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The Crowdsourcing Business Opportunity in Air Transportation through the Mobility of Inter-Urban Passengers and the Utilization of Internet in Hang Nadim Airport, Batam

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Abstract: This study examines logistics business opportunities through air transportation in relation to passenger mobility and internet usage. Data collection was carried out using a survey method by distributing questionnaires involving 100 respondents, and the research was conducted at Hang Nadim airport in Batam, Indonesia. Data analysis uses the Partial Least Square (PLS) approach with the help of SmartPLS 3.0. PLS is a statistical method of Structural Equation Modeling (SEM) based on variance. The results of the study found that there was a significant influence of passenger mobility between cities (X1), air transportation (X2), and internet usage (X3) simultaneously on crowdsourcing (Y) with a determination of 0.977. Furthermore, the relationship between inter-city passenger mobility (X1) and air transportation (X2) is determined at 0.954 and inter-city passenger mobility and air transportation (X2) with simultaneous usage (X3) - at 0.954. The novelty of this study is the relationship between the variables of inter-urban population mobility, air transportation, internet usage, and crowdsourcing in logistics transportation at Hang Nadim Airport, Batam, Indonesia. The study concluded that through inter-city passenger mobility, air transportation and internet usage had a significant effect on the crowdsourcing business at Hang Nadim Airport, Batam.

Keywords: crowdsourcing, mobility of inter-urban passengers, air transportation, usage of internet.

巴淡岛韩那定机场通过城市间乘客流动和互联网利用的航空运输众包商机

摘要：本研究通过与乘客流动性和互联网使用相关的航空运输考察物流商机。数据收集采用调查方法，通过分发涉及 100 名受访者的问卷调查，研究在印度尼西亚巴淡岛的韩那定机场进行。数据分析在智能求助 3.0 的帮助下使用偏最小二乘法(求助)方法。求助是一种基于方差的结构方程建模（扫描电镜）统计方法。研究结果发现，城市之间的乘客流动(X1)、航空运输(X2)和互联网使用(X3)同时对众包(是)有显著影响，确定值为 0.977。此外，城市间乘客流动性(X1)与航空运输(X2)之间的关系确定为 0.954，同时使用(X3)的城市间乘客流动性和航空运输(X2)之间的关系为 0.954。本研究的新颖之处在于印度尼西亚巴淡岛汉那丁机场的城市间人口流动、航空运输、互联网使用和物流运输中的众包变量之间的关系。该研究得出结论，通过城市间的乘客流动，航空运输和互联网使用对巴淡岛汉那丁机场的众包业务产生



了重大影响。

关键词：众包、城市间乘客的流动性、航空运输、互联网的使用。

1. Introduction

Crowdshipping or mass delivery is a developing phenomenon in public transportation and brings transportation to a different level; this concept is also known as crowdlogistics [3], which implemented the concept of crowd source to send personalized stuffs through the using of social media as the internet usage to collaborate and to share services or assets to deliver the bigger community's need, followed by personal benefits for themselves [1]. This service does not need a processing facility or a special main carrier but only the carrier that is used by a crowdshipper according to the purpose and can be improved cheaply and quickly [10].

This concept can assess the economic impact or financial effect of its implementation and the impact on global environmental issues, which is very relevant. The existence of a description of the economic and environmental effects of mass shipping makes this concept interesting and relevant to logistics and the other disciplines.

Crowdshipping will also help understand and measure future strategies for the business of shipping goods to customers. Furthermore, it provides information to local lawmakers to develop rules and regulations regarding the public transportation and can also determine economic and environmental impacts.

In the mass delivery of goods by using connections between interested parties in general, service users are made through types of internet platforms or applications that can be operated via cellular, laptop, computer or other gadgets. This type of delivery system seems particularly suitable for non-large or non-standard items that cannot be sent by post because the unusual volume makes using standard services impractical or too expensive [7].

The initiative of mass good sending is operated using a search engine that matches client requests with the offers of airline passengers of the same origin and destination [8]. Prospective users of the service can place advertisements informing the crowd of their own delivery needs, while peers post their upcoming travel plans. These initiatives are spread worldwide and may have global scope, although most of them specialize in multiple connections such as Sherpal and Grabr [8].

There is also a less common part of the community-based platform that connects international buyers and local shippers and allows buyers to use the return address as the buyer's destination. The forwarder can then ship the goods back to buyers through several

platforms such as Parcel.com and Shippn [4].

