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Is the Covid-19 pandemic strong enough to change the online order delivery methods? Changes in the relationship between attitude and behavior towards order delivery by drone

Ümit Yaprak a,*, Fatih Kılıç a, Abdullah Okumuş b

a Institute of Social Science, Marketing Ph.D Program, Istanbul University, Istanbul, Turkey
b Marketing Department, School of Business, Istanbul University & Dean Faculty of Transportation and Logistics, Istanbul University

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ABSTRACT

Delivery of products in online orders by drones has begun to be tested by major retailers. How about consumers? Are they ready for this? Due to the emergence of Covid-19 and its easy transmission from person to person, considering the risks in the streets, a lot of people have started to place their orders online. However, the interaction between the courier and the consumer during the order delivery has become a problem over time. Reducing people’s anxiousness in such pandemic situations brings uncertainty about the delivery of the orders. The object of the research is to create a drone delivery system, which is an alternative delivery system that will be solution to these problems and is also used in a limited way around the world. With this study, whose theoretical background is based on the diffusion of innovations theory, technology acceptance model and protection motivation theory, it is aimed to test the relationship between consumer’s perceptions, attitudes and behavioral intentions towards drone delivery of online orders. In this research, questionnaire method has been used for data collection and measurement. Moreover, the Structural Equation Modeling approach has been used for data analysis and validation of models. According to the results of this study, significant relationships have been identified between the consumers’ perception of benefit and risk, and attitudes and behavioral intentions towards drone delivery of online orders during pandemics.

1. Introduction

Covid-19 (SARS-CoV-2), which has started in December 2019 in Wuhan, China as a local outbreak whose cause is unknown, has quickly begun to spread to other cities of the country (Blackburn et al., 2020). This pandemic, which is a serious acute respiratory disease, has also reached many countries of the world with more than 70,000 confirmed cases and thousands of deaths as of February 2020 (Lancet Infect Dis 2020; Jianjun, et al., 2020). According to the report published by World Health Organization (WHO), it has been announced that as of March 19, 2020 in line with the information obtained from the national authorities, the number of cases exceeded 200,000. While the first 100,000 of these cases occurred within a three-month period, the other 100,000 cases occurred only in 12 days (World Health Organisation, 2020). It is reported in WHO’s website that numbers increased and as of May 11, 2020, confirmed cases exceeded 4 million worldwide and the virus spread to 215 countries, having around 280,000 deaths. According to the explanations both WHO and the United States Department of Health and Human Services have made, Covid-19 is announced as pandemic on March 11 due to the worldwide spread of a new disease and its affect on the majority of people (London Business School, 2020).

Looking at the history of infectious diseases affecting the vast majority of people; in the 14th century the bubonic plague, which is also known as “Black Death”, 1918-1920 Spanish flu, 1981 AIDS epidemic, 2002-2004 SARS outbreak, 2009 Avian influenza, 2014-2016 Ebola epidemic and lastly Covid-19 threatened the mankind (London Business School, 2020). As a result of these outbreaks, naturally, there have been differences in people’s daily lives. Due to the emergence of Covid-19 and its easy transmission from person to person, considering the risks in the streets, a lot of people have started to place their orders online (Online water order, 2020). However, the interaction between the courier and the consumer during order delivery has become a problem over time. This situation appears as a problem in order delivery. Such pandemic situations bring uncertainty about the delivery of the online orders.
Technological change has become a need for enterprises to achieve their various aims. This change is about paving the way for previous plans or expectations, keeping up with the times, and achieving balance with competitors (Ayres, 1989: 51; Koc, 2017). Every technological innovation provides convenience with itself (Chesbrough, 2020; Schmidthuber et al., 2020). Recently, businesses have focused on service improvement actions for the delivery of orders by drone. Up to the present, the various difficulties of this method have made it difficult to integrate into our everyday lives. However, businesses especially tech businesses, have started to make significant strides in this regard (Levy, 2017). According to research conducted in the US, regardless of Covid-19, the consumers appear to be in the process of embracing services by drone delivery. According to the results of this research, 47% of the consumers are interested in drone delivery, 29% of them will utilize drone delivery within the next five years (2022), and 23% of them will care about this technology in the current situation, as well (Statista, 2017). Drone delivery, which started to be viewed as the future delivery system (Statista, 2017; Lidynia et al., 2017; 2018), is being prepared to replace traditional delivery systems and this new logistics infrastructure offers solutions for both human health problems and the environmental problems (Zhu, 2020).

The theoretical background of the study consists of diffusion of innovations theory (Rogers, 1983), technology acceptance model (Davis, 1989), and protection motivation theory (Rogers, 1975). In diffusion of innovations theory, in order to describe the dimensions of accepting a new idea, Rogers (1983) explains how the innovation is perceived by individuals with relative advantage (degree of an advantage over a precursor), complexity (difficulty perceived by the individual about the innovation), compatibility (consistency of the innovation with past and future), trialability (ease of the trial) and observability (the degree of innovation being transferred from individual to individual). Technology acceptance model, developed by Davis (1989), is an approach used for describing the acceptance and usage behaviors of the new technologies on an individual basis. It is accepted that the perceived ease of use and perceived usefulness shape intentions which are formed for the acceptance and use of information technologies. For the protection motivation theory, it is stated that when individuals face threats to their health and safety, they tend to protect themselves and, in this context, they gravitate to change their behaviors and attitudes (Rogers, 1975). All of these theories, which are related to each other, are theories quite often used in explaining consumer behavior in the marketing field (Lopez-Nicolás et al., 2008; Kang, Mun, & Johnson, 2015; Min et al., 2019; Sun, Wang and Shen, 2020; Rehman, Baharun and Salleh, 2020). In this context, the relationships between consumers’ risk perception and usage intentions towards drone delivery of online orders during the Covid-19 have been tested and examined thorough developed hypotheses.

2.1. Diffusion of Innovations Theory

Rogers (1983) introduced the diffusions of innovations theory, bringing a new perspective to the studies on the consumers’ process of adaption to innovations. According to Rogers (1983), quoting from Sanson-Fisher (2004), and Kamal, et. al. (2020) this theory describes the process of spreading innovations, new practices of the new ideas in society. In the process of spreading innovations, individuals can either adapt to a technology, innovation or reject them (Yuen, Wang, X, Ng, and Wong, 2018). The decision process consists of basically five phases in the diffusion of innovations in individuals, these are: knowledge, persuasion, decision, implementation, and confirmation (Yuen, Wang, X, Ng and Wong, 2018; Talke and Heidenreich, 2014; Wijaya, 2015). In the first stage, individuals try to get information about the innovation and try to make sense of this innovation. In the second stage, individuals start to investigate the source of this innovation and evaluate the credibility of the source. In the third stage, individuals either accept or reject the innovation in question. In the fourth stage, after they accept the innovation, individuals start to implement it. In the fifth and last stage, individuals evaluate the innovation they accepted and implemented, and they look for ways to support their decision.

According to the Diffusion of Innovations theory these five elements play an important role; (1) Relative Advantage (economic profit or perceived convenience), (2) Complexity (ease of use or trial), (3) Compatibility (assets in hand, consistency with the past and needs, and experiences of the adopters), (4) Observability (Evaliubility), and (5) Trialability (prior evaluation) (Min, So and Jeong 2019). Previous literature has showed that “Relative Advantage, Complexity, and Compatibility” elements are more prominent in the diffusion and adaptation of innovations (Agarwal & Prasad, 1998; Kang, Mun, & Johnson, 2015; Tornatzky & Klein, 1982). Therefore, “Relative Advantage and Compatibility” of the Diffusion of Innovations Theory are added to the research model of this study.

Since the Diffusion of Innovations Theory’s sub-dimensions (Relative Advantage and Compatibility) and technology acceptance model’s sub-dimensions (perceived usefulness and perceived ease of use) will be tested together in research model, the main hypothesis for this aspect is proposed as follows;

H1: There is a positively significant relationship between consumers’ perception of usefulness of drone delivery in their online orders during pandemics and their attitude to drone delivery in online orders.

