

## **Crowdshipping as an Intermediary for Passenger Mobility and Internet Utilization Affects the Social Crowdcourier Environment**



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### **ABSTRACT**

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*passenger mobility, crowdshipping, internet utilization, social crowdcourier environment*

This study seeks to determine the prospects for airline passenger mobility acting as freelance couriers. Analyzing four variables: passenger mobility, internet utilization, crowdshipping, and social crowdcourier environment from 200 aircraft passenger data surveyed and processed using SEM PLS. The results obtained show that passenger mobility has a significant effect on internet utilization by 0.942, crowdshipping by 0.527, and the social crowdcourier environment by 0.369. Internet use has a significant effect on crowdshipping by 0.441, social crowdcourier environment by 0.211. Crowdshipping has a significant effect on the social crowdcourier environment of 0.416. The research succeeded in revealing the impact and implications of passenger mobility and the use of the internet in crowdshipping on the influence of the social crowdcourier environment as well as offering new business opportunities, namely that airplane passengers can also become freelance couriers.

## **1. INTRODUCTION**

Passenger mobility, departure, and arrival are closely related to departure, and arrival of goods/logistics [1]. These elements have combined to provide new opportunities for logistics [1-3]. The integration between passengers and logistics opens up opportunities in transportation rides with improvements in the load factor and freight efficiency [4]. One of the main issues identified here is balancing supply and demand of these services, given that supply first arises from the passenger transport sector, while the freight transport sector generates demand [5].

The level of passenger crowd density narrows the departure space, including linear with passenger arrivals [6]. If passengers already have a ticket, they automatically have the right to get flight travel services, including free baggage that can be used independently [7]. This condition is very likely to be utilized to reduce the cost of logistics deliveries consumed in certain areas so that logistics transportation and logistics prices are more efficient and effective [6]. The passengers' Departure and arrival on the flight are given accessible baggage facilities to carry personal goods or logistics [2]. Airlines limit free baggage facilities, and excess baggage will be shared with passengers with the same flight number [8] which is the basic concept of crowdshipping, which can generally be viewed and ordered through Internet services [9].

Crowdshipping is a method that utilizes crowds of departure people to deliver packages to customers [10]. This method is considered a sustainable business that corresponds to supply

and demand for any logistics transportation [11] with a market concept that allows information connectivity to occur [12]. The primary process of crowdshipping is that the logistics are transported by passenger aircraft that are traveling according to the passenger destination [13]. The type of crowdshipping investigated is based on crowdshippers using public transport, explicitly using flights, including planning urban transport activities on flight paths for sustainable logistics [9, 14].

If the free baggage facility is still available, registered cargo/logistics delivery can use the facility, and passengers have the opportunity to become freelance couriers [5]. Through Internet services, freelance couriers can view the availability of crowdlogistics to be delivered, logistics delivery destinations based on offers from shippers, remuneration earned as compensation as a courier, payment methods, and other parcel delivery service needs [9, 12]. In addition to the interests of shipping goods, internet services also function in forming a community in the virtual world of these freelance couriers, so internet utilization is crucial [15]. The increasing number of freelance couriers will form a group in the crowd courier social environment [8].

However, the influence of passenger departures and arrivals (passenger mobility) is potentially problematic for air transport crowdshipping [16]. The negative influence of passenger movement on crowdshipping services can be attributed to factors such as delivery delays due to flight delays, service effectiveness, passenger overflow, supply determinants, and the compatibility between passengers and goods [5]. These factors need to be carefully considered when

designing and implementing crowdshipping services to ensure their success and sustainability [8]. In addition, crowdshipping systems are expected to be continuously updated so that they can adapt to the dynamics of passenger mobility and how well regulations and policies are implemented to address these challenges [11, 17].

Restrictions on free baggage facilities can be accessed through the Internet, so the influence of Internet utilization is potentially problematic with air transport crowdshipping [18]. Baggage quota restrictions in crowdshipping reduce the interest of couriers due to capacity constraints and, thus, less flexibility in logistics delivery, which can also reduce the remuneration [19]. This restriction can also negatively impact both the sender and the recipient, making crowdshipping services less attractive than other deliveries [20]. Opportunities to become a freelance courier can be accessed through the Internet, so the influence of Internet utilization has the potential to be problematic in the crowdcourier social environment [21]. The negative impact of freelance couriers with internet services can be difficulties in receiving and sending messages when making communication contacts [5, 11]. If this condition makes social crowdcourier environment not conducive to the internet connection, it can lead to late information, problematic use of applications, and risk of losing orders [17].

The increasing number of freelance couriers allows the influence of crowdshipping to be problematic for the freelance courier environment potentially (crowdcourier social environment). In the crowdshipping concept, freelance couriers face some challenges, including intense competition, income uncertainty, and significant workloads [21]. Couriers don't get benefits like health insurance and paid time off; they rely heavily on the platform to get orders as couriers. Legal protection factors and the impact of technology also play an important role in shaping the conditions of their social environment.

This research is important because it has the potential to open up new business opportunities by utilizing passengers as intermediaries in logistics transportation, through the use of free baggage facilities supported by the use of the internet. The novelty of this research lies in how crowdshipping can act as an intermediary medium in influencing the formation of the work environment for freelance couriers.

## 2. BASIC THEORY

This analysis aims to determine the relationship between four research variables, passenger mobility  $X_1$ , internet utilization  $X_2$ , and crowdshipping  $Z_1$  in influencing social crowdcourier environment  $Y_1$ .

### 2.1 Passenger mobility

$X_1$  is the number of individuals who travel by air to and from the city of Batam, and its indications include, among other passengers number  $X_{1.1}$ , logistics number  $X_{1.2}$ , destination number  $X_{1.3}$ , baggage number  $X_{1.4}$ ; vehicles number  $X_{1.5}$ ; logistics regulation  $X_{1.6}$  [1, 2, 22].

### 2.2 Internet utilization

$X_2$  is an activity that involves using internet technologies to speed up the fulfilment of needs [23, 24], where indicator

measurements can be viewed from, platform app availability  $X_{2.1}$ ; ease of app using  $X_{2.2}$ ; easy of transaction app  $X_{2.3}$ ; online payment  $X_{2.4}$ ; services and security  $X_{2.5}$  [20, 21, 24].

### 2.3 Crowdshipping

$Z_1$  sends mass goods or logistics using passenger departures crowd as delivery people, known as freelance couriers [8, 9, 11]. The measurement indicator for this process are, crowdlogistics  $Z_{1.1}$  is the availability of free charge baggage 15-20 kg as a form of service from airlines in the form of logistics ready to be sent via passengers; crowdshipper  $Z_{1.2}$  is the companies or people sending logistics; crowdcourier  $Z_{1.3}$  is the passengers who are willing to carry logistics on behalf of the ticket; crowdplatform  $Z_{1.4}$  is means the platform of delivery available; crowdshare economic  $Z_{1.5}$ , is the shipping cost received by passengers as a logistics delivery medium [5, 11, 25].

