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Factors Affecting Role of Air Transportation in Economic Development: Evidence from Indonesia

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Preface

The author declares that this work and study presented in this master thesis is original. The copyright of the master thesis is with the author, where the author also responsible for all the work results and its contents.

Abstract

Air transportation in Indonesia has become one of the largest aviation markets in the region. With its unique geographical condition and the fate of having thousands of islands, airlines have tons of competitive advantage compared to the other transportation mode to grow overtime substantially. Simultaneously, Indonesian government is also expecting this industry to support the overall economic performance as of the country.

This study analyses possible factors that might affect the air transportation performance which can bring greater economic prosperity in the future. The performance measured in two sectors: passengers and air cargo. Moreover, by taking Indonesia fiscal decentralization policy into account, this study also able to explain the analysis in provincial level by using the valid databases from World Bank, Indonesia Central Bureau of Statistics, and Indonesia Ministry of Transportation.

The result shows that passengers and cargo are positively affected by the level of infrastructure of transportation such as airports and the main competitors including seaports and train station. Moreover, government spending in infrastructure and budget of tourism also affect the air transport performance both passengers and cargo. Indonesia can be considered as a developing country with immense potential of air transport development in the future.

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To my Grandpa

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1. Introduction

1.1 Problem Statement

Trade has been the major part of economic activities since hundred years ago. This activity develops between the people across the globe in various kind of goods and service to gain somewhat needed by each party related to the transaction. Practically, transactions might happen after at least two sides reach an agreement within various factors related to the transactions, including the value of goods, settlement procedure, safety, insurance, until the schedule which relies on the speed of transaction. Previous research from Fujita and Mori (1996) elaborate that skills specialization and trade activities have brought benefit to people before it helps them to expand the larger market, look another opportunity, and even establish a city. Another example of the importance of trade also appears on the case study of Boston city development which had successfully re-established themselves several times within four hundred years by accelerating their capabilities on service trade (Glaeser, 2005).

With the adequate access to technology in this globalization era, which nowadays has been used by so many people in the world, the demand for every goods and product can be driven from almost anywhere¹. This condition might not only affect directly producers to produce more quantity but also be smarter, faster, and stronger about their strategy, performance, and development especially about speed. Consistently with this condition, the role of transportation is also rising as there still no scientific innovation available for the producer to deliver physical things, person or goods, instantly across the globe within seconds.

As one of the biggest nation in the world with a rich history of global trade, Indonesia also face this challenges and opportunity to become greater in the future. Separated by oceans has limit Indonesia's across island transportation mode into only sea and air lines. This condi-

¹ In 2015 there were 2.21 billion people using the Internet actively. This number was rising more than 50% within a year where now the world has 3.5 billion internet user. Further information can be accessed through <https://www.statista.com/statistics/273018/number-of-internet-users-worldwide/> (Accessed February 4, 2017)

tion push Indonesia to further develops adequate infrastructure especially in the transportation mode sectors by establishing sustainable development plan across the islands and international scope in order to facilitate its growing economic activities.

Among other transportation modes, sea lines industry has been significantly affecting Indonesia's economy since a long time. However, in global world, seaport nowadays is more focus on supply-chain logistics and cargo performance rather than as being a global transportation option for people. Data from *Central Bank of Indonesia* shows 5.02% of Indonesia's GDP 2015 derived from transport and storage sectors, where air transport industry contribute 24.62% in the industry. This is a significant proportion to the transport and storage sectors where land transport, water transport, and railways transport contribute 48.92%, 9.25%, and 1.08% respectively². Air transport has brought larger direct effect to the economy compared to sea and rail transportation, regardless the fact that over half of Indonesian territory is water.

Moreover, air transportation has brought the people to gain more efficiency in several aspects including tourism activities, which also can be interpreted as a kind of trade that drives the economic performance. Different than cargo and logistics which is a physical thing, human have broader reason to choose transportation mode and travel anywhere in the world.

Furthermore, government of Indonesia after new order regime also focus to improve air transport sector by finished The Civil Aviation Act 2009 (Sudiro and Martono, 2016), which later succeed prove a one-year growth of 116% in 2010 in number of passengers³. A significant improvement push both government and privates to spend valuable investment in infrastructure which also directly enhancing the other strong sectors in Indonesia including manufacturing (20.84%) and agriculture, forestry, and fishery (13.52%)⁴. Over the time, development of those sectors possibly also enlarge the indirect effect of air cargo delivery perfor-

² According to Gross Domestic Product by Industrial Origin at Current Prices by Central Bank Indonesia (<http://www.bi.go.id/en/iru/economic-data/real-sector/Contents/Default.aspx>) Accessed May 10, 2017

³ According to Number of Passenger Data by World Bank (<http://data.worldbank.org/indicator/IS.AIR.PSGR?locations=ID>) Accessed February 12, 2017

⁴ According to *Indonesian Financial Statistics 2015* by Bank Indonesia (<http://www.bi.go.id/en/statistik/seki/terkini/ril/Contents/Default.aspx>) Accessed February 12, 2017

mance. Meanwhile, according to *International Air Transport Association*, 4% air traffic accident in the world came from Indonesia in 2010, where also should be improved in the future for better economic development⁵.

1.2 Aim and Research Question

All these advancements in air transport development has brought the main question: *What factors do affect the demand for cargoes and passengers of air transportation in Indonesia?*

The effect of air transportation has been a major and sustainably increasing over time. Several previous types of research have been done to obtain the relationship between air transportation and the economic development. Several studies were done in time series regression and perform a case by case analysis (Chang and Chang, 2009; Marazzo, Scherre and Fernandes, 2010; Ishutkina and Hansman, 2008) which the result indirectly unique to certain characteristics and policy of countries included in the studies. Other studies show that the role of cargo-logistics (Kasarda and Green, 2005; Leinbach and Bowen, 2004) and tourism economy (Bieger and Wittmer, 2006; Marazzo, Scherre and Fernandes, 2010) are not affecting the economy as one. Specific study about Indonesian air transport policy has conducted by Saraswati, Hanaoka, and Engineering, (2013) and Sudiro and Martono (2016). Research from Darmawan (2012) were more focus on tourism without deeper insight about the role of infrastructure over regions. However, there is still lack of understanding about factors that affecting volume of cargoes and passenger in Indonesian air transportation industry.

1.3 Methodology

In the direction to answer the main question, this thesis will provide analysis from all provinces in Indonesia with panel data regression from 2006 – 2012. This study will be elaborated in six parts. To bring extensive knowledge about the role of air transportation across all of

⁵ According to Press Release No. 44 by IATA (<http://www.iata.org/pressroom/pr/Pages/2011-09-22-01.aspx>) Accessed February 12, 2017

Indonesian province, this thesis will analyze both volume of cargoes and passengers as dependent variables through separate models. This approach will add beneficial values since many previous literatures were only focus on one.

1.4 Structure of The Report

The next two chapters will be a comprehensive literature review: On the first section, we will discuss the definition, role, and development of air transportation from an international perspective. Second, the development, structure, and condition of Indonesian economic performance. Chapter four will discuss about data & methodology with panel data regression which will be made on two dependent variables: (i) volume of passengers carried; and (ii) volume of air cargoes. All data will be derived from World Bank and INDO-DAPOER dataset. The result and conclusion will be explained in chapter five, parallel with explanation of research limitation and recommendation for further studies.

2. Air Transportation and Economic Development

This study focus to obtain facts about the relationship between air transportation and economic development in Indonesia. However, it is important to understand the position of air transportation itself, both in Indonesia and international world. According to nature itself, this sector might be related to many other sectors and industry before directly impacting the economic performance. To understand these facts, this study will start from the definition, interaction to the economy, the role of infrastructure, the regulations, until local independence and several parts that might be occurred only due to the force majeure condition.

2.1 The Use of Air Transportation

Briefly, the use and operation of air transportation can be defined into two: civil operations and military operations. Those two are having strong differences regarding their functions which explained in Figure 1. When civil operations in air transportation industry can be classified as commercial flights or general flight, military flight operations can be seen as part of routines from the military organization which usually conducted by national agenda for a specific purpose⁶.

Instead of generating revenue, military operation is usually using government revenue as military expenditure. From another perspective, it also can be seen as a “revenue generator” when, for example, the economic value counter-terrorism preparation is way higher than the nominal expenditure since it is plausible to assume that security can be considered as compulsory for humankind⁷. Overall, those two categories in air transportation are getting more advance every period, where create better performance and efficiency for each aim and purpose.

⁶. According to many works of literature, the terms of ‘operation’ also interpreted as ‘aviation’, such as explained by Australian Government (<https://infrastructure.gov.au/aviation/general/>). Accessed March 5, 2017.