2.1.1. Relative Advantage

Relative advantage refers to the advantage that individuals perceive...
about the innovation when an innovation comes to life rather than its intellectual dimension. In short, whether an innovation is advantageous when it comes to life or not (Hashem, and Tann, 2007). Relative advantage can be considered in the eyes of consumers by factors such as economic, social prestige, ease of use, utility, suitability, and satisfaction. When we consider order delivery by drone, delivery of orders by drone has been perceived by consumers as fast and environmentally friendly in the studies that have been conducted about this (Soffronoff et al., 2016; Joerss et al., 2016; Yoo et al, 2018). In this study, the hypothesis is proposed as follows to test the relative advantages consumers perceive about idea of delivery of online orders by drone, and attitudes towards the idea of order delivery by drone;

2.1.2. Compatibility

Compatibility can be defined as the degree to which an innovation meets the needs of potential customers with past experiences and existing values (Rogers, 1983; quoting Sanson-Fisher, 2004; Kamal, et al. 2020). Compatibility plays an important role when consumers evaluate new technologies, if they overlap with the perceived usefulness and the ease of use of technologies they experienced in the past. Previous studies have shown that there is a positive relationship between compatibility and consumers’ adaptation to new technologies. Min, So, and Jeong (2019) confirmed that in the customers’ adaptation processes to the Uber mobile application, compatibility characteristic has been found to have a positive effect on perceived usefulness and perceived ease of use. Therefore, we can say that compatibility dimension has an affect on the attitude. This study aims to test how compatible consumers perceive the drone delivery idea, in accordance with their own experiences and habit, and to what extent this idea will meet their needs. To achieve this goal, the following hypothesis is proposed;

H1.2: Perceived compatibility positively affects consumer attitudes in drone delivery of online orders.

2.2. Technology Acceptance Model and Its Development

Development of information and communication technologies brings many innovations. There are many theoretical studies in the previous literature on the acceptance and diffusion of these innovations. Among these theoretical studies the ones that stand out are; Diffusion of Innovations Theory (Rogers, 2003), Theory of Reasoned Action (Fishbein and Ajzen, 1975), Theory of Planned Behavior (Ajzen 1991), Technology Acceptance Model (Davis, 1989). Later on, technology acceptance model was developed and ‘Unified Theory of Acceptance and Use of Technology” was put forward by Venkatesh, Moris, Davis and Davis (2003). Finally, this theory was updated as “Unified Theory of Acceptance and Use of Technology 2”, by Venkatesh, Thong and Xu (2012).

Rogers (2003) defined diffusion as the process in which an innovation is communicated through certain channels over time among the members of a social system. He explained the process of diffusion of innovation in communication processes by including factors affecting the perceptions of potential adopters about innovation in the process of introducing technological innovations. Fishbein and Arjen (1975) used the theory of planned behavior, which is one of the most fundamental theory of human behavior, to understand the reasons of various behaviors, and to have profound knowledge on how attitude and subjective norms and behavioral intentions are correlated. Ajzen (1991) introduced the theory of planned behavior by adding behavioral control to the theory of reasoned action. Theory of planned behavior is used to understand individual acceptance of information system products (Shih and Fang, 2004). Davis (1989) tested the acceptability of information systems with perceived usefulness and perceived ease of use. Later on, he introduced The Unified Theory of Acceptance and Use of Technology, which is a combination of eight different models and theories (Venkatesh et al. 2003). Finally, Venkatesh et al. (2012) analysed the consumers’ use and acceptance of technology through The Unified Theory of Acceptance and Use of Technology, with a different perspective from other models.

Similar to the theory of planned behavior, technology acceptance model is considered to be an extension of the theory of reasoned action. However, instead of being a general model for individual behavior in the social environment, the technology acceptance model clearly focuses on technology acceptance behaviors of computer users (Davis, 1985; Davis, 1989; Davis et al. 1989). The main purpose of technology acceptance model is to analyse how external factors, such as system dynamics, certification, education affect individual beliefs, attitude and intentions. It is assumed that two perceptions, perceived usefulness and perceived ease of use, are important determinants in technology acceptance model (Davis, 1989). Table 1 shows the short definitions of variables used in the technology acceptance model.

While the perceived usefulness and perceived ease of use constitute two external structures in the Technology Acceptance Model, attitude and behavioral intention constitutes two internal structures (Min et al. 2019; 771). Perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance”, and perceived ease of use is defined as “the degree to which a person believes that using a particular system would be free from effort” (Van der Heijden, 2003: 542).

Min, So and Jeong (2019) tested the consumers’ adaptation to the new technology, Uber mobile application. In this context, the relative advantage of the Uber mobile application was found to have a positive effect on the perceived usefulness (PU) of consumers and the perceived ease of use (PEOU). Another study found out that the benefits of using mobile application in banking has a positive affect on consumers’ PU and PEOU (Lee, Hsieh and Hsu, 2011; Shin and Fang, 2004) (Soffronoff et al. 2016; Yoo et al, 2018). The following hypotheses are proposed in the idea of delivery of online orders by drone, with the aim of testing consumers’ attitude towards this services’ perceived usefulness and the ease of use they perceived for this service;

H1.3: The ease of use that consumers perceive in online delivery by drone positively affects consumers’ attitudes towards online delivery by drone.

H1.4: The usefulness consumers perceive in online delivery by drone positively affects consumers’ attitudes towards online delivery by drone.

Attitude refers to a person who creates positive or negative feelings towards adopting a certain technology. This, in turn, leads to the intention of using a particular technology and helps its adaptation (Wang, et al. 2012; Kim, 2016: 1537). Past studies have revealed that perceived usefulness and perceived ease of use have a positive effect on behavioral intentions (Chin and Todd, 1995; Sahin and Alkaya, 2017; Kalyoncuoglu, 2018). In their study Min, So and Jeong (2019) confirmed the consumers’ perceived usefulness and perceived ease of use toward using Uber mobile application affects their attitude towards using the app, and this attitude positively affects their intentions to use new technologies. Considering the previous studies, the following hypothesis is proposed as follows to test behavioral intention and attitude towards drone delivery, within the model of this research.

Table 1

| Technology acceptance model variables | Variables | Explanation |
|--------------------------------------|-----------|-------------|
|                                       | Behavioral Intention | It refers to an individual’s intention to perform a behavior and is a function of attitude and perceived usefulness. |
|                                       | Attitude | It refers to an individual’s evaluation of a behavior as positive or negative and is a function of perceived usefulness and perceived ease of use. |
|                                       | Perceived Usefulness | It refers to an individual’s beliefs that using a particular system would enhance their job performance. |
|                                       | Perceived Ease of Use | It refers to the individual’s belief that using a particular system would be free from effort. |

Source: Davis et al. (1989).
H2: There is a positively significant relationship between consumers’ attitude towards drone delivery of online orders and their behavioral intention towards drone use in the delivery of online orders.

2.3. Operational Risk Perception

Theory of perceived risk has been used in explaining consumer behavior since 1960s (Bauer, 1960, quoted Lee, 2009; Featherman and Pavlou, 2003). There are many studies on the perceived risk in the previous literature, and various definitions have been made on this notion. Peter and Ryan (1976, quoted Lee 2009) defined the perceived risk as the loss one expects. Featherman and Pavlou (2003) defined perceived risk as the potential loss that occurs when one attempts to achieve the goals one desires.

Consumers consciously or unconsciously perceive certain rates of risk towards new technologies (Featherman and Pavlou, 2003). Many researchers have suggested that the perceived risk is multidimensional. In previous literature, perceived risk is often defined as a six-dimensional. These dimensions are defined as: social, financial, performance, physical, privacy, and time risks (Lee, 2009; Featherman and Pavlou 2003; Jacoby and Kaplan, 1972). In this study, the risks that consumers perceive towards drone delivery are conceptualized as “operational risks” and the following hypothesis is formed:

H3: There is a negative relationship between the operational risks consumers perceive towards drone delivery in their online orders and the attitude towards drone delivery of online orders.

Yoo et al. (2018) limited the risks perceived by consumers towards cargo transportation by drone as “Performance, Privacy and Delivery” risks, and tested them.

