

The Effect of Air Transportation on Regional Economic Development: Evidence from Indonesia

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Abstract

This study aims to examine the importance of air transportation on regional development in Indonesia as an archipelago and developing country. Using cross-section dataset in regencies level and multiple regression analysis, we found that the number of flight, air passenger, and air cargo give positive and significant impact on regional per capita income. The effect of air cargo is the strongest, which imply that airport will provide the more substantial impact on regional economic growth if the airport is intended to use for trade and business activities. The motivations of regency to have an airport are if Regency is an independent island, manufacturing industry with its high-skilled and mid-skilled workers, and tourism sector.

Keywords: air transportation, regional economic development, tourism industry

Abstrak

Penelitian ini bertujuan untuk menganalisis pentingnya transportasi udara terhadap pertumbuhan ekonomi regional di Indonesia sebagai negara kepulauan dan negara berkembang. Menggunakan dataset cross section pada level kabupaten/kota dan analisis regresi berganda, transportasi udara melalui variabel jumlah penerbangan per kapita, jumlah penumpang per kapita, dan jumlah kargo per kapita memberikan pengaruh positif dan signifikan terhadap pendapatan regional per kapita. Jumlah kargo per kapita memberikan pengaruh paling besar dibandingkan dua variabel lainnya, yang berarti bandara akan memberikan pengaruh lebih besar terhadap pertumbuhan ekonomi regional apabila bandara digunakan untuk aktifitas perdagangan dan bisnis. Motivasi dari kabupaten/kota untuk memiliki bandara di daerahnya adalah apabila kabupaten/kota tersebut merupakan pulau tersendiri, adanya industri manufaktur dengan pekerja berkemampuan tinggi dan menengah, serta adanya sektor pariwisata di daerah tersebut.

Kata Kunci: transportasi udara, pembangunan ekonomi regional, industri pariwisata

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Introduction

Nowadays air transportation has become an essential indicator of competitive advantage of a country/region as it enables faster traffic to integrated local, regional and global network (e.g., Button and Taylor, 2002). It is not only essential to transport people worldwide but also for carrying goods which mean that air travel supports the economic activity by giving access to global markets. The importance of aviation has become even more for developing countries which mainly depend on trade with other nations. Air transportation provides the more significant opportunity for developing countries to export their abundant agricultural products and raw materials mostly natural resources to foreign markets (Button, 2006). Also, multinational companies are recently getting more involved in international fragmentation of production in the global value chains through both offshoring and outsourcing (Timmer et al., 2014; Los et al., 2015).

Airfreight will improve the delivery speed, lower damage risk, and has a regular schedule for a destination. Thus, air travel supports the economic activity by providing a better delivery service (Tseng et al., 2005). The need for on-time transportation for standard intermediate goods for production become higher than before. In this case, air cargo plays a significant role. Earlier evidence suggests that one percent increase in cargo development is likely to increase total trade by 6.3 percent (Shepherd et al., 2016). Therefore, countries that can develop their load connection well combined with high quality in customs and borders services are one step ahead in the global value chains integration.

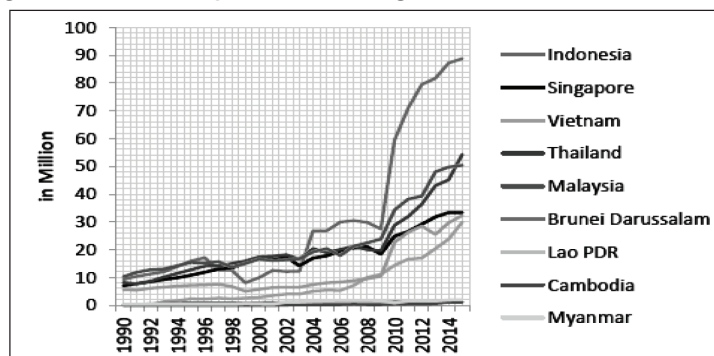
Indonesia which has almost 258 million population is the most populated country in the Southeast Asia region and fourth largest in the world after China, India and the United States. It is an archipelago with over 17,000 islands covered its 1,905,000 square kilometers surface area whereas seas and ocean take 81 percent of the total area. There are seven major islands in the country: Java & Bali, Sumatera, Nusa Tenggara, Kalimantan, Sulawesi, Maluku, and Papua. Each island consists of several provinces, which in total 34 provinces.