⁷ Supply of military operation can be regarded as strong economic driver. Based on National Conference of State Legislatures (<http://www.ncsl.org/research/military-and-veterans-affairs/military-s-impact-on-state-economies.aspx>), there are at least ten states in The USA spent at least 10 billion US dollar in Fiscal Year 2015. Accessed March 6, 2017.

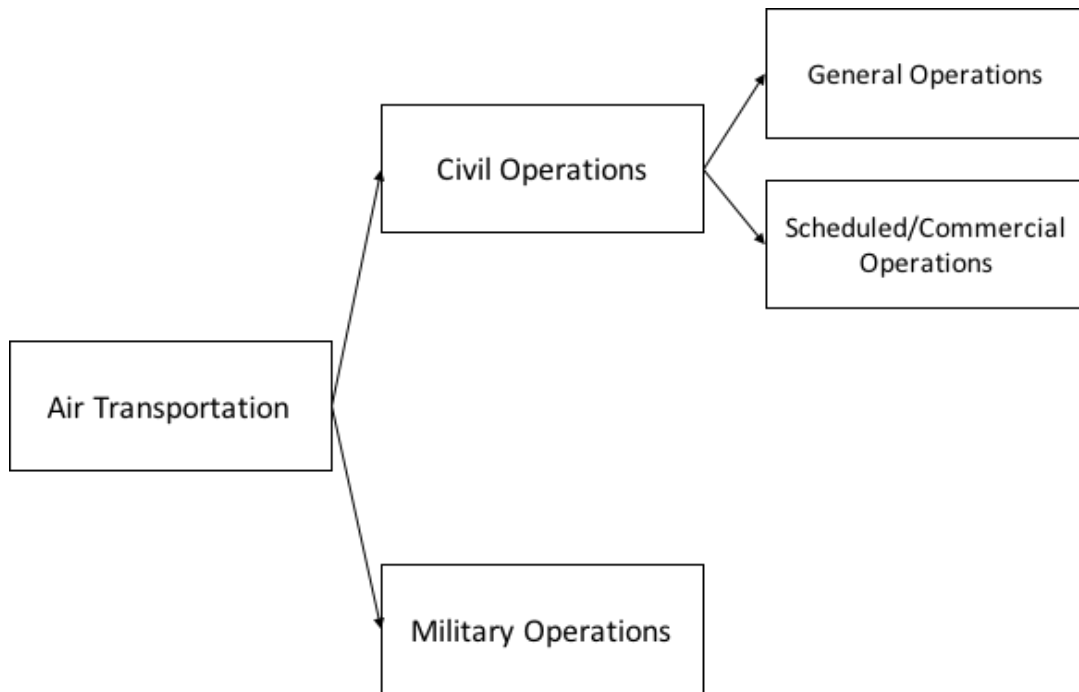


Figure 1: Structure of Air Transportation Based on The Functions

2.2 Performance of Air Transportation in Global Operations

Over the area of economic discussion, scheduled commercial operation is the one which has been getting the most interest from the world because of increasing trend of global trade activity. Since the era of globalization starts, the power of commerce has been significantly rising all over the world. Data from World Trade Organization as explained in Figure 2 shows that total value of commerce in 2015, both merchandise side and services side, has increased nearly hundred percent within ten years (World Trade Organisation, 2016).

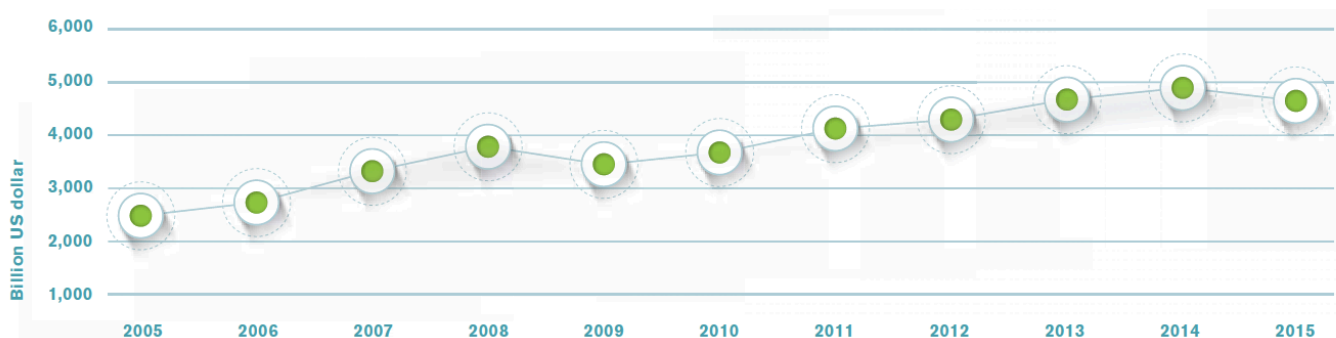


Figure 2: Trade in Commercial Service 2005 – 2015 (Source: World Trade Organisation, 2016)

Based on International Air Transport Association 2016 End-year Report⁸, commercial operation on airline industry all over the world has always gain real positive net profit over the last seven years since the period of global economic crisis during 2008 – 2009. Moreover, the return on invested capital has never been negative since 2005. This condition might be different over the different continent in the world because of different condition and other economic factors including policies.

System-wide global commercial airlines	Net Profit, \$ billion														
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016E	2017F	
Global	-5.6	-4.1	5.0	14.7	-26.1	-4.6	17.3	8.3	9.2	10.7	13.7	35.3	35.6	29.8	
Regions															
North America	-10.0	-6.7	1.0	5.5	-19.7	-2.7	4.2	1.7	2.3	7.4	11.2	21.5	20.3	18.1	
Europe	1.1	1.6	2.4	6.4	0.0	-4.3	1.9	0.3	0.4	1.0	1.0	7.5	7.5	5.6	
Asia-Pacific	3.4	1.2	1.7	3.0	-4.7	2.7	9.2	5.0	5.8	2.3	1.9	7.8	7.3	6.3	
Middle East	0.2	0.2	-0.1	-0.1	-0.3	-0.6	0.9	1.0	1.0	0.3	0.4	1.1	0.9	0.3	
Latin America	0.1	-0.1	0.1	0.1	-1.4	0.5	1.0	0.2	-0.2	0.2	0.0	-1.7	0.3	0.2	
Africa	-0.3	-0.4	-0.2	-0.2	-0.1	-0.1	0.1	0.0	-0.1	-0.5	-0.8	-0.9	-0.8	-0.8	

Table 1: Financial Results of Global Airline Industry per Continent (Source: IATA 2016 End-year Report)

Referring to Table 1, assuming there is no high volatility on US dollars to each continent, the airline industry in North America had the most unfortunate from the global economic crisis, followed by Asia-Pacific with -19.7 billion US dollars and -4.7 US billion dollars. However, Asia-Pacific made a significant performance in 2010 where this continent booked 9.2 billion US dollars as net profit. This condition highly supported by the implementation of air transport liberalization policy. Tan (2014) reported there are at least three major multilateral agreement on air passenger and air freight service within ASEAN region⁹. Moreover, Indonesia, as the biggest airline market in ASEAN region, also have finished The Civil Aviation Act in 2009 where created tremendous impact to the industry (Sudiro and Martono, 2016)¹⁰.

Generally speaking, the potential for outstanding growth of air transport industry in South-east Asia has been predicted by various literature from the various viewpoint of analysis. Based on IATA report in 1997, Asia-Pacific airline market predicted to overtake Europe by

⁸ The annual report are reported by IATA (<http://www.iata.org/whatwedo/Documents/economics/Central-forecast-end-year-2016-tables.pdf>). Accessed March 5, 2017.

⁹ There are two agreements in 2009 (Multilateral Agreement on Air Service – MAAS; Multilateral Agreement for the Full Liberalization of Air Freight Services – MAFLAFS) and one agreement in 2010 (Multilateral Agreement for the Full Liberalization of Passenger Air Services – MAFLPAS).

¹⁰ Number of the passenger in Indonesia rose 106% during 2009 – 2010 after the policy implementation.

2010 and being the second largest in the world behind North America (Li, 1998). The prediction has met the fact that by 2016 the operating profit margin of Asia-Pacific only a step lower than North America while in terms of net after-tax profit per passengers still lower than North America, Europe, and Middle East (IATA, 2016). This condition might have affected by the differences in currency power since the data are in US dollars. Moreover, the prediction explained based on fact that most of the countries have the same goal and working together for achieving Open-Skies Policy under the Singapore Declaration, and the Framework Agreement on Enhancing ASEAN Economic Cooperation starts in 28 January 1992¹¹.

2.3 The Effect of Air Transportation to Economic Development

More recent study conducted by Hooper (2005) explained that Southeast Asia airline industry might be very interesting over couple of years with three main drivers: (i) The expansion of low-cost carrier (LCC) airline company which driven after the success of LCC in US and Europe; (ii) The incremental economic growth and enlargement of middle-income group; and (iii) The nature of Southeast Asia's travel market which separated by oceans. Those three conditions are supporting each other, where also tend to create urban population larger in Bangkok, Jakarta, Kuala Lumpur, Manila, and Singapore.