The massive demand for the delivery of goods from a personalized delivery service creates a responsibility to fulfill the demand. This responsibility can be seen in the various startups and technology companies providing mass delivery services that aim to be more efficient and effective than traditional logistics options. This service is driven by technological innovation, improvement in internet infrastructure, and increased use of smartphones. These efforts are all to meet customer satisfaction so that the sustainability of the logistics business continues [1].

As a result of the on-demand delivery field, which faces several challenges, including specified pick-up and delivery times and locations, the market demand and supply of prospective crowdshippers must be well understood to ensure industry success. Several studies have shown that various prospects for the behavior and expectations of prospective crowdshipper applicants make business strategies that are in accordance with the expectations of applicants and prospective shippers, and then giving positive impacts to customers [9].

2. Methods and Analysis

The analysis was preceded by a survey of 100 samples of customers, prospective passengers, passengers, and ex-airplane passengers to determine the response to the specified variables in the form of inter-urban passenger mobility (X_1), air transportation (X_2), and internet usage (X_3) in shaping crowdshipping Y. The survey results were analyzed using SEM.

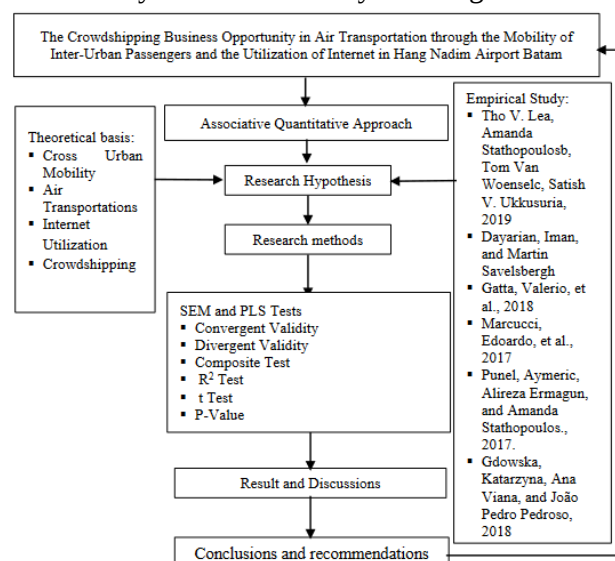


Fig 1. Research Flow Framework

2.1. Cross-Urban Mobility

The mobility of the population between cities, the number of people going back and forth who travel via air transportation from Batam to other cities where the indicators used are: $X_{1.1}$ passenger movement, $X_{1.2}$ logistics movement, $X_{1.3}$ means of transportation, $X_{1.4}$ final destination of movement (last mile delivery), and $X_{1.5}$ rules regarding passenger luggage (logistics regulation) [8].

2.2. Air Transportations

Air transportation, in the form of transportation of people or goods by using air transportation including animals and plants other than using post, aircraft needs during flight, luggage, or unclaimed goods. Air transportation is certainly very useful in providing support for community mobility in transporting people and goods where the indicators can be seen in the form of $X_{2.1}$ number of operating airlines (airline number), $X_{2.2}$ number of operating aircraft (aircraft number), $X_{2.3}$ aircraft capacity, $X_{2.4}$ flight routes, and $X_{2.5}$ flight schedules available for each airline and aircraft [5].

2.3. Internet Usage

Usage of the Internet, a general term for any technology that assists humans in creating, modifying, storing, communicating and or disseminating information that impacts ordering goods via the Internet, shopping activities through ordering via the Internet; The growth of e-commerce, quantitative and irreversible size changes of trade through electronic systems such as the internet, television, and other computer networks; Payment by e-money, transfer of funds, to fulfill an obligation with an electronic money system; E-commerce transactions, electronic trading processing systems such as the internet, other networks. Generally, activities in using Internet applications to support the acceleration of fulfillment of needs, where the measurement of indicators can be seen from: $X_{3.1}$ the availability of the ordering application platform (platform application availability), $X_{3.2}$ the ease of using applications looking for needs (easy of app using), $X_{3.3}$ ease of transacting using applications (easy of transaction app), $X_{3.4}$ online payment (online payment), $X_{3.5}$ security of services in conducting online transactions (services and security) [9].

2.4. Crowdfunding

Crowdfunding, delivery of goods by using the departure of passengers as the carrier is known as crowdshippers. The measurement indicator of this process is the usage of free charge baggage of 15–20 kg, in the form of Y_1 logistics that are ready to be sent via passengers (crowdlogistics), Y_2 companies or logistics senders (crowddelivery), Y_3 passengers who are willing to carry logistics on behalf of the ticket

(crowdshipper), Y_4 means of delivery (crowdplatform), Y_5 shipping costs (crowdshare economics) [3].