### 2.4 Social crowdcourier environment

$Y_1$  is the interaction or relationship between people or airplane passengers who work as freelance couriers and are closely related to crowdshipping process [26, 27]. Like other communities, the social environment that exists in general, the crowdcourier social environment, also influences the emergence of issues around the community where the measurement indicators can be seen from the process of interaction in the form of, collaboration  $Y_{1.1}$ ; conflict  $Y_{1.2}$ ; income  $Y_{1.3}$ ; happiness  $Y_{1.4}$ ; knowledge  $Y_{1.5}$ ; character  $Y_{1.6}$ ; and quality of life  $Y_{1.7}$ ; civilization  $Y_{1.8}$ ; attitude  $Y_{1.9}$ ; opinion  $Y_{1.10}$ ; norm  $Y_{1.11}$ ; behavior  $Y_{1.12}$  [15, 17, 28].

Therefore, the hypothesis in this study is:

H<sub>1</sub>: Passenger mobility has a significant and positive impact on internet utilization.

H<sub>2</sub>: Passenger mobility has a significant and positive impact on crowdshipping.

H<sub>3</sub>: Passenger mobility has a significant and positive impact on Social Crowdcorier Environment.

H<sub>4</sub>: Internet utilization has a significant and positive impact on crowdshipping.

H<sub>5</sub>: Internet utilization has a significant and positive impact on Social Crowdcourier Environment.

H<sub>6</sub>: Crowdshipping has a significant and positive impact on Social Crowdcourier Environment.

## 3. METHODOLOGY

From the research variables summarized in Table 1 below, and a thinking framework was developed as shown in Figure 1.

The analysis was preceded by a survey of 200 customer samples such as prospective, passengers, and former passengers. The collected survey data was analyzed using Structural Equation Model based on Partial Least Square (SEM PLS) Serie 4.0.1.

Structural Equation Modeling Partial Least Squares (SEM-PLS) aims to ensure direct, indirect, and total effects in the specified model. It is important to note that the term "effect" in this context does not mean causation because SEM-PLS is based on correlational analysis and not causal modeling.

In addition, the application of SEM-PLS is very beneficial considering the limited availability of previous research

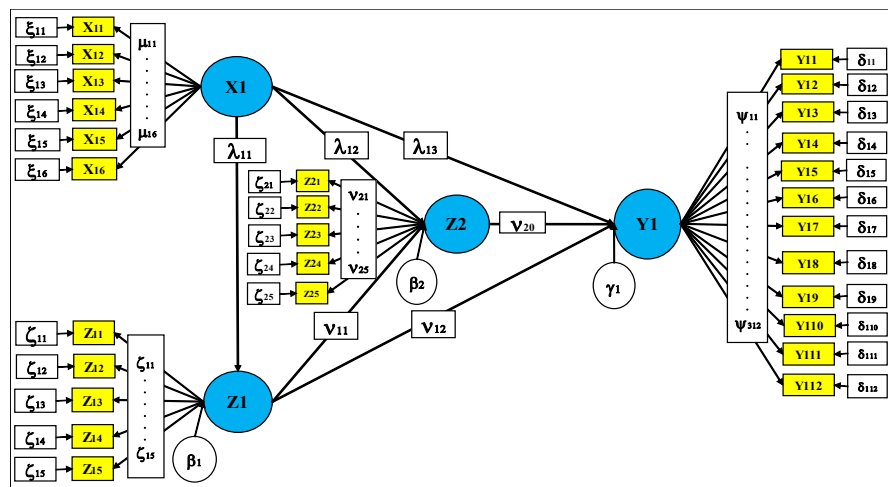
information in this field. In this regard, SEM-PLS is very suitable to handle these challenges by providing strong

analytical capabilities even though there are constraints in existing information.

**Table 1.** Summary of operational definitions

No	Variable	Definitions	Indicators	Literature
1	X <sub>1</sub> Passenger mobility	The arrival and departure of passengers trips via air transport from Batam to other cities whose indicators include the movement of people, logistics movements, means of transportation, final destination of delivery, regulations related to logistics	X <sub>1.1</sub> passengers number X <sub>1.2</sub> logistics number X <sub>1.3</sub> destinations number X <sub>1.4</sub> baggages number X <sub>1.5</sub> vehicles number X <sub>1.6</sub> logistics regulation	[9, 29]
2	Z <sub>1</sub> Internet utilization	Activities in using internet applications or any technology that helps humans create, change, store, communicate, and disseminate information to support accelerated fulfillment of needs	X <sub>2.1</sub> platform app availability X <sub>2.2</sub> ease of app using X <sub>2.3</sub> easy of transaction X <sub>2.4</sub> app online payment X <sub>2.5</sub> services and security	[30, 31]
3	Z <sub>2</sub> Crowdshipping	Delivery of goods or logistics by utilizing mass passenger departures as delivery people is known as crowdcouriers	Z <sub>2.1</sub> crowdlogistic Z <sub>2.2</sub> crowdcourier Z <sub>2.3</sub> crowdshipper Z <sub>2.4</sub> crowdshare-economic Z <sub>2.5</sub> crowd-transportation	[32-34]
4	Y <sub>1</sub> Social Crowdcourier Environment	Interactions or relationships between people or airplane passengers working as freelance couriers and having a tight relationship with the crowdshipping business	Y <sub>1.1</sub> collaboration Y <sub>1.2</sub> conflict Y <sub>1.3</sub> income Y <sub>1.4</sub> happiness Y <sub>1.5</sub> knowledge Y <sub>1.6</sub> character Y <sub>1.7</sub> quality of life Y <sub>1.8</sub> civilization Y <sub>1.9</sub> attitude Y <sub>1.10</sub> opinion Y <sub>1.11</sub> norm Y <sub>1.12</sub> behavior	[35, 36]

Source: Author processed data, 2024



**Figure 1.** Conceptual framework

Source: Author processed data, 2024

The social crowdcourier environment is influenced by passenger mobility and internet utilization directly and through the moderating variable Air Transportation Crowdshipping. Passengers utilize the internet to find positions as freelance couriers and airplane passengers according to the purpose of their trip. When someone becomes a passenger and is registered as a crowdcourier, then as a courier carrying logistics, social interaction begins to occur.