Various international studies elaborated that better airline performance and condition are positively supporting economic growth (Fu and Oum, 2014; Bowen, 2000; Geloso Grosso and Shepherd, 2011; Chang and Chang, 2009). Developments are including growing number of passenger and flow of goods. Hence, a report from Air Transport Action Group elaborate the economic and social benefit of air transportation into four different impacts (ATAG, 2005):

- **Direct Impact**

The airline industry may create jobs in the sectors, including generate taxes payment for the government and produce service output from transporting people and goods commodity.

¹¹ After several times of preparation, ASEAN established an official Plan of Action 1996 – 1998 which contain seven-point of issues ordered by top-down level of priority. Those points include development plan in law, policy, infrastructure, environmental problem, until the Open-Skies Policy which later preceded by Singapore and Brunei in 1997.

- **Indirect Impact**

Airline industry creates larger possibility of development in semi-external sectors such as travel agents and food & beverage for the airline company.

- **Induced Impact**

Airline industry creates a new economic activity in a region by spending or transaction that plausibly generated because of air transportation activity, such as in restaurant and banks.

- **Catalytic Impact**

Airline industry and development stimulate other sectors, such as tourism sectors and supply chain activity across the world, to grow since the infrastructure and policy in the airline industry can be seen as intangible assets.

The report considers catalytic impact as the one that creates the largest and widest impact to the economy. It is also important to note that the air transportation performance cannot be implemented without several necessary preconditions such as the infrastructure. However, instead of arguing infrastructure as a prerequisite that might drive the performance and economy, Darmawan (2012) suggest infrastructure as a yield that generated after the air transportation demand increasing. Therefore, the increments of demand itself are produced by local investment and the economic growth. It is clear that air transportation performance and the economy are affecting each other in various ways from every side of the world.

2.3.1 Investment and Infrastructure in Air Transportation Industry

The importance of investment as the main source of capital has been well known in many industries. This argument met the theory of production function where output is a function that derived from capital and labour. The theory explained in the following equation:

$$Y = f(K, L)$$

Overall, the relationship is between capital and labour, which can be considered as a source of non-monetary capital.

There is a various source of investment that can be implemented in the air transportation industry including government spending and foreign direct investment. As one of the major service industry in the world, this environment needs both monetary and non-monetary investment on its infrastructure. More than that, infrastructure needs to be built and later can be transformed as the main source of capital for the output production: airlines operation.

However, every industry has different capability and average rate of return. In several cases, some industries might simply cannot be developed unless there are huge willingness to spend very high cost of investment (Button and Taylor, 2000). For example, developing a snow-ski attraction in tropical country is probably only possible with additional charge of investment because of the limit of natural advantage: the developer will need more infrastructure to keep the temperature at low level compared to region that has winter season.

As have been explained in the previous subsection, one out of four social benefits in airport infrastructure operation is the catalytic impact. Aschauer (1990) supports this argument as he stated that investment in infrastructure could be a catalyst for higher economic growth in the long run. Better condition plausibly enhances the probability of creating prospective chance in the economy which also can be a major factor that affects demand level in air transportation industry. Button and Taylor (2000) explain there are four effects of infrastructure investment in aviation industry:

- **Primary effects**

Development and improvement of airport enlarge possibility of business creation and expansion through the region. However, the effect is mostly limited to some extent and also considered as short-term effect.

- **Secondary effects**

The long-term effect on the local economy that gained from operating international flight service. This effect includes the involvement of new employment in international standardization.

- **Tertiary effects**

An established condition in the region increases probability of business that regularly use air transportation to open closely within the region. Most of the time, companies like this

need high-quality transportation and have regular schedule of flight due to the need of inter-personal contact.

- **Perpetuity effects**

In longer-term effect, the infrastructure development may attract new type of business with air transportation services in the region, which is unavoidable from the need of new investment. This impact may accelerate the economic growth in the future.

Investing in infrastructure is clearly important as a 'dynamo' to start running the business economy. However, a good infrastructure not only can be measured by monetary calculation alone. Aschauer (1990) explain the importance of investment infrastructure to quality of life by elaborating three main linkages between those two: (i) Attributes to human habitat, which includes health, safety, recreation, and aesthetics; (ii) Economic opportunity; and (iii) Leisure. From those three explained above, the success of investing in transportation infrastructures such as highways, airport, and mass transit cannot be measured only by the leisure, which closely engaged with tourism activity, or economic opportunity by creating new business, but also from the benefit of safety level which is often forgotten.

A good and balanced investment on infrastructure is a must since sustainable development plan has to bring satisfaction in a long-term period overtime.

2.3.2 Demand of Air Transportation Services

As a service industry that running business for profit, airlines and airport need an excellent approach to penetrate the market. It is plausible to assume that the first and main reason of public transportation operation is to accommodate the people by getting affordable service that they can manage and use to achieve each people need on a daily basis. From economic approach, these things can be defined as a necessary commodity to support the economic growth to accelerate in the future. However, not all public transportation can be accommodated a hundred percent by the government: there are private parties' contribution needed to this operation.

The volume of passengers and air cargoes are considerably two main drivers that may drive the demand for air transportation development. Ishutkina and Hansman (2008) elaborate the arguments by clustering those as follow:

- **Passengers**

- o *Business motives*, which is them who need the air transportation service based on their business and economic reason including investor relationship, product market penetration, and so on.

- o *Personal motives*, which is them who meet their personal interest and needs with air transportation. Medical, education, and family reason are among possible grounds of using the air transportation service.

- o *Leisure motives*, which is them who use air transportation for traveling and tourism. With the improvement of low-cost carriers and ‘city break’ trip, air transportation strongly related with tourism business that is contributing to economic growth.

- **Air Cargo**

Air transportation can accommodate transportation for goods, which has no significant major differences on the main infrastructure compared to transporting people.

Furthermore, Dunne, Flanagan and Buckley (2010) explain that low-cost carrier airlines as the first factor out of three that improve ‘city break’ trip popularity in Europe. The other factors are people perception of city tourism and increasing role of the internet. They also argue that market segmentation on each type of trip can be very effective especially for destination management institution.

2.3.3 Government Policy in Air Transportation Industry

As have been discussed, policies are proven as one factor that might improve air transportation performance. Within worldwide operation, the liberalization of air transportation policy is among one of the most discussed.

Research from Fu, Oum and Zhang (2014) in the USA has proven that liberalization policy was positively impacting the economic and traffic growth. According to the research, the ultimate

contribution of liberalization policy in air transportation industry is creating competition between the service provider, where lead to three direct impacts: (i) Reduced price, (ii) Increased traffic, and (iii) Enhancing productive efficiency improvement.

There is two condition that might occur with more parties competing in one market. First, assuming there is a sustainable positive growth of demand in air transportation industries from both passengers and air cargoes, more airlines in the market may enlarge the supply needed for meeting all expected demand. Without a growing number of supply, there will be an increasing number of unsatisfied demand which lead to price volatility. From customer's perspective, high prices per flight might decrease the probability of using the services which can decrease overall traffic performance in the industry. Second, assuming the industry is already mature, then there will be a perfect competition market. This condition might lead to a tight competition between each service providers to win customers on one same bucket. Hence, it will force each airline to "relentlessly improve their efficiency" (Fu, Oum and Zhang 2014 pg.27).

Despite the success story of liberalization policy on creating a tremendous impact to air transportation, there is no guarantee the market can sustainably growing in the future after the policy implementation. On the other words, several factors also explain the liberalized market to improve including but not limited to infrastructure and regional development.

On his study in the European Union region, Graham (1998) found that even liberalization policy has won consumer benefit in the market operations, it still has some limitations on the overall economy where regional disparities development stands as the most influential factors that affect geographical demand on the market. With this, investors decision to invest in the market might be unbalanced due to differently fixed condition over time. For example, most of the global cities in Europe are having a landlocked condition, which is impossible to be changed in the future. Assuming that at one period most people in the world prefer beaches compared to mountains, then cities and airports on the coastline probably receive better demand compared to the rest.

The implementation of liberalization on air transportation is not only affecting the passengers traffic but also air cargoes. As a growing service, in the future this operation plausibly getting stronger yet significant to the economy together with the development of e-commerce. Regardless the fact that the required infrastructure between passenger service and air cargo service are the same, the specific need for these two type of service are different. Zhang and Zhang (2002) has mentioned several arguments about the air transport actual operation:

- Passengers service are most likely prefer to have a direct flight, when this is not the main concern for air cargoes as long as meet the supply-chain schedule.
- Passengers service prefer to have a convenient and attractive airport environment, where this is not included in air cargoes service.
- The flow of cargo movement, which is a demand function, is not as balance as passenger movement

As of recent condition, the cargo movement is dominated by Asia to Europe and the USA. This condition also might change in the future regarding the pattern of the economic situation between regions and countries. With the condition that demand pattern of air cargo is not as flexible as passenger demand, there might be slightly different needs and priorities between those two services. This explanation also met the argument that regional characteristics might affect air transportation performance to the whole economy.