3. Findings

3.1. Characteristics of the Respondents

Based on Table 1, it can be seen that the respondents are divided into two categories: Male and Female. From the data obtained from 100 respondents, the composition of respondents based on gender is 62 respondents or 62% are male and the remaining 38 people or 38% are female, as shown in Table 1. The result shown in Table 1 is the largest number of respondents. Therefore, according to the authors' observation, it is suspected that men often travel by airplane.

Table 1 The respondents' gender

No.	Gender	Percentage
1	Male	62%
2	Female	38%

Based on Table 2, it can be seen that the respondents are divided into three professional categories: Public, Bureaucracy, and Entrepreneur. From the data obtained from 100 respondents, the composition of respondents based on profession is 76 people or 76% are the public, 21 people or 21% of the bureaucracy (Government, DPRD, BUMN, BUMD), 2 people or 2% are entrepreneurs. The results shown in Table 2 are dominated by the public, with 76 people or 76%.

Table 2 The respondents' profession

No.	Profession	Percentage
1	Public	76%
2	Bureaucracy (Government, DPRD, BUMN, BUMD)	21%
3	Entrepreneur	2%

Based on Table 3, it can be seen that the respondents are divided into three categories of education level: high school/equivalent, DI/DII/DIII, and DIV/S1/S2/S3. From the data obtained from 100 respondents, the composition of respondents based on education is 59 people or 59% are high school/equivalent, 14 people or 14% DI/DII/DIII, 21 people or 21% are DIV/S1/S2/S3. The results shown in Table 3 are dominated by high school/equivalent respondents, with 59 people or 59%.

Table 3 The respondents' education level

No.	Education	Percentage
1	High School/equivalent	59%
2	DI/DII/DIII	14%
3	DIV/S1/S2/S3	21%

3.2. Validity and Reliability Test

Table 4 is the outer model table, which is an

assessment of the reliability and validity of this study. The reflective measure is said to be high if it has a correlation of more than 0.50 with the construct to be measured.

Table 4 Outer loading

	X ₁	X ₂	X ₃	Y
X _{1.1}	0.841			
X _{1.2}	0.757			
X _{1.3}	0.880			
X _{1.4}	0.668			
X _{1.5}	0.810			
X _{2.1}		0.839		
X _{2.2}		0.740		
X _{2.3}		0.887		
X _{2.4}		0.637		
X _{2.5}		0.801		
X _{3.1}			0.857	
X _{3.2}			0.778	
X _{3.3}			0.890	
X _{3.4}			0.650	
X _{3.5}			0.800	
Y ₁				0.861
Y ₂				0.736
Y ₃				0.883
Y ₄				0.692
Y ₅				0.806

Based on the results of the outer loading output in Table 1, it appears that the correlation value of all question items on the questionnaire for all indicators and items is above 0.50, so it can be concluded that all items have met the validity requirements.

Table 7 Total influence

Influence	Original Sample	Average	Deviation Standard	T Statistics (IO/STDEVI)	P Value
X ₁ -> X ₂	0.977	0.977	0.007	136.419	0.000
X ₁ -> X ₃	0.969	0.969	0.012	82.009	0.000
X ₁ -> Y	0.979	0.978	0.007	136.419	0.000
X ₂ -> X ₃	0.571	0.567	0.191	2.982	0.003
X ₂ -> Y	0.553	0.554	0.107	5.165	0.000
X ₃ -> Y	0.315	0.333	0.125	2.522	0.012

The overall effect of the independent variable on the dependent variable is significant, where the indicator can be seen from the P value smaller than 0.05. This means that passenger mobility significantly affects air transportation, internet usage, and crowdshipping. Then, air transportation significantly affects internet usage and crowdshipping. Furthermore, the usage of the internet significantly affects crowdshipping.

4. Discussion

Based on the results of the tests conducted, there is a strong relationship of inter-city population mobility (X₁), air transportation (X₂), and internet usage (X₃) to crowdshipping (Y). This can prove that Crowdshipping is one that provides reinforcement for going back and forth or mobility of people to be able to overcome logistical growth in managing customer demand and is

Table 5 Cronbach's alpha

Var.	Cronbach's Alpha
X ₁	0.851
X ₂	0.841
X ₃	0.855
Y	0.856

Based on the results in Table 2, it appears that the Cronbach alpha value of the four research variables is above 0.7. Thus, it can be concluded that the instrument has met the reliable requirements.