2.3.1. Performance Risk

Performance risk can be defined as the possibility of the product not performing at its designed standards (Grewal, Gotlieb, & Marmarostein, 1994). Featherman and Pavlou (2003) tested the performance risk in their study of consumers’ adaptations to e-service providers. Lee (2009) found out in a study, which tested the factors affecting adaptation processes to internet banking that performance risk affects adaptation processes. Also, Yoo et al. (2018) showed in their research on cargo transportation about drone vehicles that performance risk negatively affects consumers’ attitudes to this service. Based on studies in the previous literature, performance risk is hypothesized in this study as follows;

H3.1: The perceived performance risk of drone use in online orders negatively affects consumers’ attitudes towards drone delivery.

2.3.2. Delivery Risk

The risk consumers perceive if the products they bought are not delivered to their address can be defined as “delivery risk” (Lopez-Nicolas and Molina-Castillo, 2008). Yoo et al. (2018) tested the risk of delivery in cargo transportation by drone vehicles. Lopez-Nicolas and Molina-Castillo (2008) also tested delivery risk in their study aimed at consumers shopping through e-commerce sites. In this study, the risk of delivery is hypothesized as follows;

H3.2: The perceived delivery risk of drone use in online orders negatively affects consumers’ attitudes towards drone delivery.

2.3.3. Privacy Risk

Privacy risk can be defined as the leakage or dissemination of confidential information outside of consumers control, or the disappearance of privacy (Featherman and Pavlou, 2003). During the delivery of online orders by drone, there are risks such as interference in the privacy of households by malicious individuals (Soffronoff et al. 2016). Based on existing studies in the previous literature, privacy risk is hypothesized as follows in this study;

H3.3: The perceived privacy risk of using drone in online orders negatively affects consumers’ attitudes towards drone delivery.

2.4. Protection Motivation Theory

Protection Motivation Theory (PMT) argues that individuals tend to protect themselves when faced with threats, and they tend to change their behaviors and attitudes within this context (Rogers, 1975). This theory, which has often been used in the healthcare field, is used in protecting individuals from potential diseases (Milne, Sheeran and Orbell, 2000). Rogers (1975) mentions two basic cognitive assessment processes of PMT for individuals to protect themselves from potential threats. The first of these processes is Threat Appraisal and the other is Coping Appraisal. In the threat appraisal phase, the person first assesses the extent to which the potential threat will affect himself/herself (perceived severity) then the likelihood that the threat will occur (perceived vulnerability). In the second phase, how to deal with this threat is explained and, in this context, the effectiveness of the behavior, self-sufficiency to implement this behavior, and finally the cost of this behavior is evaluated (Rogers, 1975). According to PMT, two factors related to threat appraisals (perceived severity and perceived vulnerability) and two factors associated with coping appraisals (response efficacy and self efficacy) are proposed to positively affect protection motivation while response costs are proposed to negatively influence protection motivation (Sun, Wang and Shen, 2020).

Rogers (2003) defined diffusion as the process in which an innovation is communicated through certain channels over time among the members of a social system. He explained the process of diffusion of innovation in communication processes by including factors affecting the perceptions of potential adopters about innovation in the process of introducing technological innovations. Fishbein and Arjen (1975) used the theory of planned behavior, which is one of the most fundamental theory of human behavior, to understand the reasons of various behaviors, and to have profound knowledge on how attitude and subjective norms and behavioral intentions are correlated. Ajzen (1991) introduced the theory of planned behavior by adding behavioral control to the theory of reasoned action. Theory of planned behavior is used to understand individual acceptance of information system products. Davis (1989) tested the acceptability of information systems with perceived usefulness and perceived ease of use. Later on, he introduced The Unified Theory of Acceptance and Use of Technology, which is a combination of eight different models and theories (Venkatesh et al. 2003). Finally, Venkatesh et al. (2012) analysed the consumers’ use and acceptance of technology through The Unified Theory of Acceptance and Use of Technology, with a different perspective from other models.

To give an example for better understanding of the appraisal processes of PMT, the fact that a doctor tells an over-weight person that they need to lose weight raises awareness of the person’s health. If the person takes this situation into account, he/she can maintain his/her health, otherwise, he/she may have a heart attack (perceived severity), die as a result, or have a stroke (perceived vulnerability) and this explains this process. In the first stage, the person first assesses what the threat is and its severity. He/she knows that they need to consume low-calorie food (response efficacy) that does not contain trans fats to cope with this (coping appraisal). At this stage they question whether they have the patience and perseverance (self efficacy) to sustain this kind of special diet. Ultimately, they question whether they have enough budget (response cost) for this particular dietary plan at the end of the entire process, and as a result decide whether or not to start the diet program (Neuwirth, Dunwoody and Griffin, 2000). While the factors that increase the protection motivation of the individual during this process are perceived severity, perceived vulnerability, self efficacy, and response efficacy, the response cost of this behavior can lower the motivation of the person.

In their study, Liang and Xue (2010) sought to understand the behavior of personal computer users to avoid cyber security threats. In the study, Technology Threat Avoidance Theory is tested with sub-dimensions of PMT. The study found out that personal computer users’ motivation to avoid technological threats was significantly
affected by perceived threat, security cost, self-sufficiency, and security effectiveness. In their study, Neuwirth, Dunwoody and Griffin (2000) investigated what behaviors people exhibit in case of a danger emerged from the mass media within the scope of PMT. The results of the research were in line with PMT. In their study Tsai, Jiang, Alhabash, LaRose, Rifon and Cotten (2016) measured the online risks faced by internet users within the scope of PMT. It has been confirmed that internet users’ threat appraisal against online risks and efforts of coping appraisal have been found to have a large impact on their intentions to take internet security measures. In another study, Sun, Wang and Shen (2020) expanded the PMT and applied the configurational protection motivation theory. The study measured the adaptations of Chinese people to mobile health services. The result of the study met theoretical expectations. In this study, considering the previous studies in literature, the dimensions of PMT were hypothesized and tested as follows:

H5: Consumers’ attitude towards drone delivery of online orders has a mediating effect between the perceived threat during pandemics and consumers’ behavioral intention towards drone use in the delivery of online orders.

H6: There is a positively significant relationship between the risk and threat consumers during pandemics.

H6.1: The perceived severity of pandemics positively affects the perceived threat.

H6.2: The perceived threat vulnerability of pandemics positively affects the perceived threat.

H6.3: During pandemics, the mass media channels positively affect the perceived threat.

H6.4: The perception of individual risk during pandemics positively affects the perceived threat.

H7: Consumers’ attitude towards drone delivery positively influences behavioral intention towards drone use.

H8: Consumers’ perceived threat level due to the pandemic positively affects behavioral intention towards drone use.

3. Method

In this part of the study, information about the purpose and importance of the research, the model of research and the sampling process, the data and information collection methods and tools used in the research, and the data analysis with its interpretation are given. The results of the study were interpreted within the scope and constraints of the research and various proposals were made.

3.1. Subject, Purpose and Importance of the Research

Covid-19 (SARS-CoV-2) has led to major changes both economically (Yoo & Managi 2020) and socially (Stoll, 2020). Due to the emergence of Covid-19 and its easy transmission from person to person, considering the risks in the streets, a lot of people have started to place their orders online (Online water order, 2020). However, the interaction between the courier and the consumer during order delivery has become a problem over time. This situation appears as a problem in order delivery. Such pandemic situations bring uncertainty about the delivery of the online orders (workload, 2020). The object of the research is to create a drone delivery system, which is an alternative delivery system that will be solution to these problems and is also used in a limited way around the world.

With this study, theoretical background of which is based on the diffusion of innovations theory, technology acceptance model and protection motivation theory, it is aimed to test the relationship between consumer’s perceptions, attitudes and behavioral intentions towards drone delivery of online orders. It is also aimed to increase the awareness of the drone delivery, which is planned to be used for the delivery of online orders, and to be a source for the future studies.

It is hoped that this study will be a significant one for both the smooth delivery of online orders in such pandemic situations and the expectation of drone delivery taking part in our daily life in the near future. In addition, we can say that this study is important because there are very few equivalents of this study that suggest a new way of delivery for consumers’ online orders, there are no studies on how online orders affect consumers’ behavior towards drone delivery in cases such as global pandemics, and because we think that the possible differences that are revealed as a result of this study will contribute to the literature, with a small number of studies conducted before the pandemic.