The influence of variables can be formulated as the formulas below:

$$Z_1 = \lambda_{11} + \beta_1 \tag{1}$$

$$Z_2 = \lambda_{12} + v_{11} + \beta_2 \tag{2}$$

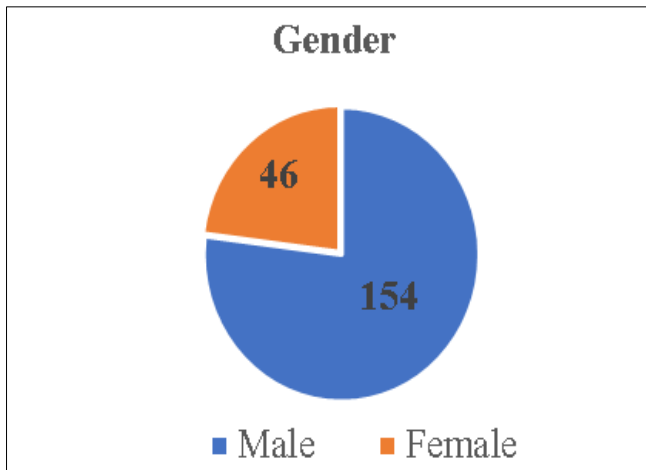
$$Y_1 = \lambda_{13} + v_{12} + v_{20} + \delta_1 \tag{3}$$

## 4. RESULT

### 4.1 Respondent characteristic

Based on Figure 2, as can be seen, respondents are classified into two categories, namely male and female. From data obtained from 200 respondents, the composition of respondents based on gender was 154 respondents or 77% were male; the remaining 46 respondents, or 23% were women, as seen in Figure 2.

The results shown represent the largest number of male respondents. Therefore, according to the author's observations, men are thought to travel more often by airplane compared to women.



**Figure 2.** Respondent's gender

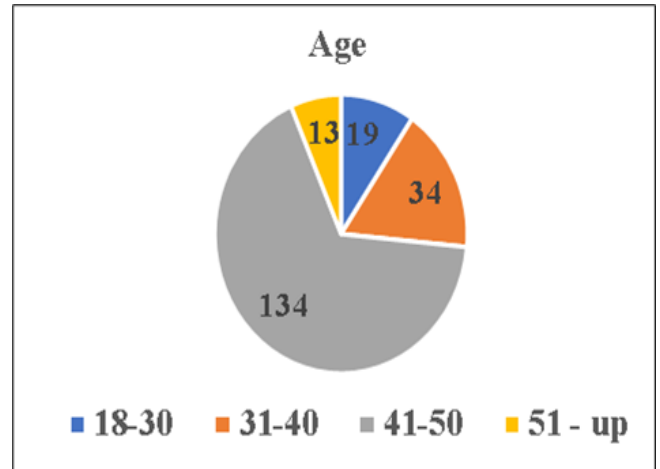
Source: Author processed data, 2024

Based on Figure 3, it can be seen that responders can be classified into four categories: ages 18-30, 31-40, 41-50, and over 51 years old.

From the data of 200 respondents obtained, the age distribution of responders is 19 persons, or around 9.5% aged 18-30 years, 34 people or 17% aged 31-40 years, 134 people or 67% aged 41-50 years, and age over 51 years and over obtained 13 people or around 6.5%. As illustrated in Figure 3, the number of respondents is dominated by 31-40 years of age around 67% which is an enjoyable age.

The results shown represent the largest number of aged 41-

50 years respondents. Therefore, according to the author's observations, aged 41-50 years are thought to travel more often by airplane compared others.



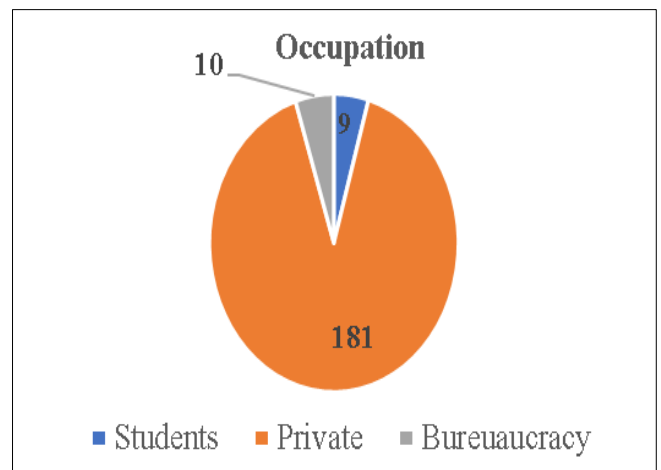
**Figure 3.** Respondent's age

Source: Author processed data, 2024

Based on Figure 4, as can be seen, respondents are divided to three occupation classifications, namely Student, Private, along with Bureaucracy.

From the data of 200 respondents acquired, the composition of responders according on occupation are 9 respondents or 4.5% Students, 181 respondents or 90.5% Privats, and as many as 10 respondents or 5% Bureaucracy. The findings in Figure 4, reveal that the number of respondents is dominated by the private sector with 181 people or 90.5%

The results shown represent the largest number of private respondents. Therefore, according to the author's observations, private are thought to travel more often by airplane compared others.



**Figure 4.** Respondent's occupation

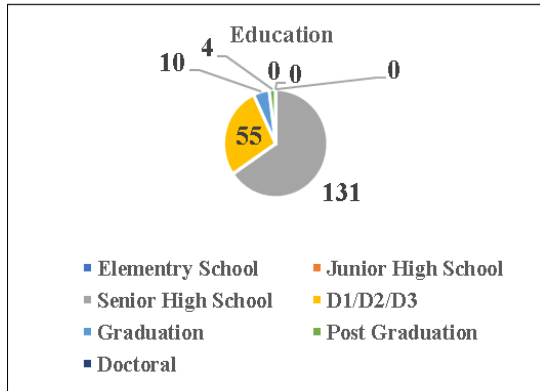
Source: Author processed data, 2024

Based on Figure 5 as can be seen, respondents are classified into seven types of education, namely: Elementary school, junior high school, senior high school, D1 / D2 / D3, graduate, post graduate and doctoral.

From the data of 200 respondents obtained, the composition of respondents depending on occupation are elementary school 0 or 0%, Junior High School 0 or 0%, Senior High

School 131 or 65.5%, D1 / D2 / D3 55 or 27.5%, Graduate 10 or 4%, Post graduate, 4 or 2% and S3 amounted to 0 or 0%. The results shown in Figure 5 the number of respondents is dominated by Senior High School 131 as many as 131 respondents or 65.5%.

The results shown represent the largest number of Senior High School respondents. Therefore, according to the author's observations, Senior High School are thought to travel more often by airplane compared others.



**Figure 5.** Respondent's education  
Source: Author processed data, 2024

#### 4.2 Validity and reliability test

Tables 2-5 outer model test results provide an assessment of the study's reliability and validity. A reflective measurement is considered high if it has a correlation of more than 0.70 with the construct being tested.