The main transportation modes are railways, roadways, ships, and airplane. Land transports are available in all provinces while ships transport is only available for them who located in the coastal area. Railways are only accessible in the Java and Sumatera islands whereas it not established in the other islands due to their geographical condition. Hence the primary transportation mode within an island is road transport although sometimes to travel from the east to west part of a province needs 12 to 24 hours or more due to the condition of roadways infrastructure. Moreover, to move from east to west part of an island will spend a longer time.

The airplane is an important transportation mode in Indonesia because it is the most efficient mode in term of travel time to connecting thousands of island in the Indonesian archipelago. Also, to travel between islands that separated by the ocean only possible to use ships or aircraft while most people choose aircraft since it is less risk and takes less travel time. These are the reasons why Indonesia has more than hundred airports in its regencies. Air travel is not only necessary to connect people but also to support economic activities across regions, which is useful for their development (Britton et al., 2005). The correlation between air transportation and economic development is required for a policymaker to arrange proper policy regarding the cause and effect that arise from their relation.

Indonesian air transportation has experienced significant increases in both passenger and cargo carried for the last 26 years period. In 1990, the passenger of aviation was only 9,22 million, and by 2015 as described in Figure 1, the total number of passengers has increased to 88,69 million which is the highest among Southeast Asian nations. Within this period, the annual growth rate is about 9.48 percent, which is higher than Thailand 7.82 percent, Malaysia 6.58%, and Singapore 6.41%. In term of cargo, it is increased almost twofold from approximately 876 million ton in 1990 to become 1428,37 million ton in 2015 which is the highest in the region (Figure 2). Although the number of cargo carried is the highest among countries in the area, but the annual growth rate of Indonesian cargo 1.97 percent is lower compared to Singapore 5.64 percent, Malaysia 5.13 percent, and Thailand 4.80 percent.

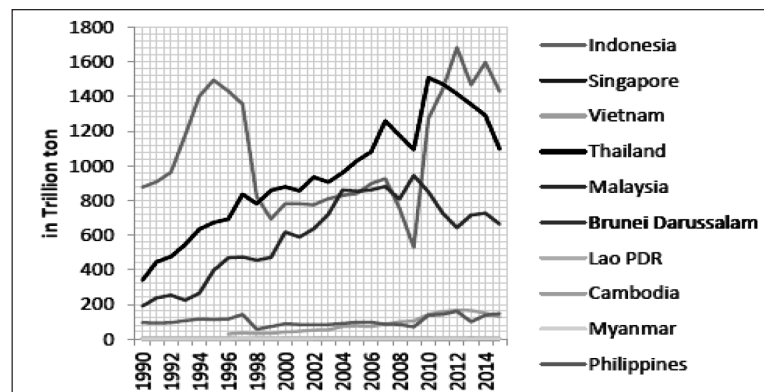
Figure 1. The air transportation Passengers in Southeast Asian Countries



Source: World Development Index, The World Bank

The existence of aviation industry to serve passenger and cargo is expected to increase the economic development in Indonesia. Air passenger is related to the movement of people including workers whereas air freight related to the flow of inbound raw materials and outbound of intermediate and finished product which will support industries in regencies to gain a broader output. Figure 3 describes the growth of air passenger, air cargo, and GDP in Indonesia from 1991 to 2015. It is look alike that three lines have a positive correlation. There are at least three events actively show air passenger, air cargo, and GDP growth have a similar trend. Firstly, the Asian financial crisis in 1997 affected the growth of air passenger dropped into -26.1 percent in 1997 and continued to -36.2 percent in 1999, air cargo decreased -39 percent in 1998, and GDP declined to -13.1 percent in 1998. Secondly, the global financial crisis in 2008 reduced air passenger by -7.8 percent, send air cargo to fall by -29.8 percent, it slowed the GDP growth from 6 percent in 2008 to 4.5 percent in 2009. Finally, there is a rapid improvement in air transport indicators in 2010 as people started to travel and do business again after global financial shock in 2008. Air passenger increased more than two-fold from 27 million to 59 million, air cargo experienced increase by 1.4 times, whereas GDP growth increase from 4.5 percent in 2009 to 6.2 percent in 2010. One problem that might arise from this correlation is endogeneity issue, a lot of literature argues that air transportation impacted economic growth and it could also be another way. Given that, in this study, we use cross-section data so we cannot do Granger causality test to check such endogeneity problem. We are ignoring reverse causality relations in this research.

