

CUSTOMERS' ACCEPTANCE IN USING UNMANNED AERIAL VEHICLES (UAV) DELIVERY SERVICE

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Abstract. The high demand for shipping from online shopping is now starting to make companies compete in creating innovations. Delivery of goods by using drones is one of the disruptive technologies that attract companies as their ways to improve their service. This research intends to find out the customers' acceptance of delivering goods by using drones. The methodology used for this research was a quantitative method with multiple linear regression analysis and SPSS for data analysis. The purpose of this study is to examine the safety and privacy aspects of drone delivery service. By finding out the perspective of customers' acceptance of this innovation will can maximize the innovations themselves. The results of this study show that customers accept the innovation of using drone as delivery service in terms of safety and privacy as a reference.

Keywords: Unmanned Aerial Vehicles, Customer Acceptance, drone delivery, safety, privacy

1. Introduction

The growth of e-commerce has increased from year to year. Many new e-commerce sites are emerging and they are competing to provide the best service for customers. There has also been an increase in e-commerce users in this world. As reported in an article (Katadata.co.id, 2019) based on data from the Global Web Index notes that Indonesia has the highest level of e-commerce users in the world. A report also released by We Are Social says 96% of internet users are looking for products or services to be purchased online. Therefore, the number of delivery of goods from e-commerce has also increased due to a large number of requests from customers. There are various ways to deliver packages until they are received by end-consumers using various modes of transportation. New innovations also began to emerge in the world of shipping along with the development of technological advances for human life.

The Industrial World also tried to implement Industry 4.0. Digitalization will balance harmonious collaboration between people and technology in working together. Besides, it is to improve efficiency in the industrial world. Drones or Unmanned Aerial Vehicles (UAV) are known as unmanned aircraft. Usually, human play a role in operating the device remotely. Drones are one example of disruptive technology. It can be called disruption because initially drones are often used in the world of photography only for taking photos or videos. However, over time even drones can now be used almost in various fields. One of which will be discussed in this study is to deliver goods. Some companies have practiced using drones to support their delivery services. Companies such as Amazon, Google, DHL, and others have committed R&D to examine the practicality of delivery using drones. As of now drones utilized by Amazon and Google can provide space of weighing less than 5 lbs, endorsement by FAA is being looked for to convey bigger packages (R. Khan et al., 2019).

In the middle of a public health crisis, the COVID-19 outbreak, UAVs, i.e., drones, can offer numerous benefits. Not only to reduce or to minimize human interaction, but they can also be utilized to reach inaccessible area (Chamola et al., 2020). The use of drones helps people in the current situation. Current circumstances encourage human to keep their distance and also to reduce direct contact in order to avoid the spread of COVID-19. Based on the article (Katadata.co.id, 2020), the current situation makes some companies waiting for a while for intercity delivery, delivery delays, and pick up packages. It can be used as one way to meet the current demand for shipping goods. This latest innovation is expected to maximize the services

provided by e-commerce. This paper will discuss customer acceptance of using drones for delivery services. Since there is a possibility of using drone delivery service by e-commerce in the future.

1.1 Unmanned Aerial Vehicles

The drone is one type of *Unmanned Aerial Vehicle* (UAV) that does not require pilots to control from inside (Dukkanci et al., 2019). Drones can be operated by humans remotely or can fly independently through flight plans that are controlled by software (M. A. Khan et al., 2018). The drone delivery can fly in an elevation of up to 120 meters with the capacity of carrying a bundle of up to 5Kg. It can fly as far as 50 km with the most extreme speed of up to 65km/hour. Besides, it requires a landing zone of around 2m². Drones have the capacity to productively provide the allocation to the precise address with a time outline of one hour (Ba & Management, 2019). The device becomes a new way of doing business. Drones have been around for a long time and have been used in various industries, from agriculture to the military and to make a film. At present, the industry is aware of the large potential use of drones in the commercial section. Drones have won consideration from industries that provide serious potential and competitive advantage in the future for drone delivery. Based on a report made by PwC has evaluated the potential of the showcase for an increase in drones of more than \$ 127 billion. (Mittendorf et al., 2017)