Based on the results of the outer loading in Tables 2-5, it is clear that the correlation value of all question items in the questionnaire for all indicators and items is greater than 0.70, implying that all items met the validity requirements and that the indicators accurately describe the variables [16].

a. The exogenous latent variable  $X_1$  Passenger mobility or pax mobility according to Table 2, has 6 (six) manifest variables or indicators consisting of  $X_{1.1}$  Passengers number with a load factor of 0.890, based on the load factor value it can be concluded that passengers number confirmed to be able to describe the passenger mobility variable.  $X_{1.2}$  Logistics number with a load factor of 0.889, based on the load factor value it can be concluded that logistic number are confirmed to be able to describe the passenger mobility variable.  $X_{1.3}$  destinations number with a load factor of 0.890, based on the load factor value it can be concluded that destinations number are confirmed to be able to describe the passenger mobility variable.  $X_{1.4}$  Baggages number with a load factor of 0.889, based on the load factor value it can be concluded that baggages number are confirmed to be able to describe the passenger mobility variable.  $X_{1.5}$  Vehicles number with a load factor of 0.890, based on the load factor value it can be concluded that vehicles number are confirmed to be able to describe the passenger mobility variable.  $X_{1.6}$  Logistics regulation with a load factor of 0.890, based on the load factor value it can be concluded that Logistics regulation are confirmed to be able to describe the passenger mobility variable.

b. The latent variable as well as the intermediate variable  $X_2$  Internet Utilization according to Table 3, has 5 (five) manifest variables or indicators consisting of:  $X_{2.1}$  platform application

availability with a load factor of 0.894, based on the platform application availability load factor it can be concluded that it is confirmed to be able to describe the Internet Utilization variable.  $X_{2.2}$  Ease of App Using, with a load factor of 0.894, based on the load factor value, it can be concluded that the Ease of App Using is confirmed able to describe the internet utilization variable.  $X_{2.3}$  easy of transaction app, with a load factor of 0.895, based on the load factor value of the easy of transaction app is confirmed to be able to describe the Internet Utilization variable.  $X_{2.4}$  online payment with a load factor of 0.895, based on the load factor value it can be concluded that online payment is confirmed to be able to describe the Internet Utilization variable.  $X_{2.5}$  services and security, with a load factor of 0.895, based on the load factor value it can be concluded that services and security are confirmed to be able to describe the Internet Utilization variable.

c. The latent variable as well as the intermediate variable  $Z_1$  Crowdshipping according to Table 4 has 5 (five) manifest variables or indicators consisting of:  $Z_{1.1}$  crowdlogistic, with a load factor of 0.894, based on the load factor value it can be concluded that crowdlogistic is confirmed to be able to describe the Crowdshipping variable.  $Z_{1.2}$  crowdcourier, with a load factor of 0.894, based on the load factor value it can be concluded that crowdcourier is confirmed to be able to describe the Crowdshipping variable.  $Z_{1.3}$  crowdshipper, with a load factor of 0.895, based on the load factor value it can be concluded that the crowdshipper is confirmed to be able to describe the Crowdshipping variable.  $Z_{1.4}$  crowdshare-economic, with a load factor of 0.895, based on the load factor value it can be concluded that crowdshare-economic is confirmed to be able to describe the Air Transportation Crowdshipping variable.  $Z_{1.5}$  crowd-air-transport with a load factor of 0.894, based on the load factor value it can be concluded that crowd-air-transport is confirmed to be able to describe the Crowdshipping variable.

d. The endogenous latent variable  $Y_1$  Social Crowdcourier Environment according to Table 5 has 12 (twelve) manifest or indicator variables consisting of:  $Y_{1.1}$  collaboration, with a load factor of 0.811, based on the load factor value it can be concluded that collaboration is confirmed to describe the Crowdcourier Social Environment.  $Y_{1.2}$  conflict, with a load factor of 0.811, based on the load factor value the conflict can be confirmed to describe the Crowdcourier Social Environment.  $Y_{1.3}$  income, with a load factor of 0.802, based on the income load factor value, is confirmed to describe the Crowdcourier Social Environment variable.  $Y_{1.4}$  happiness, with a load factor of 0.707, based on the load factor value of each manifestation of happiness, it can be concluded that happiness is confirmed to describe the Crowdcourier Social Environment variable.  $Y_{1.5}$  knowledge, with a load factor of 0.716, based on the knowledge load factor value, is confirmed to describe the Social Crowdcourier Environment variable.  $Y_{1.6}$  Character, with a load factor of 0.706, based on the character load factor value, is confirmed to describe the Social Crowdcourier Environment variable.  $Y_{1.7}$  quality of life, with a load factor of 0.706, based on the confirmed quality of life load factor value capable of describing the Social Crowdcourier Environment variable.  $Y_{1.8}$  civilization environmental conditions, with a load factor of 0.756, based on the load factor value it can be concluded that civilization environmental conditions is confirmed to describe the Social Crowdcourier Environment variable.  $Y_{1.9}$  attitude, with a load factor of 0.705, based on the load factor value, can be concluded that the attitude is confirmed to describe the Social



Crowdcourier Environment variable.  $Y_{1.10}$  opinion or idea, with a load factor of 0.705, based on the load factor value of manifest opinion or idea, it can be concluded that the confirmed to describe the Social Crowdcourier Environment variable.  $Y_{1.11}$  moral norms, with a load factor of 0.725, based on the load factor value it can be concluded that moral norms is confirmed to describe the Social Crowdcourier Environment variable.  $Y_{1.12}$  consumer behavior with a load factor of 0.753, based on the load factor value it can be concluded that consumer behavior is confirmed to describe the Social Crowdcourier Environment variable.