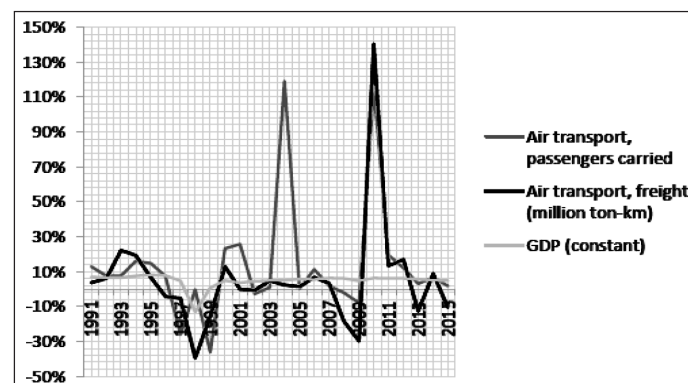
Figure 2. Cargo carried by flights in Southeast Asian countries



Source: World Development Index, The World Bank

According to Papatheodorou and Lei (2006), people move to another place is for leisure, business, visiting friend, healthcare treatment, and pilgrim's journey. The travel for leisure is dominated the other purpose in term of arrival and departure tourist passenger. Table 1 shows the economic contribution from tourism industry based on accountability and performance report from Indonesian Ministry of Tourism in 2015. Investment in the tourism sector in 2015 has increased compared to previous two years. The investment is \$1.05 million from total national investment \$43.63 million or accounts for 2.4 percent. The number of employment generated from the tourism sector in 2015 also increased to 12.16 million employees from 10.32 million in 2014, which is the growth rate is 17.83 percent. GDP from tourism industry also experienced an increasing pattern in last three years. The GDP from tourism is IDR 461.36 trillion represents 4.23 percent of National GDP. The number of both foreign and domestic tourists did increase from 2013 to 2015. In 2015, international tourists reached 10.41 million visitors with foreign revenue approximately \$11.90 million, while domestic tourists attain 255 million and their expenditure around IDR 224.65 trillion.

Figure 3. Air Pasenger, Cargo, and GDP Growth



Source: World Development Index, The World Bank

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Table 1. Economic contribution from tourism sector

Description	2013	2014	2015
Investment in tourism as a percentage of national investment	1.63%	2.18%	2.4%
Number of employment directly and indirectly related to tourism (millions)	9.61	10.32	12.16
GDP from tourism sector (trillion IDR)	365.02	394.52	461.36
Contribution of tourism as a percentage of National GDP	4.02%	4.04%	4.23%
Number of foreign tourists (millions)	8.80	9.44	10.41
Foreign revenue from tourism sector (million USD)	10.05	11.17	11.90
Number of domestic tourists (millions)	250.04	251.20	255.05
Domestic tourist expenditure (trillion IDR)	177.84	213.94	224.65

Source: Accountability and performance Report, Indonesian Ministry of Tourism, 2015.

This study aims to understand the importance of air transportation on regional development in Indonesia. We first analyze the impact of air traffic on regional economic development in regencies level, and subsequently, we investigate the motivations behind the likelihood of local regency to build an airport in their area. The rest of the research paper organized as follows. The remaining of this chapter discusses the importance of air transportation for economic development, in particular, regional development. Section 2 provides a review of literature in this area from previous researchers. A methodological framework for the model and data description provided in sections three. Analysis and results will be presented in section 4, whereas the sixth part will provide the conclusion of the research study.