3.2. Model of the Research

The variables predicted to be included in the model for the purposes of the research are listed below in Figure 3. In the creation of this model, a large number of consumer-oriented research has been examined and their models has been evaluated. In this regard, this proposed hypothesis and literature-supported integrated model is created. Chin and Todd (1995); Milne, AP, and Orbell (2000); Neuwirth, Dunwoody and Griffin (2000); Van Der Heijden, 2003; Liang and Xue (2010); Tsai, Jiang, Alhabash, LaRose, Rifon, and Cotten (2016); Kim, 2016; and Şahin and Alkaya (2017); Yoo and Dig. (2018); Min et al. 2019; Kalyoncuoğlu, (2018), Min, So and Jeong (2019); Sun, Wang and Shen (2020).

According to the research model, it is aimed to demonstrate consumers’ attitude towards drone delivery in terms of its positive/negative effects and impact levels relative to a variety of factors linked to benefit and risk perception. In the model the foreseen variables that influence the attitude towards drone delivery research are benefit perception (perceived ease of use, perceived usefulness, relative advantage, compatibility), the operational risk perception (performance, privacy, delivery risk), and perceived threat (risk perception). Through attitude, the effect of these variables and attitudes on behavioral intention toward drone delivery in consumers is investigated. It is also foreseen that the perceived threat will affect consumers’ attitude towards drone delivery, and ultimately the perceived threat will affect consumers’ behavioral intention towards drone delivery.

Within the scope of the study, multivariate statistical analysis methods were used in the analysis of the data. SPSS 22 statistical software and Amos 20 software were used in the analysis of the data obtained. Accordingly, Cronbach Aplha and Composite Reliability tests were performed for frequency analysis, scale reliability, AVE values were checked for validity and structural equality modelling (SEM) was used to test linear relationships between variables in the model, which includes the main subject of the study, consumers’ attitude towards drone delivery and perceived threat, related primary variables and behavioral intention relationship.

3.3. Content and Limitations of The Research

In this study, detailed literature reviews were utilized to understand the relationship between attitudes and behavioral intentions towards drone delivery of consumers’ online orders during pandemics such as Covid-19 and in the selection of foreseen effectual variables. It should be taken into consideration that there may be other variables not included in the model of the research and the results should be evaluated within this framework.

Within the scope of the study has significant limitations. The most important of these is that consumers in Turkey are yet have no experience with drone delivery. Also, within the scope of the study, one limitation is the sample selection and generalizability of the data. This study is limited to Istanbul because it has been difficult in terms of time and cost to reach potential consumers in other cities of Turkey. Therefore, it would not be right to generalize the research results for all consumers. However, this study is important since it provides useful findings on the
Fig. 1. Technology Acceptance Model, Davis et al. (1989).

Fig. 2. Decision Making Process in Behavioral Change, Sun, Wang and Shen (2020).

Fig. 3. Proposed Research Model
issue, examines the consumers’ perception towards drone delivery of online orders in a field that is up-to-date and is constantly improving such as online shopping, and serves as an example for the future studies.

3.4. Research Sampling and Data Collection Process

In order for a research carried out on a target audience to be effective, the sampling must be determined with a precise frame. In other words, in the process of defining the universe (target population) of the research, while it is necessary to determine who should be included in the sample, the time frame in which the sample will be applied must be clearly determined, as well. The incorrect determination of the universe will lead to the wrong results of the research and it will cause researcher to waste their time. (Nakip, 2006). In this respect, all consumers living in Turkey constitute the universe of this research. In line with the purpose of the study, the sampling of this research consist of consumers aged 18 or older, with online ordering experience, who live in Istanbul, the most populous city in Turkey, in which people from all over the Turkey lives, and which we think represents Turkey the best. In accordance with the aims of the research, for determining the sample of it, it was decided to select from consumers who had purchased online from the internet in the months after the first case of the Covid-19 in Turkey. Consumers who did not shop online during the pandemic were not included in the sampling process. Therefore, in our 423-person data set, 23 people did not shop online during these periods were removed from the data set, and our research model was tested with a total of 400-person data set.

During the data collection process of the research, only the online survey method was utilized, as face-to-face survey implementation was not possible due to various restrictions imposed by the government during the Covid-19. For the purposes of the study, the relevant scales in the previous literature were identified and translated into Turkish by the researchers. Later on, these translations were analysed by a linguist who specialized in the field. Then, the statements on the scales were also evaluated by two distinguished academicians specialising in consumer behavior and a draft questionnaire was created. Before moving on to the fieldwork related to the research, the final survey form was created by the researchers after checking the statements in the draft survey form, which was created with the help of literature. The scale statements included in the survey form are based on the five-point Likert scale (I strongly disagree, I disagree, I neither agree nor disagree, I agree, I strongly agree). The scales of sizes in the tested model are adapted according to the purposes of the research, utilizing studies such as; Perceived Threat Rosenstock, (1974); Liang and Xue (2010), Perceived Severity and Perceived Vulnerability Johnston and Warkentin (2010); Liang and Xue (2010); Sun et al. (2020), Individual Risk Perception Ryu and Kim (2015), Mass Media Channels Song et al. (2016); Yoo et al., (2018), Attitude Davis, (1989); Venkatesh and Davis, (2000); Cheng et al. (2006), Perceived Ease of Use and Perceived Usefulness Davis (1989); Venkatesh and Davis (2000); Cheng et al., (2006), Relative Advantage and Compatibility Min et al. (2019), Performance Risk,
privacy risk, delivery risk yoo et al. (2018), behavioral intention davis (1989); venkatesh and davis, (2000); cheng et al. (2006); liang and xue (2010).

in our research, for the data collection method, online survey method is used as a convenience sample. the data was collected from all consumers residing in istanbul between 10.05.2020 – 10.06.2020, aged 18 and older, and who have online ordering experience. participants of the online survey were selected on completely anonymous and voluntary basis. the most important reason for choosing to implement online surveys is, in addition to government’s restrictions, the fact that carrying out face-to-face survey would not be possible as social distancing rules were implemented during covid-19 pandemic, and people isolated themselves. both technology-based studies in the previous literature and the studies that are sources to this study; liang and xue (2010) b sun et al. (2020); song et al. (2016); min et al. (2019) were seen to use online survey methods, as well. another major reason for using the online survey method is the idea that the universe within the reach may be wider.

3.5. analysis of the data

the results of the spss 20 statistical software program and the amos 20 statistical software program used to test the relationships between the variables of the research were presented in a process as follows.

3.5.1. demographic profile

the demographic profiles of the consumers who participated in the survey are seen in table 2. according to the frequency analyses, 52.3% of the total available responses were received from female and 47.8% from male consumers. 46.3% of the participants were aged 18-28, 45% were aged 29-39, 8% were in the 40-50 age range and 0.8% were 51 years of age or older. when we look at the educational backgrounds of consumers, 2.3% are literate, 0.5% are elementary school graduates, 4.3% are secondary school graduates, 38.3% are high school graduates, 44% are university graduates and 10.8% are masters/doctoral graduates. according to their incomes, 39.5% of consumers have income less than 3000 tl, while 22.8% have income of 3001-5000 tl, 24.5% have income of 5001-7000 tl, 7.8% have income of 7001-9000 tl and 5.8% have income of 9000 tl and greater. finally, the professional distribution of the consumers who participated in survey is: 9.3% who are not working, 5% who are managers in the public sector, 5.8% who are managers in the private sector, 5.5% who are doctors, lawyers, etc., 10.5% are craftsmen and artisans, 11% are office holders, 4% are industrialists, businessmen, 8.3% are workers, 16.8% are private sector workers, 4.5% are housewives, 3.3% are retired, 11% are students.

the values showing consumption behaviors and levels of exposure of the consumers who participated in the survey during the pandemic are shown in table 3. when the data obtained is carefully examined, it is understood that there is a slight positive change in the frequency of ordering from the internet. the main reason for this change is thought to be due to people spending more time at home during the pandemic. it is understood that consumers experienced economic suffering in a short term. in line with this situation, it is observed that consumers’ levels of concern for their future are also moderate. in other words, since consumers’ perception of threat in the pandemic is moderate, we can say that their perception of concern is also moderate. the most notable data is the numerical data showing that consumers are shopping to meet their needs other than their basic needs even during the pandemic. for example, it is understood that a large majority (27.5%) of consumers who participated in the survey bought clothing as their most recent shopping. also, the consumers were asked questions such as “what kind of habits of yours do you think covid-19 pandemic affected? you can choose more than one option.” and “which sector do you think will suffer the most during the covid-19 pandemic? you can choose more than one option.” and two more other questions. according to the answers consumers gave to these questions, their habits were affected from covid-19 pandemic by 22% (256 people) shopping, 20% (247 people) entertainment, and 19% (229 people) travel 16% (194 persons) cleaning and 8% (103 people) payment, 8% (103 persons) order, by 6% (74 people) of cargo and 1% (14 persons) other habits. consumers surveyed think that tourism sector will be negatively affected by 14.7% (325 people), entertainment sector by 13% (308 people), travel sector by 12% (269 people), restaurant sector by 9% (200 people).