**Table 2.** Passenger mobility outer model

No	Variables	Indicators	Outer Loadings
1	X <sub>1</sub> Passenger Mobility	X <sub>1.1</sub>	<b>0.890</b>
2		X <sub>1.2</sub>	<b>0.889</b>
3		X <sub>1.3</sub>	<b>0.890</b>
4		X <sub>1.4</sub>	<b>0.889</b>
5		X <sub>1.5</sub>	<b>0.890</b>
6		X <sub>1.6</sub>	<b>0.890</b>

Source: Author processed data, 2024

**Table 3.** Internet utilization outer model

No	Variables	Indicators	Outer Loadings
7	X <sub>2</sub> Internet Utilization	X <sub>1.1</sub>	<b>0.894</b>
8		X <sub>1.2</sub>	<b>0.894</b>
9		X <sub>1.3</sub>	<b>0.895</b>
10		X <sub>1.4</sub>	<b>0.895</b>
11		X <sub>1.5</sub>	<b>0.895</b>

Source: Author processed data, 2024

**Table 4.** Crowdfunding outer model

No	Variables	Indicators	Outer Loadings
12	Z <sub>1</sub> Crowdfunding	Z <sub>1.1</sub>	<b>0.894</b>
13		Z <sub>1.2</sub>	<b>0.894</b>
14		Z <sub>1.3</sub>	<b>0.895</b>
15		Z <sub>1.4</sub>	<b>0.895</b>
16		Z <sub>1.5</sub>	<b>0.894</b>

Source: Author processed data, 2024

**Table 5.** Social crowdcourier environment outer model

No	Variables	Indicators	Outer Loadings
17	Y <sub>1</sub> Social Crowdcourier Environment	Y <sub>1.1</sub>	<b>0.811</b>
18		Y <sub>1.2</sub>	<b>0.811</b>
19		Y <sub>1.3</sub>	<b>0.802</b>
20		Y <sub>1.4</sub>	<b>0.707</b>
21		Y <sub>1.5</sub>	<b>0.716</b>
22		Y <sub>1.6</sub>	<b>0.706</b>
23		Y <sub>1.7</sub>	<b>0.706</b>
24		Y <sub>1.8</sub>	<b>0.756</b>
25		Y <sub>1.9</sub>	<b>0.705</b>
26		Y <sub>1.10</sub>	<b>0.705</b>
27		Y <sub>1.11</sub>	<b>0.725</b>
28		Y <sub>1.12</sub>	<b>0.753</b>

Source: Author processed data, 2024

### 4.3 Reliability and validity

Reliability testing can be summarized based on Table 6, which presents the results of Cronbach's Alpha and AVE tests to measure internal consistency, namely how closely related the variables are as a group.

Based on Table 6, it can be seen that the 2 variables above, Z<sub>2</sub> Air Transportation Crowdfunding and Y<sub>1</sub> Social Crowdcourier Environment all have a Cronbach's Alpha value of more than 0.7 and an Average Variance Extracted (AVE) value above 0.5 so it can be stated that all variables are reliable or fulfill the requirements.

**Table 6.** Construct reliability and validity

No	Variabel	Cronbach's Alpha	Average Variance Extracted (AVE)
1	Z <sub>2</sub> Air Transportation Crowdfunding	<b>0.962</b>	<b>0.657</b>
2	Y <sub>1</sub> Social Crowdcourier Environment	<b>0.981</b>	<b>0.603</b>

Source: Author processed data, 2024

**Table 7.** Test of determinant

No	Variables	R-Square	R-Square Adjusted
1	Z <sub>1</sub> Internet Utilization	<b>0.888</b>	<b>0.887</b>
2	Z <sub>2</sub> Crowdfunding	<b>0.954</b>	<b>0.908</b>
3	Y <sub>1</sub> Social Crowdcourier Environment	<b>0.910</b>	<b>0.952</b>

Source: Author processed data, 2024

The level of ability to influence variables can be seen in Table 7. Based on the R<sup>2</sup> value, it is found that the Passenger Mobility is able to interpret Internet Utilization 88.8%, the remaining 11.2% is explained by constructs other than those investigated in this study.

Passenger Mobility and Internet Utilization variables are simultaneously able to interpret 95.4% of the variability in Crowdfunding, the remaining 4.6% is explained by constructs other than those investigated in this study.

Then Passenger Mobility, Internet Utilization, and Crowdfunding are simultaneously able to interpret the variability of the Social Crowdcourier Environment construct by 91.0%, the remaining 9% is explained by constructs other than those investigated in this study.

Based on Table 8, Passenger mobility significantly influences Internet utilization by 0.942, crowdfunding by 0.527, and crowdcourier social environment by 0.369. Internet utilization significantly influences crowdfunding by 0.441, and crowdcourier social environment by 0.211. Air Transportation Crowdfunding significantly influences the crowdcourier social environment by 0.416.

**Table 8.** Path coefficient significant

No	Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	t Statistics ( O/STDEV )	p Values
1	X <sub>1</sub> -> Z <sub>1</sub>	0.942	0.946	0.048	19.674	<b>0.0000</b>
2	X <sub>1</sub> -> Z <sub>2</sub>	0.527	0.531	0.113	4.654	<b>0.0000</b>
3	X <sub>1</sub> -> Y <sub>1</sub>	0.369	0.368	0.091	4.046	<b>0.0000</b>
4	Z <sub>1</sub> -> Z <sub>1</sub>	0.441	0.437	0.113	3.871	<b>0.0160</b>
5	Z <sub>1</sub> -> Y <sub>1</sub>	0.211	0.210	0.088	2.411	<b>0.0000</b>
6	Z <sub>2</sub> -> Y <sub>1</sub>	0.416	0.416	0.096	4.344	<b>0.0000</b>

Source: Author processed data, 2024

## 5. DISCUSSION

Passenger mobility has a significant effect on internet utilization by 0.942, meaning that if passenger mobility increases by 1 it will affect the increase in internet utilization by 0.942 and by 0.058 it is influenced outside of this research. This influence value is certainly supported by the level of determination towards crowdshipping of 0.888 from internet utilization.

The very strong correlation value and high coefficient of determination show that flight passengers' mobility has a considerable impact on internet utilization [19, 20].

The ramifications include opportunities for the aviation and telecommunications businesses, more successful marketing techniques, a beneficial impact on the digital economy, and enhanced connectivity and access to information for air travelers [18, 21].

The significant impact of airplane passenger movement on internet usage can be explained by three major factors:

The amount of airplane passengers raises the demand for internet access at airports for purposes such as check-in, flight information searches, and entertainment while waiting for a flight [23, 24].

Passengers are increasingly requesting internet connection during flights in order to stay connected with business, family, and entertainment. This motivates airlines to provide Wi-Fi services onboard flights, which necessitates suitable infrastructure and technology [20, 21].

With increased mobility, passengers are more reliant on mobile applications and internet services such as ticket purchase, flight schedule updates, ground transportation, and hotel reservations. This increases total internet data traffic.

The great mobility of flight passengers contributes to a growth in global data traffic through the usage [21, 24].

Passenger mobility has a significant effect on crowdshipping by 0.527, meaning that if passenger mobility increases by 1 it will affect the increase in crowdshipping by 0.527, and by 0.473 it is influenced outside of this research. This influence value is certainly supported by the level of determination towards crowdshipping of 0.954 from simultaneous passenger mobility with internet utilization.

Passenger mobility has a significant impact on innovation in the air transportation industry, especially through crowdshipping is primarily driven by the presence of passengers and the availability of logistics to be sent.