Method

To analyze the effect of air transportation on regional economic development, we replicate the model developed by Florida et al. (2015) with several adjustments due to Indonesian condition. We proxy regional economic development with regional GDP per capita, whereas airport factors represented by three independent variables which are the

number of flight per capita, passenger per capita, and cargo per capita. Since Indonesia is a developing country and less familiar with the high-tech industry, we use manufacturing sector, which associated with the more advanced region in Indonesia. Human resources represent by high-skilled, mid-skilled, and low-skilled workers.

$$\begin{aligned} \text{Regional GDP per capita} = & \beta_0 + \beta_1 \text{ Air transport factor} + \beta_2 \text{ International dummy} + \beta_3 \\ & \text{Population} + \beta_4 \text{ Industry structure} + \beta_5 \text{ High skilled workers} + \beta_6 \\ & \text{Mid skilled workers} + \beta_7 \text{ Low skilled workers} + \beta_8 \text{ Unemployment} \\ & + \beta_9 \text{ Tourism} \dots \dots \dots (1) \end{aligned}$$

Variable regional GDP per capita, flight per capita, passenger per capita, and cargo per capita expressed in the natural log function. Whereas, the rest variable is not transformed into the natural log form because they are already in percentage value except international dummy which its values are 1 or 0. To ensure that the criteria of “Best Linear and Unbiased Estimators” (BLUE) can achieve, the linear regression has to satisfy several assumptions called Gauss-Markov assumption or classic test assumption (Ariefianto, 2012). To check the Gauss-Markov assumptions, this research will conduct heteroscedasticity and multicollinearity tests. We would not test for autocorrelation because the dataset is a cross section data, while autocorrelation will happen in the time series and panel dataset when the residuals are serially correlated.

After we know how air transportation gives an impact to regional economic development, we would like to examine the likelihood of regencies to have an airport in their area. The dependent variable is a binary response, one if a regency has an airport and zero otherwise. Also replicating that model of Florida et al. (2015) with several adjustments due to Indonesian condition as in first analysis, we add one more variable which reflects Indonesia as an archipelago country, which is independent island dummy to shows whether an ocean separates a Regency from the main island. Since the dependent variable is a binary response variable, we will use logit regression to figure out the likelihood of regencies to have an airport.

$$\begin{aligned} \text{Airport} = & \delta_0 + \delta_1 \text{ Population} + \delta_2 \text{ Industry structure} + \delta_3 \text{ High skilled workers} + \delta_4 \text{ Mid} \\ & \text{skilled workers} + \delta_5 \text{ Low skilled workers} + \delta_6 \text{ Unemployment} + \delta_7 \text{ Tourism} + \delta_8 \\ & \text{Independent island} \dots \dots \dots (2) \end{aligned}$$

Result and Discussion

In Table 2 we provide the summary statistics. As Kuncoro and Murbarani (2016) said that Indonesia has a high degree of inequality, it also appears in the difference of regional GDP per capita between regencies. The highest regional GDP per capita regency is about fifty-eight times of the lowest. A similar pattern also happens in flight per capita, passenger per capita, and cargo per capita which their gaps between the highest and the lowest also significant. The distribution of population among regency in a province also unequally distributed. The highest is 56.24 percent, and the smallest is 0.22 percent, whereas the average is about 6.64 percent. In term of the labor force, low-skilled workers dominate both high-skilled and mid-skilled workers with the highest share of 46.46 percent and its average approximately 17.64

percent. Even, the lowest proportion of low skilled, which is 0.39 also, the largest compared to two other types of workers lowest share. Unemployment share in all regions is below 20 percent. In term of employment share in industrial sectors, agriculture, forestry, and fisheries have the highest percentage with an average of 49 percent. Manufacturing which has 10.29 shares on average is in the second rank. The lowest average percentage is other services by only 1.24 percent.