3.5.2. exploratory factor analysis

the demographic profiles of the consumers who participated in the survey are seen in table 2. according to the frequency analyses, 52.3% of the total available responses were received from female and 47.8% from male consumers. 46.3% of the participants were aged 18-28, 45% were aged 29-39, 8% were in the 40-50 age range and 0.8% were 51 years of age or older. when we look at the educational backgrounds of consumers, 2.3% are literate, 0.5% are elementary school graduates, 4.3% are secondary school graduates, 38.3% are high school graduates, 44% are university graduates and 10.8% are masters/doctoral graduates. according to their incomes, 39.5% of consumers have income less than 3000 tl, while 22.8% have income of 3001-5000 tl, 24.5% have income of 5001-7000 tl, 7.8% have income of 7001-9000 tl and 5.8% have income of 9000 tl and greater. finally, the professional distribution of the consumers who participated in survey is: 9.3% who are not working, 5% who are managers in the public sector, 5.8% who are managers in the private sector, 5.5% who are doctors, lawyers, etc., 10.5% are craftsmen and artisans, 11% are office holders, 4% are industrialists, businessmen, 8.3% are workers, 16.8% are private sector workers, 4.5% are housewives, 3.3% are retired, 11% are students.

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Table 2
Demographics profiles of participants

| N = 400 | Frequency | Percentage | N = 400 | Frequency | Percentage |
|---------|-----------|------------|---------|-----------|------------|
| Gender  |           |            | Age     |           |            |
| Female  | 209       | 52.3%      | 18-28   | 180       | 46.3%      |
| Male    | 191       | 47.8%      | 29-39   | 165       | 45.0%      |
|         |           |            | 40-50   | 32        | 8.0%       |
|         |           |            | 51 and over | 3       | 0.8%       |
| Education |         |            | Income  |           |            |
| Literate | 9         | 2.3%       | Less than 3000 TL | 158 | 39.5%     |
| Primary School | 2 | 0.5% | 3001-5000 TL | 91 | 22.8% |
| Secondary School | 17 | 4.3% | 5001-7000 TL | 98 | 24.5% |
| High school | 153 | 38.3% | 7001-9000 TL | 31 | 7.8% |
| University | 176 | 44.0% | 9000 TL and greater | 22 | 5.5% |
| MA/PhD  | 43        | 10.8%      | Profession |    |            |
| Unemployed | 37 | 9.3% | Worker | 33 | 8.3% |
| Public Sector Manager | 20 | 5.0% | Private Sector Employee | 67 | 16.8% |
| Private Sector Manager | 23 | 5.8% | Housewife | 18 | 4.5% |
| Doctor / lawyer etc. | 22 | 5.5% | Retired | 13 | 3.3% |
| Craftsmen and Artisans | 42 | 10.5% | Student | 44 | 11.0% |
| Office Holder | 44 | 11.0% |       | 21 | 5.3% |
| Industrialist, Businessman | 16 | 4.0% |       |   |  |
Table 3
Consumers' consumption behaviors and affection levels during pandemic

| N = 400 | Frequency (%) | N = 400 | Frequency (%) |
|---------|---------------|---------|---------------|
| How often do you shop online? | How much did your last Online Order cost? |
| Once A Week | 23 | 5.8% | 100 TL and less | 106 | 26.5% |
| Several Times A Week | 72 | 18% | 101-200 TL | 138 | 34.5% |
| Once A Month | 78 | 19.5% | 201-300 TL | 63 | 15.8% |
| Several Times A Month | 142 | 35.5% | 301-400 TL | 38 | 9.5% |
| Once A Year | 12 | 3% | 401-500 TL | 19 | 4.8% |
| A Few Times A Year | 73 | 18.3% | 501 TL and greater | 36 | 9% |

What kind of order did you placed online last time?

| Books/Stationery / Games | 67 | 16.8% | 100 TL and less | 106 | 26.5% |
| Groceries | 37 | 9.3% | 101-200 TL | 138 | 34.5% |
| Food | 67 | 16.8% | 201-300 TL | 63 | 15.8% |
| Clothing | 110 | 27.5% | 301-400 TL | 38 | 9.5% |
| Technology Products | 60 | 15% | 401-500 TL | 19 | 4.8% |
| Sports and Hobby Products | 16 | 4% | 501 TL and greater | 36 | 9% |
| Home Decoration | 20 | 5% | I Did Not Suffer | 71 | 17.8% |
| Other | 23 | 5.8% | I Suffered A Lot | 54 | 13.5% |

Are you worried about the future of your educational life / job / profession because of the Covid-19 pandemic?

| I am Not Worried at All | 54 | 13.5% | I Did Not Suffer | 71 | 17.8% |
| I am Little Worried | 103 | 25.8% | I Suffered Little | 112 | 28% |
| I am Moderately Worried | 167 | 41.8% | I Moderately Suffered | 163 | 40.8% |
| I am Very Worried | 76 | 19% | I Suffered A Lot | 54 | 13.5% |

Table 4
Results of exploratory factor analysis and reliability analysis

| Factors | Factor Loads | Variance Explained (%) | Cronbach’s Alpha | Factors | Factor Loads | Variance Explained (%) | Cronbach’s Alpha |
|---------|--------------|------------------------|------------------|---------|--------------|------------------------|------------------|
| Behavioral Intention | B1 0.895 | 78.580 | 0.916 | | | | |
| | B12 0.891 | | | | | | |
| | B13 0.873 | | | | | | |
| Perceived Severity | PS1 0.836 | 59.818 | 0.911 | | | | |
| | PS2 0.810 | | | | | | |
| | PS3 0.809 | | | | | | |
| | PS4 0.769 | | | | | | |
| | PS5 0.748 | | | | | | |
| | PS6 0.719 | | | | | | |
| | PS7 0.714 | | | | | | |
| Mass Media | MM1 0.920 | 76.594 | 0.906 | | | | |
| | MM2 0.898 | | | | | | |
| | MM3 0.804 | | | | | | |
| Attitude | A1 0.950 | 84.895 | 0.944 | | | | |
| | A2 0.922 | | | | | | |
| | A3 0.892 | | | | | | |
| Delivery Risk | DR1 0.933 | 78.219 | 0.914 | | | | |
| | DR2 0.874 | | | | | | |
| | DR3 0.844 | | | | | | |
| Perceived Ease of Use | PEOU1 0.900 | 67.158 | 0.951 | | | | |
| | PEOU2 0.860 | | | | | | |
| | PEOU3 0.764 | | | | | | |
| | PEOU4 0.744 | | | | | | |
| Relative Advantage | RA1 0.954 | 86.886 | 0.952 | | | | |
| | RA2 0.926 | | | | | | |
| | RA3 0.916 | | | | | | |
| Perceived Threat | PT1 0.844 | 62.792 | 0.893 | | | | |
| | PT2 0.837 | | | | | | |
| | PT3 0.779 | | | | | | |
| Perceived Vulnerability | PV1 0.863 | 55.942 | 0.842 | | | | |
| | PV2 0.812 | | | | | | |
| | PV3 0.806 | | | | | | |
| | PV4 0.784 | | | | | | |
| | PV5 0.756 | | | | | | |
| Individual Risk Perception | IRP1 0.881 | 69.157 | 0.899 | | | | |
| | IRP2 0.836 | | | | | | |
| | IRP3 0.818 | | | | | | |
| | IRP4 0.804 | | | | | | |
| Performance Risk | PR1 0.920 | 80.305 | 0.942 | | | | |
| | PR2 0.806 | | | | | | |
| | PR3 0.738 | | | | | | |
| Privacy Risk | PR1 0.933 | 80.305 | 0.942 | | | | |
| | PR2 0.926 | | | | | | |
| | PR3 0.875 | | | | | | |
| Compatibility | C1 0.898 | 79.681 | 0.921 | | | | |
| | C2 0.891 | | | | | | |
| | C3 0.889 | | | | | | |
distribution of the consumers who participated in survey is; 9.3% who are not working, 5% who are managers in the public sector, 5.8% who are managers in the private sector, 5.5% who are doctors, lawyers, etc., 10.5% are craftsmen and artisans, 11% are office holders, 4% are industrialists, businessmen, 8.3% are workers, 16.8% are private sector workers, 4.5% are housewives, 3.3% are retired, 11% are students.