3.3. Hypotesis Testing

Table 6 presents the results of direct structural model testing. Hypothesis testing is done by looking at the value of R square. The results of direct model testing were as follows.

Table 6 The value of R square

Var.	R Square
X ₂	0.954
X ₃	0.954
Y	0.977

Table 3 reveals a strong influence of inter-urban passenger mobility (X₁), air transportation (X₂), and internet usage (X₃) simultaneously on crowdshipping (Y) with a determination of 0.977. Therefore, the determination of the relationship between inter-urban passenger mobility (X₁) to air transportation (X₂) is 0.954, and inter-urban passenger mobility, air transportation (X₂) with internet usage (X₃) simultaneously is 0.954.

expected to be able to reduce pollution growth. This is confirmed in the research results that by using mass crowd in transporting logistics can reduce the quantity of logistics transportation carriers [8].

The result of the next test regarding the determination of the relationship between inter-city population mobility (X₁) and air transportation (X₂) is 0.954. This proves that the existence of urban growth certainly impacts changes in the population, especially changes in the quantity of people going back and forth or mobility between cities (cross-urban mobility), as well as goods to and from an area. This agrees with the results of research, which states that the arrival and departure of people is certainly caused by various motivations putting hope in the interests of changing lives and aspirations of reaching a better future [10]. The usage of people going back and forth between

cities can be seen from a positive capital angle for the transportation of goods, so it is not considered just a waste [6].

Then, the result of testing air transportation (X2) with simultaneous internet usage (X3) was 0.954. This proves that shipping by using airplane passengers is an operational process that needs attention to be able to do research in the hope that it can become one of the most promising solutions in supporting the goods delivery business, especially those related to light packages. This is done by integrating the mobility of airplane passengers coming and going with goods in light packages (maximum size of 20 kg). With this business model, it is hoped that the enthusiasm of cargo carrier airlines will always follow the logistics destination market to be able to predict operational sustainability without being constrained [9].

Using the principle of sharing, this means that goods delivery takes advantage of passenger departures through consumer delivery requests with a pattern of sharing luggage as well as sharing the economy. With this pattern, air transportation facilities and networks are increasingly important in the process of moving people and goods. The movement of people from one place to another and the need for fast, precise transportation of goods at competitive prices are increasingly becoming trends in the present and the future [2]. This business concept needs to be maintained and developed to increase consumer trust and loyalty, and logistics demand can be maintained for business continuity.

Then, the continuous digitization between the real world and the virtual world has become the main driver of innovation and change in all sectors. The amount of data is growing exponentially and the convergence of affordable technologies is coming with the Internet changing all areas of life. The internet is central to mastering the transformation of various fields, including developing a sustainable mobility and logistics sector. One of the main instruments for increasing value creation in the Industrial Age 4.0 is platform-based cooperation from the internet [1].

5. Conclusion

5.1. Main Findings of This Study

The main finding of this study is a strong relationship between inter-urban population mobility, air transportation, internet usage, and crowdshipping in logistics transportation at Hang Nadim Airport, Batam, Indonesia.

5.2. Comparison with Other Studies

The findings of previous research support that the growth of the logistics transportation business is central to influencing economic growth, and then, most studies also find a decrease in environmental capacity.

However, there has been a development in the use of the internet in placing orders for requests for logistics delivery in anticipation of logistics customer satisfaction, and there has been no research that discusses this more specifically.

5.3. Implications of the Study

Providing information on strengthening concepts for back and forth or mobility of people to be able to cope with logistical growth in managing customer demand and is expected to be able to suppress pollution growth.

5.4. Strengths and Limitations

The study strengths are that it reinforces the concept that logistics growth manages customer demand and is expected to reduce pollution growth, while the limitations of this study only describe the variables of inter-city population mobility, air transportation, and internet usage in crowdshipping.

5.5. Recommendations and Future Research

Future research efforts will focus on providing: (i) a more detailed evaluation of population mobility and internet usage using micro-simulation modeling that considers the realistic conditions and availability of business services, as well as comparing the services of crowdshipping business providers; (ii) an in-depth analysis of the technical requirements (eg location and room size) and the necessary coordination between air transportation crowdshipping business service providers; and (iii) a comprehensive analysis that investigates, with a multidisciplinary approach, the various key elements (e.g., economic, legal, social, psychological issues) that may hinder the successful adoption of a business model.

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