Table 2. Summary Statistics

	Mean	SD	Min	Max
Regional GDP per capita	38,092.32	53,285.16	6,377	375,407
Ln regional GDP per capita	10.1303	0.8279	8.7605	12.8358
Flight per capita	0.0298	0.0436	0.0002472	0.2312
Ln flight per capita	-4.4468	1.4942	-8.3052	-1.4647
Passenger per capita	2.1338	4.7838	0.0005151	31.3052
Ln passenger per capita	-0.9948	2.2067	-7.5712	3.4438
Cargo per capita	8.5015	43.6303	5.70E-09	339.6371
Ln cargo per capita	-2.6861	4.0496	-18.9833	5.8279
International dummy	0.2381	0.4280	0	1
Population	6.6398	6.0382	0.2194	56.2355
High-skilled workers	1.8753	.9679	.02	5.61
Mid-skilled workers	0.6998	1.5796	0	12.9
Low-skilled workers	17.63928	8.373935	0.39	46.46
Unemployment	6.1705	3.5180	.13	19.84
Independent island dummy	0.1328	0.3397	0	1
Industry employment shares				
Agriculture, forestry, and fisheries	49.4811	24.7495	0.34	99.69
Mining and excavation	1.7494	3.5738	0	28.79
Manufacturing	10.2992	12.4587	0	48.6467
Electricity, gas, and water supply	0.2944	0.2715	0	2.04
Construction	4.5862	2.7163	0.04	13.54
Tourism	1.6780	2.4599	0	16.5277
Transport, warehousing, and communication	4.6325	2.8937	0	16.32
Finance, insurance, buildings, and land rental business	16.7912	8.7033	0.08	48.09
Other services	1.2456	1.0531	0	8.05

Sources: BPS (2010). Notes: Regional GDP per capita is in thousand Indonesian Rupiah.

To analyze the effect of air traffic on local economic development, we run an OLS regression with regional GDP per capita as the dependent variable. The independent variables associated with air travel are flight per capita, passenger per capita, cargo per capita, and

international dummy along with control variables population, manufacturing industry, high-skilled workers, mid-skilled workers, low-skilled workers, unemployment, and tourism sector. We take a natural logarithm of regional GDP per capita, flight per capita, passenger per capita, and cargo per capita. While for the rest variable, we do not use natural logarithm because their value is in percent. The OLS regression analysis based on equation 1, the results described in Table 3. We control heteroscedasticity by using heteroskedastic-consistent standard errors and test for multicollinearity using VIF.

The VIF values in all regression show the degree of multicollinearity for each independent variable. Its value in regression results in column (1) until (4) where we regress air transportation factors separately to regional GDP per capita all below five, which indicates that the variables are moderately correlated, but do not have to be overly concerned about it. While in the column (5) which we regress air transportation factors together to regional GDP per capita without passenger per capita because it has multicollinearity with VIF value above 10. After we drop air passenger, the highest VIF is high-skilled workers with a value of 6.55 whereas other variables all below six. Even though the VIF value is considered high but it is still below the tolerance limit, which is 10, so the VIF values in this regression are still tolerable.

In column (1) we regress flight per capita together with control variables to local GDP per capita. This model can explain regional GDP per capita by 33.6 percent represents by its adjusted R², while the rest explanation is outside the model. The relationship between flight per capita and regional GDP per capita is positive with a coefficient of 0.156 and significant at 1 percent level of significance. It means that an increase 1 percent of flight per capita will rise regional GDP per capita by 0.156 percent. Manufacturing industry together with mid-skilled workers are also positive and significant, which means that they give an influence to regional GDP per capita positively. On the other hand, unemployment shows the adverse effect to regional GDP, and the impact is significant. The higher unemployment rate in the Regency, it will result in the reduction of the regional GDP in this regency. The rest of independent variables that are population, high-skilled workers, low-skilled workers, and tourism are insignificant. The population is negligible perhaps because the market for their products is not inside the Regency itself. They usually dispatch them to 7 primary biggest islands in Indonesia or even to foreign countries.