3.5.4. Path Analysis and Structural Equality Modeling

After exploratory factor analysis, confirmatory factor analysis was performed to determine the suitability of the factor structures of the model created for the research in this study. In addition, the structural model is included to test the relationships in the proposed model. The results of the confirmatory factor analysis were evaluated according to various goodness of fit index rates proposed by multiple researchers. This goodness of fit indices consists of fit values such as CMIN/DF, CFI, NFI, GFI, RMSEA. $2 < \text{CMIN} / \text{DF} < 5$, CFI, NFI, GFI values $> 0.90$ and RMSEA value $< 0.08$ are considered appropriate in the literature for these values (Byrne, 2010; Hair and Anderson, 2010; Kline, 2015; Yaşlıoğlu, 2017; Jan et al., 2019). Goodness of fit values of confirmatory factor analysis carried out in this direction are shown in the Table 5.

When the values in Table 5 are examined, it is seen that the values of the goodness of fit suggested by many researchers are reached. Following these results, validity and reliability analyses of the factors were made. Cronbach’s Alpha value of all factors was calculated through the SPSS 22 statistical program. Composite Reliability and AVE values were determined by using the standard regression weight and correlation values that emerged as a result of the previous confirmatory factor analysis. The results are shown in Table 6.

The Cronbach’s Alpha and Composite Reliability values are the values that were used to test the reliability of the factor, and the AVE value is the value used to test their validity in the Table 6. For these values, Cronbach’s Alpha and Composite Reliability must be 0.70 and greater, while AVE must be 0.50 and greater (Fornell and Larcker, 1981; Yaşlıoğlu, 2017: 82). According to the values shown in the table, it is sufficient for us to express that the factors are reliable and valid.

3.5.5. Path Analysis and Structural Equality Modeling

After the exploratory factor analysis and confirmatory factor analysis, structural validity of the model was tested. After factor analyses, in the wake of goodness of fit’s acceptability and ensuring structural validity, structural equality modelling was used to reveal the relationships involved in the model and to test the hypotheses. Just as it was after the confirmatory factor analysis, in the wake of structural model, goodness of fit values was checked and it was observed that the necessary conditions were not met. Therefore, additional covariances have been created for values with high covariance between the surplus variables and improvements have been made in the goodness of fit values. After the improvements made, the values to be accepted have been reached. Table 7 shows these new values.

The causal hypotheses included in the research’s hypotheses were tested using the “Maximum Likelihood Estimation (MLE)” method. While related hypotheses were tested by correlation analysis, the mediation hypothesis utilized model calculations on AMOS with standardized direct effect coefficients and standardized indirect effect coefficients.

The correlation test results of the proposed relational hypotheses for the research show that the hypotheses H1, H2, H3, H4, H6 are supported. Finally, the perceived threat has a direct effect on attitude of 0.150, the perceived threat has a direct effect on behavioral intention of 0.229 and the attitude has a direct effect on behavioral intention of 0.658. The perceived threat has an indirect effect on behavioral intention at a rate of 0.099. The H5 hypothesis was also supported in this case. So, it is concluded that consumers’ attitude towards drone delivery of online orders has mediating effect on the relationship between the perceived threat during pandemic and consumers’ behavioral intentions against using drone delivery. All hypotheses of the study are shown in Table 10.

The 21st century in which is considered to be the age of science and technology, technology is fairly a part of the life. New technologies are constantly being produced and people are either adapting and using these technologies after certain time and reasons or refusing to use them. In our current age, new technologies have affected every aspect of our lives as well as affecting our consumption habits and ways of consuming. In this study, the relationships between consumers’ risk perception and use intentions towards drone delivery of online orders during the Covid-19 have been tested thorough developed hypotheses and examined. According to the results of the causal hypotheses included in the study, 11 of the 13 hypotheses have been supported. While H1.1, H1.3, H1.4, H3.1, H3.3, H6.1, H6.2, H6.3, H6.4, H7 and H8 have been supported, insufficient evidence is found to support the H1.2 and H6.2. The correlation test results of the proposed relational hypotheses for the research show that the hypotheses H1, H2, H3, H4, H6 have been supported. Finally, the perceived threat has a direct effect on attitude of 0.150, on behavioral intention of 0.229 and the attitude has a direct effect on behavioral intention of 0.658. The perceived threat has an indirect effect on behavioral intention at a rate of 0.099. The H5 hypothesis has been also supported in this case. So, it is concluded that consumers’ attitude towards drone delivery of online orders has mediating effect on the relationship between the perceived threat during pandemic and consumers’ behavioral intentions against using drone delivery. We can also say that the results of the research are in line with previous studies (Yoo et al., 2018).

### Table 5

| CMIN / DF | CFI | NFI | GFI | RMSEA |
|-----------|-----|-----|-----|-------|
| 2.625     | 0.904 | 0.913 | 0.911 | 0.064 |

### Table 6

| Factors               | Cronbach’s Alpha | Composite Reliability | AVE  |
|-----------------------|------------------|-----------------------|------|
| Behavioral Intention  | 0.916            | 0.917                 | 0.786|
| Perceived Threat      | 0.893            | 0.883                 | 0.601|
| Perceived Severity    | 0.911            | 0.908                 | 0.586|
| Perceived Vulnerability| 0.842          | 0.856                 | 0.560|
| Mass Media            | 0.906            | 0.909                 | 0.769|
| Individual Risk       | 0.899            | 0.900                 | 0.692|
| Perception            |                  |                       |      |
| Attitude              | 0.944            | 0.944                 | 0.848|
| Performance Risk      | 0.860            | 0.863                 | 0.678|
| Delivery Risk         | 0.914            | 0.916                 | 0.783|
| Privacy Risk          | 0.929            | 0.930                 | 0.815|
| Perceived Ease of Use | 0.887            | 0.889                 | 0.669|
| Perceived Usefulness  | 0.942            | 0.943                 | 0.806|
| Relative Advantage    | 0.952            | 0.952                 | 0.869|
| Compatibility         | 0.921            | 0.918                 | 0.788|

### Table 7

| CMIN / DF | CFI | NFI | GFI | RMSEA |
|-----------|-----|-----|-----|-------|
| 2.612     | 0.912 | 0.913 | 0.921 | 0.061 |
Table 8
Results of the causal hypotheses included in the research hypotheses

| Hypotheses          | Independent Variable | Dependent Variable | Estimate | S.E. | C.R. | P     |
|---------------------|----------------------|--------------------|----------|------|------|-------|
| H1.1                | Relative Advantage   | Attitude           | 0.284    | 0.062| 4.580| ***   |
| H1.2                | Compatibility       | Attitude           | -0.154   | 0.161| -0.957| 0.339 |
| H1.3                | Perceived Ease of Use| Attitude           | 0.416    | 0.082| 5.073| ***   |
| H1.4                | Perceived Usefulness| Attitude           | 0.274    | 0.048| 5.708| ****  |
| H3.1                | Performance Risk (-) | Attitude           | -0.199   | 0.120| -1.667| 0.099 |
| H3.2                | Delivery Risk (-)    | Attitude           | -0.136   | 0.138| -0.992| ***   |
| H3.3                | Privacy Risk (-)     | Attitude           | -0.024   | 0.079| -0.302| ***   |
| H6.1                | Perceived Severity  | Perceived Threat   | 0.523    | 0.082| 6.398| ***   |
| H6.2                | Perceived Vulnerability | Perceived Threat | -0.024   | 0.065| -0.374| 0.709 |
| H6.3                | Mass Media Channels | Perceived Threat   | 0.228    | 0.057| 3.966| ***   |
| H6.4                | Individual Risk Perception | Perceived Threat | 0.289    | 0.065| 4.446| ***   |
| H7                  | Attitude            | Behavioral Intention | 0.697   | 0.051| 13.739| ***   |
| H8                  | Perceived Threat    | Behavioral Intention | 0.237   | 0.048| 4.929| ***   |

Note:
S.E.: Standard error of regression weight
C.R.: Critical ratio of regression weight
P: Sig level of regression weight, *** Sig < 0.01

According to the results of the causal hypotheses included in the study, 11 of the 13 hypotheses were supported. While H1.1, H1.3, H1.4, H3.1, H3.3, H6.1, H6.2, H6.3, H6.4, H7 and H8 were supported, insufficient evidence was found to support the H1.2 and H6.2 of the relational hypotheses included in the study are shown in the table 9.