3. Indonesia Economy

Over the last decade, Indonesia economy has been considered as one of a strong achiever in the world. After crashed out in 1998 – 1999 due to crisis and riots between the transformation of political regime, the economy has been growing well until 2015. Compared the other ASEAN countries, the economy of Indonesia, together with Vietnam, Myanmar, and Lao PDR survived the global crisis 2008 – 2009. This is a remarkable achievement especially within the region ASEAN since they are on the way in establishing ASEAN Economic Community 2025, where might enlarge their position in the world¹². Details of ASEAN countries in economic performance elaborated in Figure 4.



Figure 3: Map of Indonesia¹³

The achievement of Indonesian economic growth also could not be separated from several main factors including the geographical structure and demographic advantages. However, the

¹² By 2014, the implementation of ASEAN Economic Community was collectively the third largest economy in Asia and the seventh largest in the world (<http://asean.org/asean-economic-community/>). Accessed March 6, 2017.

¹³ Retrieved from ANU College of Asia & the Pacific (<http://asiapacific.anu.edu.au/maponline/base-maps/provinces-indonesia-base-2013>). Accessed May 24, 2017.

chance and challenge to foster the economic development in upcoming years seem very clear from two conditions: First, regardless the fact that the economy is growing substantially, the inequality also keep rising across the provinces. Based on Indonesian Central Bureau of Statistics (BPS), Gini ratio of Indonesia was 0.36 in 1996, where later jumped into 0.41 in 2013. Gorontalo province was having the most incremental changes from 2002 to 2013 where the inequality rose from 0.24 to 0.44¹⁴.

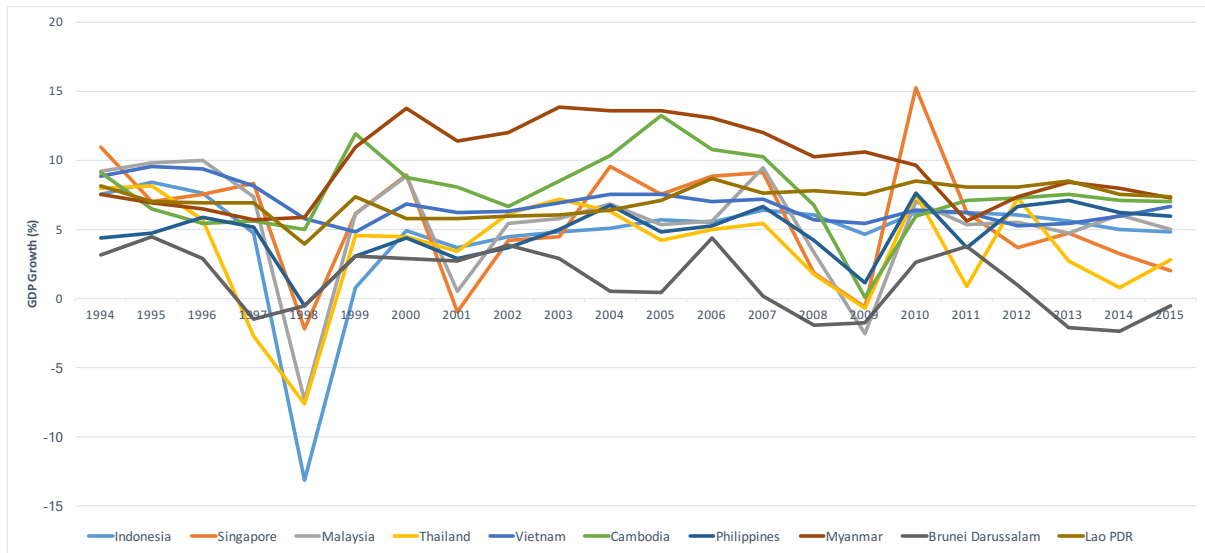


Figure 4: ASEAN Countries Economic Growth (Source: World Bank)¹⁵

Second, according to the World Bank, Indonesia was standing a rank higher than Brazil as the fourth country with the most population in the world after China, India, and the USA in 2015 (World Bank, 2017). The most important thing from this population data is, compared to the other countries which currently sitting at the top 10 population, Indonesia has the most livable island including Sumatera, Jawa, until Kalimantan. This geographical condition currently still not optimally elaborated with the fact of unequal infrastructure development within and between islands, which also explain the rise of inequality as a whole. Until 2016, railways transportation only exists in Jawa island which is the island of the capital city that divided into only six from 34 provinces: Banten, Jawa Barat, DKI Jakarta, Jawa Tengah, DI Yogyakarta, and Jawa Timur. The condition not only giving burden for supply chain and economic activity; it

¹⁴ Data can be accessed publicly on <https://www.bps.go.id/linkTabelStatis/view/id/1493> (Accessed June 15, 2017)

¹⁵ Data retrieved from World Bank database which can be accessed publicly on <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG> (Accessed June 15, 2017)

makes Indonesia highly dependent on sea and air transportation as the engine of economy and distribution.

3.1 Structure of Indonesian Economy

It is important to understand that Indonesia is now running regional autonomy and fiscal decentralization policy on their economy after the Soeharto-regime, where in 1999 Indonesia had a major change in its governmental system from *new order regime* into *reformation era* (Seymour and Turner, 2002). The condition was driven by people's dissatisfaction with the government, especially them who live outside Java Island. Brodjonegoro and Asanuma (2000, pg. 113) describe what caused this change as follow:

“This inter-governmental fiscal relationship generated a sense of the regional disparity between Jakarta or Java (Island), representing the center, and the rest of Indonesia. Natural resources-rich province, in particular, felt that the system neglected and damaged their interest, and expressed dissatisfaction in a most vocal manner.”

Regional autonomy and fiscal decentralization has mandate the central government to deliver the budget of regional government expenditure to each regional government in each province¹⁶. This implementation has enabled every province more abilities and authorities to build their area based on their need and focus where can bring more prosperity to the people. Based on McKinsey Report, until 2012, the decentralization has been successful since several main cities outside Jawa island including Pekanbaru in Sumatera, Pontianak and Balikpapan in Kalimantan, and Makassar in Sulawesi are among cities with the fastest economic growth in Indonesia (Oberman *et al.*, 2012).

¹⁶ By practice, this policy running officially since 1 January 2001 based on Law No. 22/1999 and Law No. 25/1999 where both of those laws regulate about regional government and equality in financial support between central government and regional government

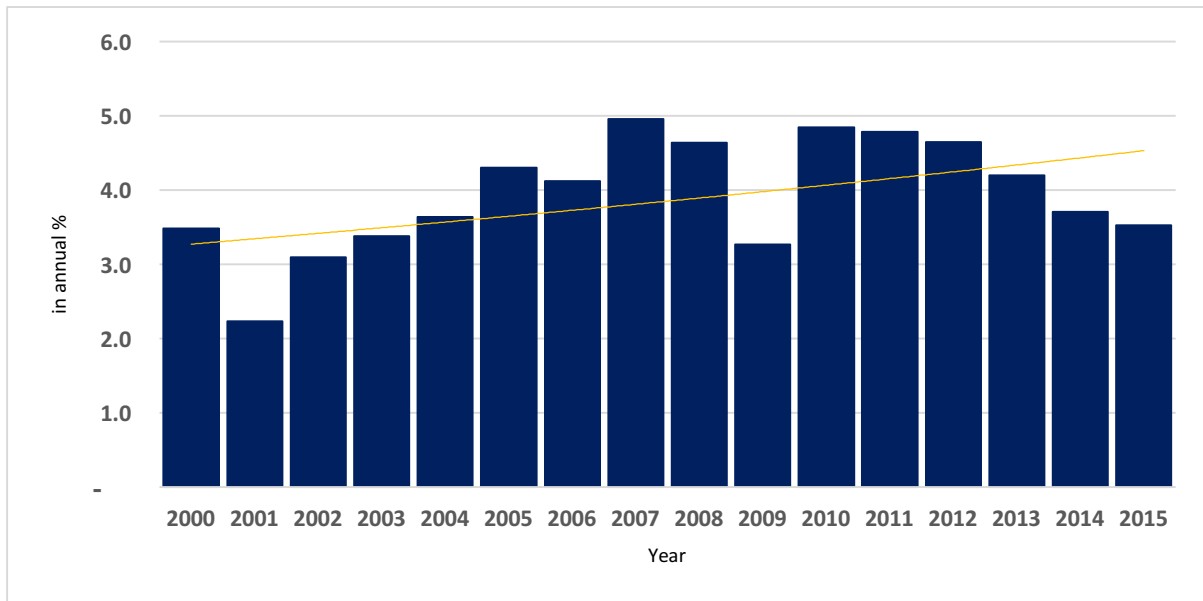


Figure 5: Annual Growth of Indonesian GDP per Capita (Source: World Bank)¹⁷

Figure 5 shows that Indonesia has a positive trend increase in GDP per capita over the last fifteen years, with average growth of 3.9% per year. Ishutkina and Hansman (2008) argue that people may shift their transport mode preference into faster one including shifting to air transportation when they have a better economic condition, which also might be applicable for air cargo delivery. Hence, following hypothesis are proposed:

H1: Better economic condition has a positive relationship with volume of passengers carried.