The relationship between passenger per capita and regional GDP per capita described in column (2). Adjusted R² shows that this model can explain regional GDP per capita by 32 percent. Air passenger per capita has a positive relationship with regional GDP per capita with coefficient 0.102 and significant at the level of 5 percent. One percent additional passenger per capita will incline regional GDP per capita by 0.102 percent. Manufacturing industry and mid-skilled workers remain positively significant. While, unemployment still gives negative impacts to regional GDP per capita. The tourism sector in this model becomes positive with the coefficient of 0.0458. The presence of air passenger per capita variable is likely accommodated tourists to reach the tourist destination regency so that they increase the share of employment in the tourism sector and gives a positive and significant impact to regional GDP per capita. One percent increase in the percentage of employment in the

tourism industry will raise regional GDP per capita by 0.0458 percent. Population, high-skilled workers, and low-skilled workers are still insignificant.

Table 3. OLS regression analysis

Dependent variable: Ln Regional GDP per capita										
	(1)	VIF	(2)	VIF	(3)	VIF	(4)	VIF	(5)	VIF
Ln flight per capita	0.156**	1.75							0.00225	3.13
	(2.95)								(0.03)	
Ln passenger per capita			0.102*	2.41						multicollinearity problem
			(2.18)							
Ln cargo per capita					0.0991***	2.35			0.0973***	4.08
					(5.27)				(3.63)	
International dummy							0.241	3.10	0.148	3.23
							(0.90)		(0.62)	
Population	0.00277	1.86	-0.000770	1.89	-0.00179	1.87	-0.000394	2.00	-0.000327	2.07
	(0.30)		(-0.08)		(-0.19)		(-0.04)		(-0.32)	
Manufacturing industry	0.0234**	1.54	0.0218**	1.54	0.0297***	1.63	0.0159*	1.32	0.0303***	1.67
	(3.23)		(2.71)		(4.18)		(2.11)		(4.23)	
High-skilled workers	-0.0164	1.98	-0.00487	1.95	0.253**	3.55	-0.0199	2.90	0.224*	6.55
	(-0.32)		(-0.09)		(3.23)		(-0.28)		(2.39)	
Mid-skilled workers	0.214**	4.70	0.211**	4.74	0.174*	4.91	0.220**	4.71	0.173*	5.00
	(2.97)		(2.88)		(2.60)		(3.00)		(2.56)	
Low-skilled workers	0.0174	2.31	0.0154	2.30	0.0157	2.30	0.162	2.31	0.0161	2.31
	(1.69)		(1.50)		(1.60)		(1.57)		(1.65)	
Unemployment	-0.0676**	2.96	-0.0682**	3.01	-0.0682**	2.93	-0.0581*	2.89	-0.0687**	2.96
	(-2.78)		(-2.74)		(-2.96)		(-2.31)		(-2.99)	
Tourism	0.0314	1.10	0.0458*	1.10	0.200	1.11	0.0426*	1.10	0.0220	1.13
	(1.52)		(2.01)		(0.84)		(2.20)		(0.88)	
Constant	9.407***		8.887***		8.745***		8.695***		8.783***	
	(26.41)		(37.09)		(38.35)		(35.89)		(21.62)	
N	105		105		105		105		105	
Adjusted R ²	0.336		0.320		0.395		0.292		0.384	

Notes: t statistics in parentheses.

* statistically significant at $\alpha=5$ percent, ** statistically significant at $\alpha=1$ percent, *** statistically significant at $\alpha=0.1$ percent

Column (3) represents the effect of cargo per capita on regional GDP per capita. The adjusted R² 0.395 represents the model can explain regional GDP per capita by 39.5 percent. This adjusted R² is the highest among five models. Air cargo per capita gives positive and significant impact on regional GDP per capita. Additional 1 percent cargo per capita will increase GDP per capita by 0.0991 percent. The effect of freight per capita is stronger

compared to other air transportation factors; because it is significant at 0.1 percent level. Manufacturing industry and mid-skilled workers are still positive and significant. The coefficient of the manufacturing sector is higher compared to its coefficient in the previous two models. This result is possible because the cargo carried by air transportation is necessarily targeting manufacturing sector, since most regencies in Indonesia, a developing country, is much involving in manufacturing activities. In this model, high-skilled workers become significant perhaps because the presence of cargo per capita make their role more critical to processing raw materials to intermediate goods and finished goods, also from intermediate products to finished goods. In the end, their role significantly contributed to regional GDP per capita. Unemployment was given negative and significant impact on regional GDP per capita. Population and low skilled industry remain insignificant, whereas tourism sector also changes to become irrelevant.