This is in line with the previous opinion where Crowdshipping is considered a model of sending logistics through airplane passengers trips from one place to another who utilize the free space in free baggage facilities or the capacity of their luggage to send packages to the same destination location as their flight [37]. This phenomenon marks a paradigm shift in utilizing passenger mobility to increase efficiency and flexibility in the supply chain.

Passenger mobility creates new potential in utilizing empty capacity on airplanes. Following past findings passengers traveling to the same place or nearer to a similar destination can become providers of goods delivery services for those in need [38, 39]. Using a special application or platform, passengers can offer their free capacity to send goods to destinations that intersect with their trips.

The main impact of air transportation crowdshipping is increased logistics efficiency and reduced shipping costs. Passengers who participate in crowdshipping can help optimize the use of aircraft cargo space [38, 39], thereby

reducing transportation costs and reducing environmental impacts. Apart from that, crowdshipping also provides a faster and more flexible alternative for shipping goods, especially for deliveries to locations that may be difficult to reach by traditional delivery services.

Based on this, passenger movements that influence air transportation crowdshipping will open new opportunities to increase efficiency and flexibility in shipping goods [3, 40]. By collaborating between passengers and air transportation service providers, this model can redefine the way goods are sent and positively contribute to the development of the logistics and transportation industry.

However, several aspects must be considered when implementing crowdshipping in air transportation, including security, privacy, and regulations. Authorities and transport companies need to develop clear and secure frameworks to maintain the trust of passengers and consignees [41].

In general, passenger mobility can foster an increase in air transportation crowdshipping activities, especially in terms of crowdlogistics, in the form of logistics that can be delivered through the free baggage facilities [39], crowdsipper, in the form of the person responsible for sending goods/logistics to the departure destination directly. the existence of logistical baggage space for passengers, meaning that passengers depart via airplane with the burden of responsibility for baggage in the form of logistics or cargo, in terms of the quantity allowed, both weight and size limits [42], willingness to become a crowdcourier or mass courier by utilizing service facilities baggage provided by each airline, crowdplatform, in the form of applications on the internet to carry out transactions for searching for goods, searching for crowdcouriers, as well as other information including payment methods for carrying out crowdshipping transactions [43], crowdshare-economy, in the form of crowdshipping rates obtained by crowdcourier for his responsibilities as a logistics courier [44].

Passenger mobility significantly influences the social crowdcourier environment by 0.369, which means that if passenger mobility increases by 1, it will affect the increase in the crowdcourier social environment by 0.369, and by 0.631 it is influenced outside of this research. This influence value is certainly supported by the level of determination towards social crowdcourier environment of 0.910 from simultaneous passenger mobility, internet utilization with crowdshipping.

Passenger mobility in relation to crowdcouriers as the main source of crowdcourier has the potential to have a positive impact on interactions between individuals in the context of the crowdcourier social environment, who are involved in the delivery of goods to non-professional individuals, then the role of passenger mobility can be a major factor influencing the structure of the social environment. This influence includes interactions between individuals, community dynamics, and the evolution of economic models in the courier ecosystem.

In keeping with earlier findings, by creating a more linked community of users and service providers, passenger mobility contributes to enriching collaboration and mutual assistance [35, 45]. Greater interaction and information exchange among users have the potential to establish social bonds within the crowdcourier network.

Passenger mobility has an impact on community dynamics in a crowdcourier context. In keeping with earlier findings, the increase in the number of active users and service providers can produce a more dynamic environment [45, 46]. This can foster a variety of social activities, including community meetings, experience sharing, and collaboration on service

creation. Passenger mobility can promote good improvements within the Crowdcourier ecosystem.

From a business standpoint, passenger mobility has a huge impact on the crowdcourier business model. Greater passenger mobility may lead to greater demand for delivery services, creating new economic prospects for those participating in crowdcourier. In keeping with prior results that with an increase in passenger movements, the crowdcourier business model can grow in scale and diversify its offerings [47, 48].

Although passenger mobility has a positive impact, it is important to recognize the ethical difficulties associated with user privacy and security. As a result, in accordance with prior findings, it is vital to design rules and practices that protect individual rights and security in the context of passenger mobility, which is critical in preserving the social crowdcourier environment [49].

To create a sustainable social environment in crowdcourier, a thorough understanding of the impact of passenger movement is required. According to prior research, greater connection between individuals, establishing strong community dynamics, and impact on business models are crucial components that enrich the crowdcourier ecosystem [50]. By understanding and managing these repercussions effectively, crowdcourier can continue to flourish as a competitive alternative and make a beneficial contribution to the social crowdcourier ecosystem.

In general, passenger mobility will have a huge impact on the social crowdcourier environment by influencing collaboration in the form of combining various people to achieve certain goals [47], influences conflict in the form of a social process between several people, describes the events that occur when one party tries to fulfill its goals in opposition to the other party [51] influencing income is the main goal of a business so its role is very large and is an important factor because it will ensure survival [52], influences happiness in the form of a situation of thought or feeling of pleasure, peace of life physically and mentally even though the perspective is different for each individual [53, 54], influences knowledge in the form of a desire to know in humans that arises from the demands and needs in life that continue to develop [55], influences the character in the form of a person's ethical or moral points that are visible, such as character, psychological traits, morals, or manners that differentiate a person from others [36], affects quality of life as a person's view in the context of the culture and value system in which the individual lives, as well as objectives, expectations, standards, and concerns [56], influencing civilization in the form of material, scientific, artistic, literary, and social progress found in a society [57], influencing attitudes in the form of a person's closed response to a stimulus, which involves the opinions and emotions of the person concerned which can reveal the person's personality as nervous readiness before giving a response [36], influencing opinion or opinions in the form of thoughts or ideas to clarify a particular preference or tendency ideologically as well as a perspective or point of view that is not objective [35], influencing norms in the form of general habits or rules that serve as guidelines for a group of people so that they can also be called social rules or social regulations. The study [35] influences consumer behavior in the form of processes and activities when someone deals with searching, selecting, purchasing, using, and reviewing products and services to satisfy needs and desires [36].

Internet utilization significantly influences crowdshipping by 0.441, which means that if internet usage increases by 1, it

will affect crowdshipping by 0.441, and by 0.559 it is influenced outside of this research. This influence value is certainly supported by the level of determination towards crowdshipping of 0.954 from simultaneous internet utilization with passenger mobility.

Internet utilization is experiencing revolutionary developments in various sectors, including in the scope of air transportation. Air Transportation Crowdshipping, which refers to the delivery of goods by non-professional individuals, is emerging as a particularly attention-grabbing phenomenon. In line with previous findings that the use of the internet in crowdshipping practices in the air transportation sector can have a significant impact on increasing efficiency and flexibility in the goods delivery process [43].