Table 9
Results of the relational hypotheses included in the study

| Hypotheses         | Attitude | Behavioral Intention | Operational Risk Perception | Risk Perception | Perceived Benefit | Perceived Threat |
|--------------------|----------|----------------------|------------------------------|-----------------|-------------------|-----------------|
| Attitude           | Pearson Correlation |                  | 1.000                        | 0.000           | 0.000             | 0.000           | 0.000           |
|                    | N        | 400                  | 400                          | 400             | 400               | 400             | 400             |
| Behavioral Intention | Pearson Correlation |                  | 0.000                        | 0.000           | 0.000             | 0.000           | 0.000           |
|                    | N        | 400                  | 400                          | 400             | 400               | 400             | 400             |
| Operational Risk Perception | Pearson Correlation |                  | 0.000                        | 0.000           | 0.000             | 0.000           | 0.000           |
|                    | N        | 400                  | 400                          | 400             | 400               | 400             | 400             |
| Risk Perception    | Pearson Correlation |                  | 0.000                        | 0.000           | 0.000             | 0.000           | 0.000           |
|                    | N        | 400                  | 400                          | 400             | 400               | 400             | 400             |
| Perceived Benefit  | Pearson Correlation |                  | 0.000                        | 0.000           | 0.000             | 0.000           | 0.000           |
|                    | N        | 400                  | 400                          | 400             | 400               | 400             | 400             |
| Perceived Threat   | Pearson Correlation |                  | 0.000                        | 0.000           | 0.000             | 0.000           | 0.000           |
|                    | N        | 400                  | 400                          | 400             | 400               | 400             | 400             |
It is also aimed to increase the awareness, consumer’s perceptions, attitudes and behavioral intentions towards diffusion of innovations theory, technology acceptance model, and this crisis. This study whose theoretical background is based on the importance of the drone delivery, which is planned to be used for the delivery of online learning, and changes in eating habits, have also been affected economically and socially. The way people live, such as remote work, disaster around the world. This has also led to major changes both in terms of uncovering differences arising from its comparability to other studies and in terms of testing the relationships between the perceived risks and behavioral intentions of consumers during pandemics such as Covid-19. This study, which may also be a reference to future studies, has been tested without any sectoral distinction. Thus, future researchers may also be advised to test the model on a sectoral basis. In addition, by adding moderator variables to the model, we can increase the model’s explanatory power.

The results of this research have also shown that the use of drones in the delivery of online orders will not be offended by consumers. This is an indication that the social change caused by the covid-19 pandemic is welcomed by consumers in the delivery of online orders by drone. We did online shopping in the months after the first case of the Covid-19 in Turkey.

Studies on drone delivery of orders in the previous literature are limited in number. The difference between this study and a small number of other studies that have been carried out on drone delivery is that the studies on drone delivery, which is rare in the world, have been independent from effects such as Covid-19. This study has been evaluated both in terms of uncovering differences arising from its comparability to other studies and in terms of testing the relationships between the perceived risks and behavioral intentions of consumers during pandemics such as Covid-19. This study, which may also be a reference to future studies, has been tested without any sectoral distinction. Thus, future researchers may also be advised to test the model on a sectoral basis. In addition, by adding moderator variables to the model, we can increase the model’s explanatory power.

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4. Conclusion and Recommendations

On December 31, 2019, Covid-19, identified by Chinese as an unknown pneumonia disease, has begun to threaten humanity as a major disaster around the world. This has also led to major changes both economically and socially. The way people live, such as remote work, online learning, and changes in eating habits, have also been affected by this crisis. This study whose theoretical background is based on the diffusion of innovations theory, technology acceptance model, and protection motivation theory, is aimed to test the relationship between consumer’s perceptions, attitudes and behavioral intentions towards drone delivery of online orders. It is also aimed to increase the awareness of the drone delivery, which is planned to be used for the delivery of online orders, and to be a source for the future studies. For these aims, the relationships between consumers’ risk perception and use intentions towards drone delivery of online orders during the Covid-19 have been tested and examined through developed hypotheses. In accordance with the aims of the research, in order to increase the effectiveness of the results of the research, it has been decided to select from consumers who did online shopping in the months after the first case of the Covid-19 in Turkey.

Studies on drone delivery of orders in the previous literature are limited in number. The difference between this study and a small number of other studies that have been carried out on drone delivery is that the studies on drone delivery, which is rare in the world, have been independent from effects such as Covid-19. This study has been evaluated both in terms of uncovering differences arising from its comparability to other studies and in terms of testing the relationships between the perceived risks and behavioral intentions of consumers during pandemics such as Covid-19. This study, which may also be a reference to future studies, has been tested without any sectoral distinction. Thus, future researchers may also be advised to test the model on a sectoral basis. In addition, by adding moderator variables to the model, we can increase the model’s explanatory power.

The results of this research have also shown that the use of drones in the delivery of online orders will not be offended by consumers. This is an indication that the social change caused by the covid-19 pandemic is welcomed by consumers in the delivery of online orders by drone. We
can say that this work has carried out in this direction is a valuable work for online shopping managers and academicians studying on technology and consumer perceptions.

**Declaration of interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**APPENDIX**

1. **Questionnaire of the study**

   **Questionnaire**
   
   **Dear Participant,**
   
   The questionnaire which you will answer in a total of 3 sections, is intended for use in an academic study titled “The affect of the Covid-19 on consumers’ attitudes towards online order delivery by drone and their intentions to use it.” Since the questionnaire will be used for statistical evaluation, the reliability of your answers is very important for this academic study to reach the correct results.

   **About Drone Delivery**
   
   The wide range of uses Drone technologies have brought to various industries has brought along many innovative services. Drones, which are no longer just hobbies and entertainment mediums, are now capable of providing transportation, security, professional photo shooting and many more specialized services made by ground vehicles/systems in the past at much less cost and with less manpower. Drone delivery system started by large companies or in prototyping stage is becoming more and more common in the world, and various activities related to this issue have been implemented in our country as well.

   ![Drone delivery image]

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**Section III**

Do you shop online? (If your answer is "No", please end the questionnaire.)