H2: Better economic condition has a positive relationship with volume of air cargoes carried.

3.1.1 Trade and Tourism Sectors

During the second decade of reformation era, the composition of Indonesian gross domestic products (GDP) is almost the same pattern over the last 10 years. Manufacturing; agriculture, livestock, forestry, and fishery; and trade, hotel, and restaurant are dominating the proportion of GDP as can be seen in Figure 6. The domination of the first two categories are not surprising as Indonesia is having a huge potential in natural resources beneath the land and ocean territory.

¹⁷ Data derived from World Bank database which can be accessed on <http://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG> (Accessed June 15, 2017)

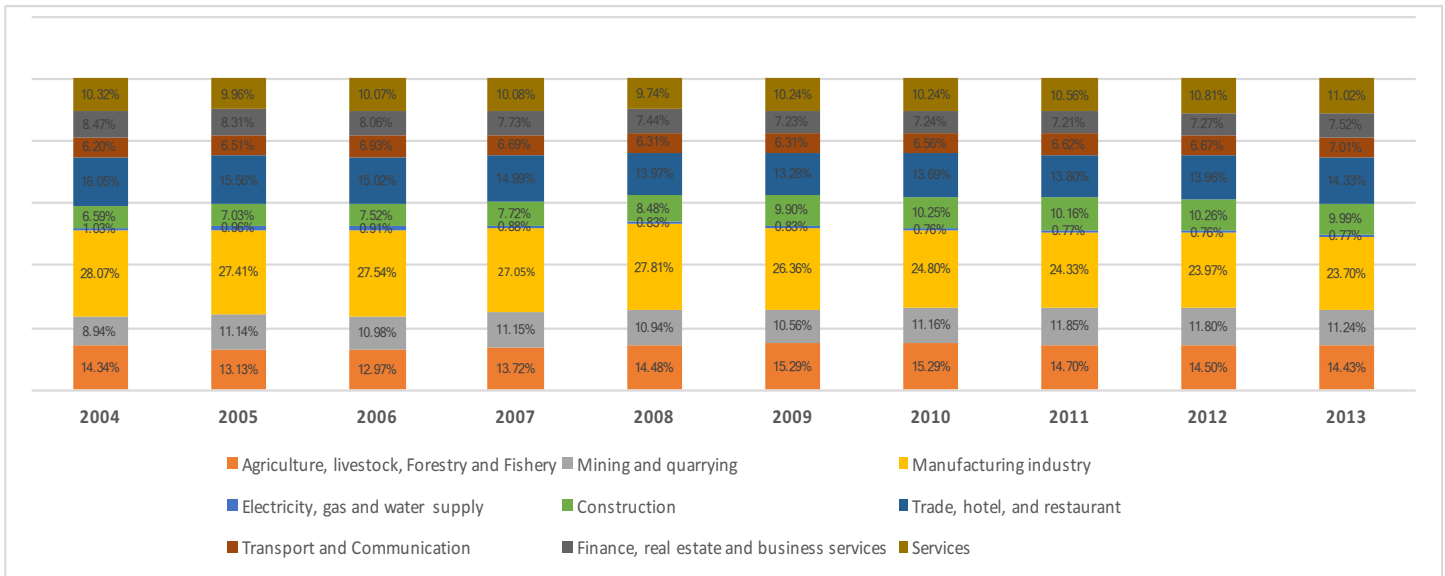


Figure 6: Structure of Indonesian Gross Domestic Product 2004 – 2013 (Source: Central Bank of Indonesia)¹⁸

It is important to understand that trade, hotel, and restaurant sectors are closely engaged with services sectors. Roughly, the sum of these two sectors is, more or less, the same with the manufacturing industry. The possible thing that might explain similarities between these two sectors is tourism activity. With this understanding, it is convenient to think that, regarding contribution, the service & tourism industry is as strong as manufacturing industries to the Indonesian economy.

The important thing to look up to trade and tourism sector performance is the fact that each province has different capabilities and opportunities to grow these particular sectors. Even decentralized government operation allows each province to propose, develop, and run their target, it could not change several fate that has been fixed to some region such as location and geographical features including beach and mountains: not every location has either or both. Looking up from marketing perspective, John Urry, a British sociologist argues that demand for tourism might come from a desire to see visual experiences that are different compared to somewhat that the person usually sees on daily activities (Hospers, 2009). The term

¹⁸ Processed from database of *Gross Domestic Product by Industrial Origin at Current Price* that published by Central Bank of Indonesia (<http://www.bi.go.id/en/statistik/seki/terkini/ril/Contents/Default.aspx#>). Accessed May 13, 2017)

that he used obviously explains what drives tourism demand in general: the desire to travel itself.

Air transportation, as have been elaborated in the previous chapter, also play an important factor in mobility, especially for people. The development in supply-side of trade and tourism sector, such as location infrastructure, possibly could not be able to reach maximum advantages for passengers and logistics performance if the supporting factor, such as connectivity and transportation, are not developed in a proper manner. For example, building a world-class warehouse in a new location as a greenfield project will be nothing if the accessibility is not efficient. Hence, the effect to the economy will come plausibly far from expectation, such as a wrong value in return to Investment.

Transport industry needs to satisfy consumers demand for mobility in the most efficient way since the main aim was providing faster services because the length of the trip can be seen as a 'cost' that should be minimalized (Schiefelbusch *et al.*, 2007). Hence, sustainable development is necessary within this sector, which require a significant variable, including the number of job creation and accommodations to achieve the overall target. For example, O'Connor argue that in Singapore and London, the airport may create a multiplier effect on hotel, tourism, and travel infrastructure (O'Connor, 1995). As a developing country which is still more labour-intensive compared to developed countries, advancement in Indonesia's development projects may lead to increasing number of workers and facilities. Regarding these arguments, hence we propose following hypotheses:

H3: Number of workers in service sectors has a positive relationship with volume of passengers carried.

H4: Number of workers in service sectors has a positive relationship with volume of cargoes carried.

H5: The accommodation has a positive relationship with the volume of passengers carried.

3.2 Airport Infrastructure Development

According to Figure 6, the fact that transportation sectors could not be a dominating sectors in Indonesian economy compared to manufacturing and tourism lead to an argument: In Indonesia case, the catalytic impact is superiorly stronger than the other impact which will result in a biased measurement if assessment conducted only by GDP contribution. On the other words, infrastructure in this sector is significantly supporting the other areas to grow, which can be called as a tangible asset.

The airport is, undeniably, the most critical infrastructure to have in air transportation development. According to Burghardt, airport development in Southeast Asia was began following the demand of colonialism activity by English, French, and Dutch in the past (O'Connor, 1995). The development started on the largest centers of colonial power at that time, which is mostly has been transformed into today's capital city of each country. One of the most significant effects of airport development is proximity effect: Whenever one airport has been a major hub in particular region, the other airports in smaller cities will be a feeder for them that creates direct impact in delivering numbers of demands which could be as passengers, air freight, or both. For example, when Jakarta was the only airport that provides international flight, smaller cities like Bandung and Surabaya acted as a feeder for Jakarta. This example, however, is no longer exist since Bandung and Surabaya now both provide international commercial flight connectivity.

The economic effect might have linear relationship to the airport quality, which normally measured by the technical specification of the airport itself including the quality of runway, air traffic control performance, and size. Better quality of airports has a larger probability of creating greater impact by providing more traffic and larger plane. This means that having an airport is not enough since there are also rules to acquiesce, which naturally creates a 'leveling' between airports.

At some point, the further regulation also needed to maintain the economic performance itself. Most of the rules are focus on creating incremental growth in costumer's satisfaction such as service quality, while other rules might disturb other airport performance such as

liberalization in international flight service. Supplying international flight service creates larger opportunity to serve more customers by providing more traffic. However, if this development run without well macro-perspective analysis, adding competitive advantage to one airport might 'steal' customers from the other airport. Jakarta's share of international flight passengers fell from 84% in 1979 to 62% in 1997 since Indonesia put two additional cities to operates international flights: Denpasar and Surabaya (Bowen, 2000).