Drones are expected as potential delivery goods instruments (Ba & Management, 2019). The development of drones is expected to be able to provide benefits to handle the challenges that will be faced by a city. Along with the development of a city will also be followed by business developments that create convenience in human life. Drone technology is used for various needs such as package delivery. Drones are also being needed by e-commerce and retailers to deliver goods. With drones, shipping goods is considered faster, more accurate, and more cost-effective (Sriratnasari et al., 2019). Several companies such as Amazon, Google, and Wal-Mart are currently developed a delivery service using their own drones and consider the potential of regular shipping methods (Ba & Management, 2019)

1.2 Limitation on The Development of The Unmanned Aerial Vehicles

1.2.1 Regulation of Unmanned Aerial Vehicles in Indonesia

The government began to make regulations regarding the operation of drones due to the development of drones in Indonesia. Ministry of Transportation has set Law No. 180/2015 and No. PM 47/2016 which has been officially displaced Law No. 90/2015 about controlling the Indonesia air space operation of unmanned aerial vehicles. This new law was announced officially on May 12, 2015, which contain prohibition of drone operation in restricted air areas, restricted air space, and in-flight operation safety area of an airport (Sriratnasari et al., 2019). The regulations regarding the operation of UAV currently do not cover the whole because the contents are only limited to the use of airspace, permits, and permit requirements. The provisions given by Permenhub are only limited to the determination of the height limits and areas that must be protected such as national strategic areas, but how low the UAV can pass in suburban areas has not been regulated (Ardes, 2016).

1.2.2 Safety Concern with Unmanned Aerial Vehicles Delivery

Similar to any other innovation from other technological developments, drone delivery service raises concerns from the public. Indeed the industry and customers will gain a benefit from this drone, but safety issues regarding the operation of the drone are also an important concern to be discussed (Ba & Management, 2019). There could be a risk of

human safety for unmanned aerial vehicles fail and accidents if they do not function in the middle of operations and crash to the ground (Vergouw et al., 2016).

1.2.3 Privacy Concern in Unmanned Aerial Vehicles Delivery

If the use of commercial drones is permitted, consumers' privacy issues will be at risk because the drones have the ability to collect various data by entering the consumer's personal space legally. Indeed, those who provide regulations cannot reach irresponsible drone users and threaten national security. The uses of drones raise consumer concerns about their privacy and security because drones are believed to be able to easily collect large amounts of data through cameras (Ramadan et al., 2017).

1.3 Customer Acceptance

In the effort of developing innovation, it is important to understand customers' acceptance. By knowing customer acceptance we can have a better understanding of the customer itself and their behavior (Trisakti, n.d.).

2. Methodology

This research used a Quantitative Research method. The types of quantitative data used are primary and secondary data. Primary data were collected by distributing measurement data with Likert scale questionnaires to respondents. Then the data were processed by using the 23rd SPSS series. The data analysis technique used was quantitative descriptive. Data were analyzed with multiple linear regressions, T-Test, F-Test, Validity, and Reliability Test. This study used multiple linear regression analysis to look for the influence of two variables, namely Safety (X1) and Privacy (X2) as independent variables on the dependent variable, and Customer Acceptance using drone delivery service (Y). In addition, the Determination Coefficient of Analysis (R²) was used to measure the extent of the model's ability to explain variations in the dependent variable (Customer Acceptance). Meanwhile, secondary data come from a variety of literature reviews to support this study. The population selected for this study were residents of the City of Depok, West Java. The number of samples obtained was 108 respondents. The sampling technique chosen was simple random sampling that allowed each sampling unit as an element of the population has the same opportunity to be sampled. This study aims to prove the effect of safety and privacy issues on customer acceptance using drone delivery services.