- **Yes**
- **No**

**How often do you shop online?**

- Several times a week
- Once a week
- A few times a year
- Once a month
- Several times a month

**How much did your last Online Order cost?**

- 100 TL and below
- 101-200 TL
- 201-300 TL
- 301-400 TL
- 401-500 TL
- 500 TL and above

**How many times have you placed an online order in the last two months?**

- 2 and less
- 3-5 times
- 6-8 times
- 9-11 times
- 12-14 times
- 15 times and over

**What kind of order did you placed online last time?**

- Book and Stationery
- Groceries
- Food
- Clothing
- Technology Products
- Sports and Hobby Products
- Home Decor
- Other (Please specify) …………

**What level of damage do you think you have suffered from the Covid-19 pandemic, personally, economically?**

- I did not suffer
- I suffered little
- I suffered moderately
- I suffered a lot

7. **Are you worried about the future of your job/profession because of the Covid-19 pandemic?**

- I am not worried
- I am worried little
- I am moderately worried
- I am very worried

8. **What kind of habit of yours do you think the covid-19 pandemic affected? You can choose more than one options.**

- Cleaning
- Shopping
- Entertainment
- Cargo Delivery
- Payment Methods
- Travelling
- Other (Please specify) …………

9. **Which industries do you think will be most affected during Covid-19? You can choose more than one options.**

- Food Industry
- Travel Industry
- Cargo Transportation Industry
- Ready-made Garment Industry
- Entertainment Industry
- Cleaning Industry
- Banking Industry
- Restaurant Industry
- Tourism Industry
- Self Care Industry
- Sports Industry
- Health Industry
- Real Estate and Automotive Industry
- Furniture Industry
- Other (Please specify) …………

**Section III**

Please indicate your degree of agreement in the following statements by placing an (X).
| STATEMENTS                                                                 | I Strongly Disagree | I disagree | I neither agree nor agree | I agree | I strongly agree |
|---------------------------------------------------------------------------|---------------------|------------|--------------------------|---------|-----------------|
| 1. I would consider using the drone delivery system in online orders to avoid the effects of pandemics like Covid-19. |                     |            |                          |         |                 |
| 2. I assume I would use the drone delivery system in online orders to avoid the effects of pandemics like Covid-19. |                     |            |                          |         |                 |
| 3. I plan to give approval to drone delivery in online orders to avoid the effects of pandemics like Covid-19. |                     |            |                          |         |                 |
| 4. I think pandemics like Covid-19 are a threat to me.                     |                     |            |                          |         |                 |
| 5. I think the problems caused by pandemics like Covid-19 threaten me.      |                     |            |                          |         |                 |
| 6. I see pandemics like Covid-19 as a threat to the rest of my life.       |                     |            |                          |         |                 |
| 7. I consider the transmission of pandemics like Covid-19 to me as a horrifying incident. |                     |            |                          |         |                 |
| 8. I find it risky to continue my social life as before when there are pandemics like Covid-19. |                     |            |                          |         |                 |
| 9. If Covid-19 infects me, I do not think some of the functions of my body will be fully working. |                     |            |                          |         |                 |
| 10. If I get infected with Covid-19, I think I will gradually lose my body functions. |                     |            |                          |         |                 |
| 11. If Covid-19 infects me, I think my body will slow down my body functions. |                     |            |                          |         |                 |
| 12. If I get infected with Covid-19, I think my social life will be affected. |                     |            |                          |         |                 |
| 13. If Covid-19 infects me, I think it will push my social activities into obscurity. |                     |            |                          |         |                 |
| 14. If I get infected with Covid-19, I think my body will take its functions away from me. |                     |            |                          |         |                 |
| 15. If I get infected with Covid-19, I think my daily life will be affected by it. |                     |            |                          |         |                 |
| 16. I think a pandemic will most likely infect me in the future.            |                     |            |                          |         |                 |
| 17. I think there's a good chance I will get infected with a pandemic.     |                     |            |                          |         |                 |
| 18. I think my body is resistant to pandemics.                            |                     |            |                          |         |                 |
| 19. I think pandemics will affect me in the future.                       |                     |            |                          |         |                 |
| 20. I see a very high risk of pandemics infecting my body.                |                     |            |                          |         |                 |
| 21. I often see written and visual publications about pandemics in the media. |                     |            |                          |         |                 |
| 22. I get a lot of information about pandemics through the media.         |                     |            |                          |         |                 |
| 23. Thanks to the media, I can get a lot of information about pandemics.  |                     |            |                          |         |                 |
| 24. I think the Covid-19 pandemic is a disaster for humanity.             |                     |            |                          |         |                 |
| 25. I am deeply fearful and concerned about the risks of the Covid-19.     |                     |            |                          |         |                 |
| 26. I think the Covid-19 also involves huge risks for future generations. |                     |            |                          |         |                 |
| 27. I think the Covid-19 pandemic was quite an eerie experience.           |                     |            |                          |         |                 |
| 28. I think drone use in the delivery of online orders during pandemics like Covid-19 is a good idea. |                     |            |                          |         |                 |
| 29. I think drone use in the delivery of online orders during pandemics like Covid-19 is a good idea. |                     |            |                          |         |                 |
| 30. I consider the use of drones to be preferable for the delivery of online orders during pandemics such as Covid-19. |                     |            |                          |         |                 |
| 31. The drone could damage my orders during transportation.               |                     |            |                          |         |                 |
| 32. The drone could take my orders to different addresses.                |                     |            |                          |         |                 |
| 33. If the drone malfunctions during transportation, it could damage someone's life or property. |                     |            |                          |         |                 |
| 34. My orders could be stolen from the drone.                            |                     |            |                          |         |                 |
| 35. While the drone is carrying my orders, other people may damage my orders. |                     |            |                          |         |                 |
| 36. My orders may delay or may not arrive at all.                        |                     |            |                          |         |                 |
| 37. Drone delivery could cause me to lose control over my privacy.        |                     |            |                          |         |                 |
| 38. Drone delivery could lead to a loss of privacy for me.                |                     |            |                          |         |                 |
| 39. Drone delivery might not be used in a way that respects my privacy.   |                     |            |                          |         |                 |
| 40. Using a drone in the delivery of online orders during the pandemics is an easy way to protect from the effects of pandemics. |                     |            |                          |         |                 |
| 41. I think I can easily understand how my online orders will be delivered by drone during the pandemic. |                     |            |                          |         |                 |
| 42. I think that using drones in online order delivery during pandemics is easy. |                     |            |                          |         |                 |
| 43. I think I have skills for using drones in online orders during pandemics. |                     |            |                          |         |                 |
| 44. I think that using a drone in the delivery of online orders can keep the threats of pandemics away from me. |                     |            |                          |         |                 |
| 45. I find it helpful to have online orders delivered by drone during pandemics. |                     |            |                          |         |                 |
| 46. I think drone delivery of online orders during pandemics is an efficient method. |                     |            |                          |         |                 |
| 47. I think drone delivery of online orders during pandemics is an efficient method. |                     |            |                          |         |                 |
| 48. I think it is healthier for the delivery of online orders during the pandemic to be done by drone rather than traditionally done. |                     |            |                          |         |                 |
| 49. I think it is more useful for the delivery of online orders during the pandemic to be done by drone rather than traditionally done. |                     |            |                          |         |                 |
| 50. I think the delivery of online orders during the pandemic to be done by drone is a safer and faster delivery method rather than traditional one. |                     |            |                          |         |                 |
| 51. I think drone use is an appropriate method of delivering online orders during pandemics. |                     |            |                          |         |                 |
| 52. I think drone use in the delivery of online orders during pandemics is a method that suits my lifestyle. |                     |            |                          |         |                 |
| 53. I think drone use in the delivery of online orders during the course of pandemics would meet my expectations in regard to health. |                     |            |                          |         |                 |

Section III

Gender:

- [ ] Female
- [ ] Male

Age:

- [ ] 18-28
- [ ] 29-39
- [ ] 40-50
- [ ] 51 and above
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ÜMIT YAPRAK
Ümit YAPRAK graduated from Bahcesehir University, Bandirma Faculty of Economics and Administrative Sciences in 2013. He has completed his master’s studies with the GPA of 3.31 at Manisa Celal Bayar University, department of Production Management and Marketing in 2019. He has started to the Marketing Ph.D program at Istanbul University in same year. His primary research interest is crossdisciplinary research including marketing, consumer behavior, digital marketing psychology, research methods and customer relation management.

FATIH KILIÇ
Fatih KILIÇ graduated from Business School of Istanbul University in 2012. He worked as a SME portfolio manager for ING Bank Turkey between the years 2012-2015. He has completed his master’s studies with the GPA of 3,92 Bahçeşehir University, department of Marketing in 2019. He has started to the Marketing Ph.D program at Istanbul University in same year. He is currently working as a General Coordinator for Oblavion. His primary research interest is cross disciplinary research including marketing, linguistics, psychology and consumer behavior.

ABDULLAH OKUMUS
Abdullah OKUMUS is a Professor at Istanbul University, School of Business, Department of Marketing, and Dean of the Faculty of Transportation and Logistics, Istanbul University. His research interests are marketing research, marketing strategy, consumer behavior and global marketing. He has numerous publications in national and international peer-reviewed journals, and contributed to many conferences. He also published books about consumer behavior, marketing channels and retailing and many books chapters.