According to the Indonesia Ministry of Transportation, Indonesia has 298 airports which each characteristic and scope of service can be clustered based on classification, hierarchy, usage, and function as elaborated on Table 2¹⁹. All the airports are operating under the rule and permission of Indonesia Ministry of Transportation, including the supports from AirNav Indonesia²⁰. However, not all of the airports are operating under the same operators. There are five parties which directly involved in managing and operating airport service, facilities, and infrastructure in Indonesia. Two of them, PT Angkasa Pura I and PT Angkasa Pura II, are both state-owned enterprise that operate airports for commercial service.

It is evident to assume that the economic performance might have been greater when the airport can provide business activities outside military operation and other non-profit actions. This thesis will focus on how airport, as a fundamental infrastructure in the industry, can enhance the economic performance.

Either as a hub or spoke, airport normally delivers not only passengers but also cargoes which can affect the economy directly. Jarach (2001) argue that business has to locates airport and air transportation accessibility closer to their supply chain operations. This argument also is proven by Yuan, Low and Ching Tang (2010) on their research in Singapore and Hong Kong which found that trade volume and income of the economy significantly have a positive relationship with achievement in the logistics industry. However, demand growth in Indonesia

¹⁹ According to Department of Air Transportation under Ministry of Transportation. Further information can be found at <http://hubud.dephub.go.id/?id/bandara/index/filter:operator,0> (Accessed May 1, 2017)

²⁰ AirNav Indonesia is a non-profit-state-owned enterprise in Indonesia which focus to provide air transportation and navigation service, including the operation of air traffic controller, weather forecast information, telecommunications, aeronautics, and search & rescue protocol. Further information can be found at <http://www.airnavindonesia.co.id/id/page/about/type/core-bisnis> (Accessed May 1, 2017)

has not supported by adequate growth of supply in infrastructure, including airport and navigation system (Darmawan, 2012). This condition seems lowering Indonesia's potential to achieve effective development. Hence, we propose two hypotheses:

H6. The number of airports has a positive relationship with volume of passengers carried.

H7. The number of airports has a positive relationship with volume of cargoes carried.

3.3 Regional Potency, Fate, and Development

As have been discussed in previous sections, regional autonomy in Indonesian political system creates easiness for every government to develop targets and produce what they think the best for the citizen by looking deep down through their immense potential. However, easiness could not guarantee perfect results since, regarding economic perspective, there is always 'invisible hand' effect²¹. More than that, some specific regional diversity in geographical features and potency also might bring a significant difference between each province regardless they might have the same quality of infrastructure, policy, or even the amount of fund on air transportation sector.

For example, as a tropical country, Indonesia naturally only have two regular seasons: dry and wet/rainy season. It is important to note that several regions might have more dry season annually when the other have the more rainy-season every year. This weather condition can be considered as a fate that, naturally, could not be changed for the business purpose all the time.

²¹ The words of 'invisible hand' popularized by Adam Smith. In simple words, this can be understood as a condition when there is always something that is unintentionally affecting our effort into achieving somewhat that might fulfill our desire.

Airport Classification	Airport Hierarchy	Airport Usage	Airport Function
<p>Clustered based on operational size which referring to the international standard on:</p> <ol style="list-style-type: none"> 1. Aeroplane Reference Field Length (ARFL) 2. Wing Span (WS) 3. Outer Mean Gear (OMG) 	<p>1. Hub Airport</p> <p>This type categorized into:</p> <ol style="list-style-type: none"> (i) primary service, which able to provide at least five million passengers annually (ii) secondary service, provide between one up to five million passengers annually (iii) tertiary service, provide between five hundred thousand up to one million passengers annually <p>2. Spoke Airport</p> <p>Airport in this hierarchy has aimed to support larger airport and increase local economic activity</p>	<p>4. International Airport</p> <p>This type of airport has official mandate to provide both international and domestic flights. The mandate was given by the minister based on several criteria including long-term economic development planning, trade, and tourism industry</p> <p>5. Domestic Airport</p> <p>The mandate to this type of airport only to provide domestic flights</p>	<p>5. Governmental operation</p> <p>Airport defined as a place to governmental activities based on the law of the country. There are four main activities provided:</p> <ol style="list-style-type: none"> (i) Air transport development (ii) Customs (iii) Immigration (iv) Need of quarantine <p>6. Business operation</p> <p>Airport defined as place to business activity and are open for airport entities, airlines entities, corporations, and individual partnership through those entities</p>

Table 2: Definition of Indonesian Airport (Source: Law No. 1/2009 and Ministry of Transportation Regulation No. 23/2013)

However, without a proper planning and financial management in executing a governmental program, particular provinces may not gain a sustainable development. Masterplan to fulfil all demands including accommodation, which normally come from both local and international airline users, should be excellent. On the other words, all those development plans and projects need government supports including financial and policies to achieve a sustainable development that has been set from and by each province. Hence, we proposed the last two hypotheses:

H8: Government expenditure has a positive relationship with volume of passengers carried

H9: Government expenditure has a positive relationship with number of cargoes carried

3.4 Air Transportation Challenges in Indonesia's Economy

It is clear that the contribution of air transport industry has been accelerating over the last few years after the global recession in 2008. The argument that commercial operation flight being an important factor in facilitating trade commercial also proven by the fact that airlines performance within industries in many countries has never had negative net profit annually. Southeast Asia and Asia Pacific are continents with the largest improvement that supported not only from the economy (e.g., increments in income per capita) but also the improvement of the rule, as has been explained in the previous section.

As an industry, it is plausible to assume that economic growth is not going to take a leap without a settled infrastructure as the main capital to run the production function. For example, it is impossible to run commercial international flight without airport even the policy supports. Hence, with the decentralized governmental system in Indonesia, each province has a regional authority to boost their infrastructure using their budget as governmental expenditure. It is also important to note that administrative expenses here might also function as a subsidy to the industry. The importance of government spending might be significant for the production function since airport facilities and infrastructure in Indonesia mostly operated by the government itself under Ministry of Transportation.

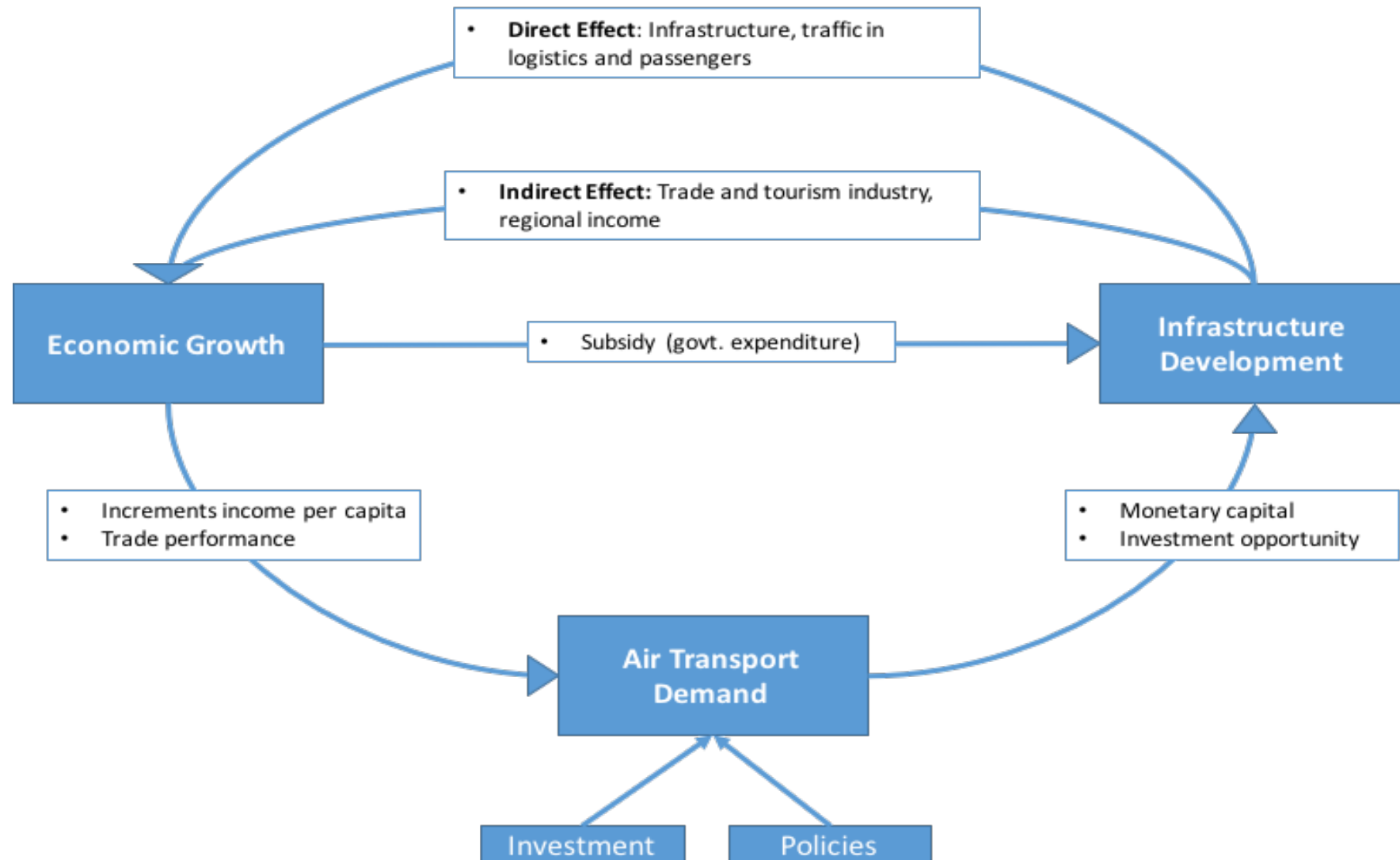


Figure 7: Indonesia Air Transport Development (Source: improved from Darmawan (2012))