3. Discussion and Results

Based on the survey, the total data obtained was 108 respondents; 50 male (46.3%) and 58 women (53.7%). Most respondents were aged between 17-29 years as many as 86 people (79.6%) and the rest were in the range of 30 years and above. Their occupations are mostly students (61 respondents or 56.5%) and then there are 16 entrepreneurs (14.8%) and the rest have diverse jobs. Almost all respondents know the drone but not all respondents have used drones from the data listed only 35 people have ever used it. Most of them knew drone is used for Photography and Videography. Only 5 people who know the drone can deliver goods.

Table 1.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.573	2.417		.651	.517
	Safety (X1)	.194	.119	.159	1.631	.106
	Privacy (X2)	.355	.126	.276	2.823	.006
a. Dependent Variable: Customer Acceptance (Y)						

The results of the Hypothesis testing using the t table were identified as Sig values. for the effect of X1 on Y is $0.106 > 0.05$ and the value of t arithmetic $1.631 < t$ table 1.982, therefore, it can be concluded that H1 is rejected which means there is no effect of X1 on Y. For the influence of X2 on Y is $0.006 > 0.05$ and the t count value is $2,823 > t$ table 1,982, hence, it can be concluded that H2 is accepted which means there is an influence of X2 on Y. This means X2 affects Y. In this case, there is the influence of privacy concern to customer acceptance for using drone delivery service.

Table 2.

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	116.391	2	58.196	8.088	.001 ^b
	Residual	755.488	105	7.195		
	Total	871.880	107			
a. Dependent Variable: Customer Acceptance (Y)						
b. Predictors: (Constant), Privacy (X2), Safety (X1)						

Hypothesis testing with the F test based on the significance output for the effects of X1 and X2 simultaneously on Y is $0.001 < 0.05$ and the calculated F value is $8.088 > F$ table 3.08, therefore, it can be concluded that H3 is accepted which means that there is an influence of X1 and X2 simultaneous with respect to Y. This means that X1 and X2 simultaneously influence Y. There is a simultaneous influence related to drone delivery service through the safety and privacy variables on customer acceptance.

Table 3.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.365 ^a	.133	.117	2.682
a. Predictors: (Constant), Privacy (X2), Safety (X1)				

Based on the table above it is known that the R Square value of 0.133, this implies that the influence of the variables X1 and X2 together on the Y variable is 13.3% of the variables X1 and X2, while the remaining 86.7% is explained by Other variables outside this study. According to respondents, the influence of variables X1 and X2 is very low in customer acceptance using drone delivery.

The majority of respondents agreed with the influence of safety and privacy aspects in customer acceptance using a drone delivery service. The customer acceptance variable has distributed 3 questions. From a total of 3 questions, 137 respondents agreed that if the drone delivery service would be implemented in the near future and would be at ease or undisturbed if someone else used the drone delivery service at their residence with a percentage of 78%. While from privacy concern there is one indicator that has a low percentage of 56,2% which means worried if the drone can access the respondent's personal data when shipping goods. From the safety concern itself, there is the highest percentage of 93,8%. The importance of first aid or safety procedure to handle accidents that are likely to occur if the drone malfunctions. Respondents strongly agree they do not have enough information about first aid or safety procedure in drone accidents.

4. Conclusion

The innovation in delivery goods using drones is still lacking of support from the government in terms of regulation and has also not been realized in Indonesia even though this innovation has been applied in other countries. Governments and companies that want to implement this innovation can begin a deeper study of what aspects will affect the future. Companies can also start evaluating many aspects, not just safety and privacy. Based on this research, a company that wants to develop drone shipments can implement safety procedures for drone accidents. Customers who order drone delivery services can be educated in the first place if there is an incident at their residence.

The results of this study indicate that customers will receive innovation in the delivery of goods using drones and do not feel disturbed when people around come using these services. From a survey of 108 respondents from simple random sampling with multiple linear regressions and processed using SPSS data analysis, proved that 78% of the respondents would attractively accept innovations in delivery service using drones. The limitation of this research is that it only focuses on safety and privacy. Further research needs to be carried out on a broader population scale and deeper analysis and understanding of the factors that influence customer acceptance in shipping goods using drones and can also add what customer value points are obtained. Distribution of the population in areas with well-to-do standards of living and not for comparison.

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