-Soriano, M., 2012. Understanding customer-specific factors underpinning internet banking adoption. *Int. J. Bank Mark.* 30 (1), 60–81.
- Zeithaml, V.A., Berry, L.L., Parasuraman, A., 1996. The behavioral consequences of service quality. *J. Mark.* 60 (2), 31–46.
- Zhou, J., Rau, P.L.P., Salvendy, G., 2014. Older adults' use of smart phones: an investigation of the factors influencing the acceptance of new functions. *Behav. Inf. Technol.* 33 (6), 552–560.