However, the indirect effect from this subsidy through air transportation industry might leak to more than just the particular industry. As have been explained, the maturity of air transportation industry might bring a powerful catalytic impact to the other industry. Tangible assets as airport that supported by adequate demand on passengers may create a long term sustainable development within those two regions. In the future, this might push the area of production (e.g cities, province) to elaborate more opportunities on their own especially in tourism industry. The rise of the industry will enlarge the opportunity of job creation, for example in hotels and other service related industry. Moreover, the performance of air cargo will enlarge probability of job opportunities in supply-chains related services.

Figure 7 elaborate the framework of Indonesian air transport development. Air transport demand derived from economic growth, which also need a support from external investment and policies from the government. The incremental development of income per capita and trade performance might enhance the air transport demand. Furthermore, the performance of the industry results the size of revenue they can obtain and use to further development as a part of investment. Assuming the industry has sustainable growth in demand, then better quality of infrastructure will lead to better economic performance and so on.

4. Methodology

4.1 Data

The analysis provided on this thesis will be based on provinces in Indonesia using annual period of 2006 – 2012. Since the beginning of 2013, Indonesia has 34 provinces which each of them has regional government authority. However, it can be understood that developing a new regional government will need some period of time: Kalimantan Utara is the newest province in Indonesia which also still lack of data until today. Hence, we exclude the particular province. The decision to use provincial level of analysis is to enlarge the scope of analysis into the understanding of the effectivity of regional authority, including investment spending and policies, into the air transportation industry and the overall economic growth.

Most of the data are derived from several valid sources including INDO-DAPOER by World Bank, Indonesia Ministry of Transportation, and Indonesia Central Bureau of Statistics²². There is also a variable that generated from individual analysis based on news from valid sources about accidents in airport services²³. The linear models function is written as follow:

$$\begin{aligned}
 & \textit{Passengers} \\
 & = f \left(\textit{EconCond}, \textit{Airport}, \textit{Policy}, \textit{OtherTrans}, \textit{AirportCategory}, \textit{FrcMjr}, \textit{GovtInv}, \right. \\
 & \qquad \qquad \qquad \left. \textit{Accom}, \textit{Workers} \right) \\
 & \qquad \qquad \qquad \text{and} \\
 & \textit{Cargo} \\
 & = f \left(\textit{EconCond}, \textit{Airport}, \textit{Policy}, \textit{OtherTrans}, \textit{AirportCategory}, \textit{FrcMjr}, \textit{GovtInv}, \right. \\
 & \qquad \qquad \qquad \left. \textit{Workers} \right)
 \end{aligned}$$

For the dependent variables function, we use two different variables on different models: *Passengers*, on the first model, stands for the volume of passengers (in person), while *Cargo* stands for the volume of cargo freight carried (in kilogram). Data of these two variables are gained from Indonesia Ministry of Transportation which stated on per-airport-basis. Starting from this, we generate data per province based on the airport location.

²² INDO-DAPOER is abbreviation from Indonesia Database for Policy and Economic Research which provided by World Bank publicly and can be accessed through <http://databank.worldbank.org/data/reports.aspx?source=1266>

²³ On the following section, this variable is under the name of 'ForceMajeure'.

Function	Variables	Type ²⁴	Explanation
<i>EconCond</i>	<i>PoorPop</i>	IV	Volume of the population that live behind the poverty line
	<i>HHCapExp</i>	IV	The household per capita expenditure in Indonesian Rupiah
<i>GovtInv</i>	<i>TourismExp</i>	IV	Annual tourism and cultural expenditure by the regional government in Indonesian Rupiah
	<i>InfraExp</i>	IV	Annual infrastructure expenditure by the regional government in Indonesian Rupiah
<i>Airport</i>	<i>Airports</i>	I	The number of airport that operates under state-owned enterprise
<i>Policy</i>	<i>CivilAviation-Act2009</i>	II	The period when Civil Aviation Act 2009 running
<i>OtherTrans</i>	<i>OtherTrans</i>	III	Availability measurement of main seaports and train services as competitors to air transportation
<i>FcrMjr</i>	<i>ForceMajeure</i>	I	Number of force majeure condition when there was major accident happened in the airport
<i>Workers</i>	<i>Workers</i>	IV	Volume of workers in service industry including trade, hotel, and restaurant businesses
<i>Accom</i>	<i>Accom</i>	I	Accommodation for tourism that measured by unit number of hotels
<i>AirportCategory</i>	<i>AirportCategory</i>	III	Categorical measurement of service level in the airport

Table 3: List of Variables

²⁴ I stands for continuous, II for dummy, III for categorical which later transformed into dummy, and IV for continuous which already transformed into natural logarithm form

For the independent variables function, we use almost the same composition of variables between two models except for two following variable function which explained in Table 3. The decision of using more than one variable as a proxy for each economic condition and government investment is to provide us a robust result. For example, with *HHCapExp* we can measure the average economic condition for overall population by looking through the expenditure: more expenditure plausibly means more revenue as well, which might come from better economic condition. More than that, when we use *PoorPop*, we can measure the condition by looking how many people live under the poverty line.

Regarding the *GovtInv* function, we can say that these expenditures can be interpreted as an investment since it might generate an establishment of something both tangible and intangible assets that possibly affecting in the long term-run. For example, the education of traditional dance art for children can be considered as part of tourism and culture investment for a long-term that also effective in the present since the kids can already perform and generate economic value for themselves and company as well. Furthermore, it is vital to transform many variables into natural logarithm (ln) form since many of them are different in the unit of measurement including the dependent variables (*Passengers* and *Cargo*), *EconCond*, *GovtInv*, and *Workers*.

Table 4 shows the descriptive statistics of the data after the natural logarithm transformation. It is important to note that there are three dummy variables that act as control variables in the model, including *CivilAviationAct2009*, *OtherTransport*, and *AirportCategory*. In details, each *OtherTransport* and *AirportCategory* can be elaborated into four classifications:

- *OtherTransport* into: (1) Road Only; (2) Has Main Seaport Access; (3) Has Train Access; and (4) Has Main Seaport & Train Access
- *AirportCategory* into: (1) Non-International Airport; (2) International Airport; (3) Hajj Airport; and (4) Government Priority Airport

Variables	(1) N	(2) mean	(3) sd	(4) min	(5) max	Hypothesis	Source ²⁵
Airports	231	0.758	0.553	0	2	H6 & H7	A
Accom	231	426.8	465.8	42	1,923	H5	C
CivilAviationAct2009	231	0.571	0.496	0	1		A
ForceMajeure	231	0.0519	0.222	0	1		
OtherTransport	231	1.667	1.122	1	4		
AirportCategory	231	2.126	1.070	1	4		
InPassenger	224	13.87	1.731	7.103	17.81		A
InCargo	226	15.51	2.495	3.219	20.25		A
InPoorPop	231	13.14	1.079	11.12	15.84	H1 & H2	B
InHHCapExp	231	15.19	1.003	13.46	17.61	H1 & H2	B
InWorkers	231	12.56	1.229	9.900	15.36	H3 & H4	B
InTourismExp	198	23.69	0.957	21.14	27.15	H8 & H9	B
InInfraExp	214	26.51	1.047	22.85	29.53	H8 & H9	B

Table 4: Descriptive Statistics

It is important to control other transportation access especially seaports and train access since both are direct competitors to air travel service business. Regarding the cost of transportation, airlines might apply the highest price while it also brings the fastest service compare to the others. People with a limited budget may adjust their decision over when there is any improvement on the other service. Furthermore, airport category will indirectly control the size of the airport itself which determines the level of service that an airport can provide. More than that, Indonesia also considered as a country that not only welcoming so many international people as tourist annually but also as a strong-loyal supplier of hajj pilgrimage operation to Mecca, Saudi Arabia. With over than 70% of Moslems population, Indonesia can fly 231,000 persons within, more or less, two weeks and welcome them back a month after. This operational require a special treatment and not all airports can handle this annually²⁶.