Internet utilization for crowdshipping in air transportation speeds up and increases system accessibility, this can be seen in every search process in crowdshipping through the use of the Internet because all information is visible through the Internet process.

In line with previous findings, through online platforms, users can easily access goods delivery services from other individuals, thereby opening up opportunities for faster and more efficient delivery. This open access expands reach and minimizes geographic barriers in the delivery process [43, 58].

The internet has made it possible to create crowdshipping platforms that can handle various shipping scales. Thus, this system becomes more flexible in accommodating various types of goods, from small packages to large items. The existence of crowdshipping also provides more options for senders and recipients in determining the most suitable delivery time and location [31, 43].

The use of the Internet in crowdshipping in air transportation can bring cost efficiencies because it reduces the involvement of large shipping companies. In line with previous findings that individuals participating in crowdshipping can offer more competitive rates, thereby providing a more affordable option for users [59].

Internet utilization makes it easier to manage transactions and security in crowdshipping. A secure online payment system and a platform with a reputation system can provide trust to users [59]. This helps address concerns regarding security and reliability in the crowdshipping process.

Overall, internet utilization significantly influences crowdshipping in air transportation. The impacts include increased speed and accessibility, flexibility in delivery scale, cost efficiencies, and positive environmental aspects. A deep understanding of these potential changes will help relevant parties, both users and service providers, in optimizing and better integrating crowdshipping in the modern air transportation ecosystem.

In general, internet utilization will be able to foster an increase in Air Transportation Crowdshipping activities based on crowdlogistic influences, enriching the perspective of the logistics sector by conceptualizing crowds as added value [43], crowdshipper, in the form of a person responsible for shipping goods/logistics who forms an air transportation network that follows market distribution trends [30], willingness to become a crowdcourier or mass courier by utilizing the baggage service facilities provided by each airline, *crowdplatform*, in the form of an application on the internet to carry out transactions to search for goods, search for crowdcourier, as well as other information including payment methods for carrying out crowdshipping transactions [43], *crowdshare-economy*, in the form of crowdshipping rates obtained as a



crowdcourier for his responsibilities as a logistics courier [44], based on information obtained from the internet.

Internet utilization significantly influences the social crowdcourier environment by 0.211, meaning that if internet use increases by 1, it will affect the increase in the crowdcourier social environment by 0.211, and by 0.789 it is influenced outside of this research. This influence value is certainly supported by the level of determination towards social crowdcourier environment of 0.910 from simultaneous internet utilization, passenger mobility with crowdshipping.

The Internet has emerged as a significant catalyst in the Crowdcourier Social Environment. This phenomenon encompasses the amount of changes and dynamics in individual interactions, business model development, and community expansion in the Crowdcourier ecosystem.

The usage of the Internet in Crowdcourier significantly alters individual interactions. In keeping with earlier findings, individuals involved in delivering goods can connect, communicate, and interact with each other more effectively via online platforms [43], this results in a more connected network and enhances the quality of social ties within the crowdcourier community [47].

The impact of internet usage has also prompted a shift in Crowdcourier's business strategy. The use of this technology enables the development of more dynamic and innovative business models, such as boosting operational efficiency, competitiveness, and experimenting with different transaction patterns. In keeping with earlier findings, the Internet plays a critical role in aiding this shift, providing favorable consequences on economic growth and corporate sustainability [60].

The usage of the Internet helps to build and form a community inside Crowdcourier. In keeping with prior findings, community members can share experiences, provide feedback, and create stronger social bonds through online platforms [47, 61]. This community expansion generates a more dynamic environment, improving individual experiences and advancing shared goals within the Crowdcourier ecosystem.

Although it has a good impact, using the internet in a Crowdcourier context has ethical and security problems. In line with previous findings, privacy protection, transaction security, and user responsibility are major issues that must be addressed [62], to ensure sustainability and fairness in the Social Crowdcourier Environment

Overall, the use of the Internet has a central role in shaping and changing Crowdcourier's social environment. By understanding its impact on interactions between individuals, the evolution of business models, the growth of communities, and the ethical challenges that arise, we can illustrate how the Internet has become a force that plays a significant role in modernizing and enriching the crowdcourier ecosystem.

Crowdshipping significantly influences the social crowdcourier environment by 0.416, which means that if crowdshipping increases by 1, it will influence an increase in the social crowdcourier environment by 0.416, and by 0.584 it is influenced outside of this research. This influence value is certainly supported by the level of determination towards social crowdcourier environment of 0.910 from simultaneous crowdshipping, passenger mobility with internet utilization.

Air transportation crowdshipping has a significant impact on the crowdcourier social environment, especially through the crowdcourier platform. In this context, positive transformation in various social dimensions can occur through

a paradigm shift from the use of conventional courier services to the active participation of public aircraft passengers in the package delivery process.

In line with previous findings, the application of crowdshipping in air transportation opens up opportunities for wider public aircraft passenger participation in the logistics ecosystem. In line with previous findings, passengers involved in the delivery process are not only consumers but also active contributors to fulfilling joint logistics needs [4, 40]. This can strengthen the sense of belonging and social engagement, creating closer bonds among the common passengers on the plane.

Positive impacts can also be seen in empowering the local economy. Through the involvement of airline passengers in the delivery chain, crowdshipping can serve as an additional source of income for individuals or groups at the local level. In line with previous findings that the involvement of airplane passengers can open up economic opportunities for those who want to be involved in shipping activities, which in turn can improve economic welfare in certain communities [44].

Additionally, the use of crowdshipping in air transportation can create stronger social networks among participants. In line with previous findings, the delivery-sharing process can build an online community where members can interact with each other, share experiences, and support each other [45]. This can create new social interactions based on common interests in delivery efficiency and environmental sustainability.

Aside from having a positive influence, the crowdshipping concept in air transportation can present various obstacles, including security, privacy, and logistics management. Regulations are required to maintain control in this area. In keeping with prior findings, it is vital to build an acceptable regulatory framework and integrate information technology into policies that can accommodate positive growth and overcome potential threats [63, 64]. Thus, the development of crowdshipping in air transportation can give a long-term and constructive contribution to the social environment of the courier.

Crowdshipping, an innovative form of logistics and delivery of goods, is gaining popularity in today's digital age. The existence of airlines has a huge impact on the growth and sustainability of crowdshipping. Airlines impact on crowdshipping can be seen from numerous key aspects.

First, airplanes expedite the process of shipping goods. crowdshipping, which uses regular flying schedules, can provide faster and more efficient delivery times than land or marine shipping alternatives. This is especially useful for international or intercontinental shipment, where time is an important aspect [64].

Second, crowdshipping can reach more remote regions thanks to airlines' broad route networks. Commercial and cargo aircraft have route networks that cover a wide range of global destinations, allowing crowdshipping to expand their services and reach clients in more remote or underdeveloped areas [11, 17].