International dummy, which measured whether the airport serves for international flight or only domestic, shows insignificant influence on regional GDP per capita as shown in column (4). A possible reason for this insignificant effect is because not all regencies in Indonesia connected to foreign countries in term of air transportation. The regencies that have a connection with international airports are usually only the capital of provinces, but not all of them. Overall, most of the regencies in Indonesia connected only locally with other regencies. Manufacturing industry and mid-skilled workers are positive and significant. Although the effect of manufacturing is still significant, its coefficient is lower compared to the previous three-regression model. This result means that the regencies who export their manufacturing products to foreign countries will give an essential role to regional GDP per capita. Tourism sector also significantly contributed to regional GDP per capita in this model. The presence of international airport will attract more foreign tourists to come to tourists' destination regency, increases the share of employment in the tourism sector, and positively contributed to the regional GDP per capita. Unemployment still gives negative and significant impact on regional GDP per capita. Whereas population, high-skilled and low-skilled workers do not affect regional GDP per capita. This model can explain regional GDP per capita by 29.2 percent, which is the lowest compared to other models.

In column (5) we first consider all the air transportation variables together to regional GDP per capita. But the results imply a high degree of collinearity in the variable passenger per capita. So, we decide to drop passenger per capita variable. The model in column (5) can explain regional GDP per capita by 38.4 percent. The effect of air cargo per capita, which is the strongest, will diminish the effect of other air transportation variables. So that, airfreight per capita is the only significant variable compared to other air travel measurements. Its significance is at the level of 0.1 percent. One percent increase in air cargo per capita will raise regional GDP by 0.0973 percent. Manufacturing industry and mid-skilled workers positive and significantly correlated with regional GDP. The presence of airfreight per capita once again makes the impact of high-skilled workers significant and positively influenced regional GDP per capita. On the other hand, the unemployment rate remains negatively correlated with regional GDP per capita.

Our second analysis is the probability of a Regency to have an airport. The dependent variable is a binary variable, which takes the value one if the regency has an airport and 0

otherwise. The independent variables are manufacturing industry, high-skilled workers, mid-skilled workers, low-skilled workers, unemployment rate, tourism, and independent island dummy. We used a logit regression for analyzing the likelihood of a regency to have an airport based on the equation 2.

The results show in Table 4. It has a Pseudo R^2 of 0.2091, which means that independent variables in this logit regression model can explain the likelihood of a regency to have an airport by 20.91 percent whereas the rest explanation is outside the model. The most reliable motivation of regency to have an airport according to the model is the location of Regency as an independent island separated by the ocean with the mainland. This dummy variable has gained a positive and significant coefficient, which is of relatively higher magnitude. The presence of manufacturing industries together with the existence of high-skilled and mid-skilled workers show a positive and significant relationship with the likelihood of a regency to build an airport, implying that these increase the motivation of a regency to have an airport. This fact is understandable in Indonesia because the results in the first analysis show that these three variables positively contributed to regional GDP per capita. With the establishment of an airport in the Regency, they hope that it can increase their regional GDP per capita. In the end, they could catch up their left behind to more advance regency.