Third, airlines offer enormous freight capacity. Most airlines have cargo space available for crowdshipping items, whether through passenger flights or special cargo planes. This provides additional wrinkles and the capacity to handle big freight volumes [5, 11].

However, airlines' involvement in crowdshipping presents some issues. Relatively high travel costs can increase crowdshipping operational costs, influencing consumer prices. Furthermore, relying on airline timetables can be inconvenient

in the event that planes are delayed or cancelled [6].

To address this difficulty, crowdshipping companies must create successful techniques, such as cooperating with airlines to obtain low prices and leveraging technology to improve shipping efficiency and tracking of goods [15].

Overall, airlines contribute significantly to the expansion and efficiency of crowdshipping. Crowdshipping can continue to grow and deliver better service to clients all around the world by using airlines' speed, range, and capacity [8, 16].

The impact of these findings on logistics efficiency, costs, and timeliness is summarized here.

### **Logistics Efficiency**

**Increased Delivery Capacity:** Crowdshipping can increase delivery capacity by utilizing a network of non-professional drivers, lowering reliance on established courier fleets.

Crowdshipping drivers can respond to delivery requests more quickly and flexibly because they can pick up parcels from areas near their regular routes.

**Route Optimization:** The employment of advanced technology and software allows for the optimization of delivery routes, resulting in reduced trip time and increased logistical efficiency.

### **Cost**

Using freelance courier can save organizations money on fleet upkeep, salary, and perks compared to permanent workers.

Crowdshipping frequently provides lower shipping prices for consumers due to the cost efficiencies realized from this technique.

**Cost Variability:** Costs can fluctuate greatly based on the demand and availability of drivers in a given location, which can benefit consumers in certain scenarios but can also be a challenge in high demand conditions.

### **Sustainability**

Crowdshipping can help cut carbon emissions by lowering the use of delivery planes and leveraging existing passenger aircraft.

**Use of Existing Resources:** Using free luggage capacity in airplanes that are already in service reduces the need for additional resources, which helps to promote environmental sustainability.

**Local Economic Support:** This strategy can generate additional money for airline passengers and freelance couriers, benefiting the local economy and community welfare.

Overall, crowdshipping has numerous benefits in terms of logistics efficiency, cost savings, and beneficial impact on sustainability. However, this model confronts issues such as maintaining delivery dependability and security, as well as establishing standardized service quality requirements.

The following are recommended strategies that logistics companies can adopt:

(i) Utilization of Technology and Digital Platforms, to create an application that integrates crowdshipping services and allows real-time tracking, direct communication with crowdcouriers, and security features; (ii) Strengthening the Crowdcourier Network; (iii) Partnership and collaboration with airlines, logistics startups; (iv) Security and Trust through the implementation of identity verification; (v) Marketing and Public Education, marketing campaigns that emphasize the speed, low costs, and positive environmental impact of crowdshipping; (vi) Sustainability and Environmental Impact

Prioritize the use of environmentally friendly air transportation; (vii) Infrastructure development, strategic hubs and warehouses near airports to facilitate faster and more efficient distribution, and use of Internet of Things (IoT) technology to monitor the condition of goods during delivery; (viii) Ensure regulatory compliance; (ix) Implement an assessment and feedback system to continuously improve services based on user experience.

Crowdshipping is a sustainable business that employs many people to deliver products to consumers [10, 12]. This is based on public and urban transport operations. Passengers can become freelance couriers by using Internet services to view availability, destinations, and payment options [11, 13]. Utilization of the internet is very important for building virtual communities [9, 14] However, passenger mobility can be detrimental to air freight services, resulting in delivery delays, service effectiveness, freight abundance, supply determinants, and passenger-freight compatibility [5, 8, 16]. Thus, the findings in this paper still require careful evaluation of variables so that crowdshipping services are successful and long-term.

## **6. CONCLUSION AND SUGGESTIONS**

### **6.1 Conclusion**

Several inferences can be derived from the description of the facts and discussion above, such as:

This study was successful in demonstrating the impact and implications of passenger mobility and the usage of the internet in the context of crowdshipping on the social environment of crowd couriers.

Passenger movements can have a considerable impact on crowdshipping and the crowdcourier social environment, as evidenced by the findings and implications.

The repercussions and implications discovered can also be seen from the use of the internet, which has the potential to greatly influence crowdshipping and the crowdcourier social environment.

The impacts and implications found can also be seen from crowdshipping as a medium for passenger movement and the use of the internet is able to significantly influence the social environment of crowdcouriers.

The results of the research will open up opportunities for the formation of new businesses in the form of airplane passengers as well as becoming freelance couriers.

This research may not take into account local contextual factors that could impact the adoption of crowdshipping. Such differences in culture, laws, and policies in different regions can result in significant variations in results.

### **6.2 Suggestions**

Based on the results and conclusions, the following suggestions can be proposed:

The impact of the significant influence on Passenger Mobility and Internet utilization in Air Transportation Crowdshipping, stakeholders are expected to be able to adapt crowdshipping services to become an official business which allows for a surge in passengers, logistics, and competition to become crowdcouriers.

Passenger Mobility, Internet Utilization, and Crowdfunding have a significant influence on the development of the Social Crowdcourier Environment, that this Crowdcourier model provides opportunities for active participation from communities or individuals in delivery services, where in this regard, facilities are needed to form networks and increase technological involvement.

This research still focuses on the Crowdcourier Social Environment where the variables of Passenger Mobility, Internet Utilization, and the concept of Crowdfunding impact the opening of business opportunities as a freelance courier. Meanwhile, many other aspects still need to be researched on the impact of an Air Transportation service from an Environmental Quality perspective as well as other business opportunities.

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## NOMENCLATURE

$Z_1$	Determinants of Internet Utilization
$Z_2$	Determinants of Air Transportation Crowdshipping
$Y_1$	Determinants of Crowdcouriers Social Environment

## Greek symbols

$\lambda_{11}$	Path Coefficient from Passenger Mobility to Internet Utilization
$\lambda_{12}$	Path Coefficient from Passenger Mobility to Air Transportation Crowdshipping
$\lambda_{13}$	Path Coefficient from Passenger Mobility to Crowdcourier Social Environment
$\nu_{11}$	Path Coefficient from Internet Utilization to Air Transportation Crowdshipping
$\nu_{12}$	Path Coefficient from Internet Utilization to Crowdcourier Social Environment
$\nu_{20}$	Path Coefficient from Air Transportation Crowdshipping to Crowdcourier Social Environment
$\beta_1$	Residual Air Transportation Crowdshipping
$\beta_2$	Residual Internet Utilization
$\delta_1$	Residual Crowdcourier Social Environment