Table 4. The likelihood of a regency to has an airport

Variable	Coefficient
Population	-0.0193 (-0.66)
Manufacturing industry	0.0233* (2.43)
High-skilled workers	0.470* (2.39)
Mid-skilled workers	0.271*** (4.10)
Low-skilled workers	-0.0437 (-1.47)
Unemployment	0.0391 (0.96)
Tourism	0.106*** (4.47)
Independent island dummy	2.178*** (6.97)
Constant	-2.558*** (-6.18)
N	497
Pseudo R^2	0.2091

Notes: t statistics in parentheses. *statistically significant at $\alpha=5$ percent, ** statistically significant at $\alpha=1$ percent, *** statistically significant at $\alpha=0.1$ percent

Another consideration for a regency to build an airport is tourism. It has gained a highly significant positive coefficient. When the tourism in regency becomes popular, it will attract more tourists to the regency, which necessitates providing better facilities including building an airport. When an airport established in the Regency, it will make both domestic and international tourists easier to reach that place. And the easiness of transportation will subsequently attract more visitors to the area.

Population, low-skilled workers, and unemployment rates are three variables, which are insignificant in the model. The population does not appear to be a consideration for regencies to have an airport, perhaps because the markets for their products are not inside the regency itself. They usually dispatch them to 7 primary biggest islands in Indonesia or even to foreign countries. Low-skilled workers are not one of the considerations of a regency to build an airport because it has no impact on regional GDP as in the previous analysis. While unemployment rates are not one of the motivations of regency to construct an airport because the type of unemployment in developing country like Indonesia is usually countercyclical, means it will be lower when economic health is high and higher during economic downturns. They can still work in the less productive sector or even informal sector (Bosch and Maloney, 2008).

The probability of regencies to build an airport is influenced by the location of a regency as the independent island separated by the ocean with the mainland, the existence of manufacturing industry in the region together with the presence of high-skilled and mid-skilled workers, and the advancement of the tourism sector in the Regency. Whereas, the other variables such as: size of the population, low-skilled workers, and unemployment rates has no impact.

Conclusion

The finding from first analysis by regressing aviation factors separately to GDP per capita is in line with many studies, which prove the evidence that air travel has a positive impact on economic growth (Brueckner, 2003; Green, 2007; Mehmood and Shahid, 2014; Hu et al., 2015). Flight per capita, passenger per capita, and cargo per capita have a positive relationship to regional GDP per capita. The most substantial effect of air cargo per capita will diminish the impact of flight per capita and passenger per capita when we regressed them together. The presence of freight per capita also makes the effect of high-skilled workers on regional GDP per capita positive and significant. Manufacturing industry and mid-skilled workers in a region consistently give positive and significant impact on regional GDP per capita. The presence of cargo per capita makes the effect of manufacturing industry on regional GDP per capita become stronger both in the coefficient and level of significance. Also, the importance of high-skilled workers increases and gains a positive coefficient when cargo includes in the regression. Oppositely, unemployment continually gives an adverse effect on regional GDP per capita. The presence of international dummy, even though its effect directly on regional GDP per capita is insignificant, makes tourism sector gives positive and significant impact on regional GDP per capita. The easiness access to a tourist destination will attract foreign tourist to visit the region. It will result in the increase in the

share of employment in the tourism sector, which will contribute positively to GDP per capita in the Regency (consistent with Prideaux, 2000; Bieger and Wittmer, 2006; Seetanah and Khadaro, 2009; Wang, 2010; and Khan et al., 2016). While, the low skilled worker does not give significant impact because they are usually worked in a less productive sector which only provides a minimum contribution to economic development (McMillan et al., 2014).

Our second analysis results suggest that the location of regency is the most reliable motivation to build an airport. If regency is an independent island located separately by the ocean with its mainland, it will increase the likelihood to have an airport in their area. The existence of manufacturing industries in regency together with high-skilled and mid-skilled workers also becomes a consideration for a regency to have an airport. The establishment of an airport will facilitate manufacturing sector to have a more significant linkage to potential buyer and supplier outside their area because the market for their product is not inside the Regency itself. The advancement of the tourism sector of regency also becomes a motivation for a regency to establish an airport. The more advanced tourism industry will attract more tourists to visit regency. Local government should provide easiness access to their area in term of transportation network by building an airport. Lastly, mid-skilled workers less contributes to economic development are not a consideration of a regency to construct an airport.

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