²⁵ A stands for Indonesia Ministry of Transportation, B for INDO-DAPOER World Bank, and C for Indonesia Central Bureau of Statistics

²⁶ Hajj pilgrimage is celebrated using Islamic lunar calendar, which make it seems come on different month every year if we use standard Gregorian calendar. In 2017, Indonesia has a quota of 231,000 persons for hajj. Further information can be accessed at <http://www.thejakartapost.com/news/2017/01/12/saudi-arabia-allotates-indonesia-haj-quota-of-221000-per-year.html> (Accessed June 7, 2017)

4.2 Analysis

To deliver a good understanding about problems that stated on previous chapters, panel data analysis will be provided using *STATA*²⁷. It has been known that panel data analysis is very useful to some extent. Panel data can use a large amount of observation to create more informative data, more efficient in confidence interval, and more likely to reduce collinearity between variables (Gujarati, 2004). Furthermore, the most important thing about panel data analysis is that it is useful to take into account individual heterogeneity overtime on the model. However, the process of data collection sometime can be a problem during analysis procedure, including missing value and correlation between variables (Baltagi, 2008).

Before running the panel regression analysis, variables correlated is tested. As we can understand from Table 5, there is no perfect collinearity between variables that used on the models. However, some variables correlated strongly one to each other, such as the relationship between *InWorkers* & *InHHCapExp* and *InPoorPop* & *InHHCapExp*. Hence, we did not put those highly correlated variables on the same model of regression.

The random effect has been used during the analysis. The structure of data in Indonesia during the period of analysis has been the major reason: random-effect enable us to keep using time-invariant variables on the model. As comparison, we have tried fixed effect and it does not allow the analysis to use variable *Airports* since the variable is time constant. The same reason also applies for several important variables such as *OtherTransport* and *AirportCategory* which is proxy to control provincial characteristics. Hence, continuing analysis without these variables may not bring efficiency as well since it may change the whole focus on analysis. To some extent, random effect estimator can bring better efficiency compared to fixed and pooled OLS regression even it was not unbiased (Wooldridge, 2012).

Homoscedasticity is also one of the critical assumptions to control during the analysis. According to Wooldridge (2012, pg. 93), the assumptions holds when the error on the model has the same variance “for all combinations of outcomes of the explanatory variables”. It is

²⁷ STATA is data analysis and statistical software. Further information can be found through this link: <http://www.stata.com>

important to understand that when homoscedasticity assumption fails, it does not create the results bias. Hence, to make sure our results consistently unbiased, we use the *robust* option on *STATA* during the whole analysis. Robust option can be performed to control heteroscedasticity by adjusting the standard errors into several clusters on panel data (Torres-Reyna, 2014).

	InHHCapExp	Accom	InPoorPor	Airports	CivilAviationAct 2009	ForceMajeure	InTourismExp	InInfraExp	InWorkers
InHHCapExp	1.00								
Accom	0.66	1.00							
InPoorPor	0.86	0.53	1.00						
Airports	0.51	0.35	0.39	1.00					
CivilAviationAct 2009	0.03	0.06	-0.08	0.00	1.00				
ForceMajeure	0.01	0.04	0.08	0.10	0.04	1.00			
InTourismExp	0.55	0.44	0.30	0.40	0.30	0.05	1.00		
InInfraExp	0.49	0.16	0.31	0.37	0.31	0.05	0.70	1.00	
InWorkers	0.95	0.71	0.74	0.50	0.09	-0.01	0.62	0.48	1.00

Table 5: Correlation Matrix

The firm contribution of this analysis, as has been explained on the previous section, is to determine insights not only from the passenger-side but also the cargo-side operation. Hence, since both of them are dependent variables, then we have to perform separate regression model using similar independent variables. Table 6 provide results from passenger-side regression using *InTourismExp* as a proxy for government expenditure function. The results on first regression show that tourism expenditure by the government is significantly affecting the growth of travellers in air transportation industry by being significant in ten-percent level: when tourism and culture expenditure increases one-percent, then volume of passengers will increase by 0.099%. Furthermore, *Airports* shows increasing return to passengers: One extra airport that managed by state-owned company can increase volume of air transport passen-

gers in the province by 202.9%. Volume of people who works in service industry also significantly affecting the volume of passengers by being significant in 1% level. A percent increase in volume of service industrial workers push can grow amount of passengers by 0.6%.

Variable	EcoCond function using <i>lnPoorPop</i>		EcoCond function using <i>lnHHCapExp</i>			Hypothesis
	1	2	3	4	5	
<i>lnPoorPop</i>	-0.306 (1.55)	-0.510 (3.24) ***				H1
Airports	2.029 (4.64) ***	1.922 (2.64) ***	1.129 (2.13) **	1.542 (2.00) **	1.509 (3.54) ***	H6
CivilAviation- Act2009	0.345 (6.16) ***	0.243 (4.40) ***	0.352 (6.06) ***	0.372 (6.58) ***	0.330 (5.23) ***	
Train	-0.613 (0.51)	-1.120 (1.37)	-1.645 (1.51)	-1.619 (1.81) *	-1.173 (1.15)	
Main Seaport & Train	-1.084 (0.90)	-3.174 (3.04) ***	-2.752 (2.33) **	-3.876 (3.94) ***	-2.092 (1.64) *	
ForceMajeure	-0.060 (0.70)	-0.115 (1.53)	-0.083 (1.14)	-0.094 (1.33)	-0.124 (1.79) *	
<i>lnTourismExp</i>	0.099 (1.79) *	0.085 (1.63)	0.097 (1.79) *	0.129 (2.63) ***	0.107 (2.07) **	H8
Accom	0.001 (2.96) ***		0.001 (2.61) ***			H5
Inter. Airport		-0.261 (0.41)		-0.503 (0.75)		
Hajj Airport		-0.181 (0.26)		-0.338 (0.48)		
Govt. Priority Airport		2.199 (1.94) *		1.984 (1.88) *		
<i>lnWorkers</i>		0.590 (2.91) ***			0.506 (2.28) **	H3
<i>lnHHCapExp</i>			0.837 (1.97) **	0.801 (2.35) **		H1
β_0	13.609 (5.05) ***	9.796 (3.37) ***	-1.943 (0.34)	-2.159 (0.48)	4.003 (1.91)	
<i>N</i>	193	193	193	193	193	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

dependent variable : *lnPassengers*

Table 6: Regression Analysis Results (Passenger) using Tourism Expenditure as GovtInv function

However, *lnPoorPop* as a proxy for the economic condition just being significant in the second regression when we take airport category into account in the model. The result met the expectation of the hypothesis: better economic situation can push the volume of passengers. For the interpretation, we can understand that when the population of people who live below poverty line increase by one-percent, then the volume of travellers will decrease by 0.51%.

The third and fourth regression were done using *lnHHCapExp* as a substitute proxy for the economic shape, while in the last regression we try to discover the effect of volume of service workers without controlling the economic condition variable. According to the result on the third regression, one percent increase in average household per capita expenditure can push the volume of passengers by 0.83% higher. The other variables such as *Accom*, which shows us how many hotel unit per province, also positively affecting the dependent variable: For every new hotel opening in the province, the volume of passengers grow 0.1%.

It is important to note that also all control variables show the right signs as expected, such as the *OtherTransport* dummy including *Train* and *Main Seaport & Train* that are negatively affecting the dependent. These results are plausible to explain since they are competitors to airlines industry.

Variable	EcoCond function using <i>lnPoorPop</i>			EcoCond function using <i>lnHHCapExp</i>		Hypothesis
	6	7	8	9	10	
<i>lnPoorPop</i>	-0.353 (1.70)*	-0.298 (1.55)	-0.457 (2.79)***			H1
Airports	2.265 (4.98)***	2.010 (4.82)***	1.947 (2.69)***	1.083 (2.01)**	1.766 (2.44)**	H6
CivilAviation- Act2009	0.406 (7.07)***	0.371 (6.52)***	0.279 (4.55)***	0.376 (6.33)***	0.364 (5.90)***	
Train	-0.058 (0.05)	-0.537 (0.47)	-1.025 (1.37)	-1.592 (1.55)	-1.350 (1.95)*	
Main Seaport & Train	-0.550 (0.42)	-1.073 (0.90)	-3.122 (3.16)***	-2.788 (2.37)**	-3.519 (3.79)***	
ForceMajeure	-0.077 (0.86)	-0.061 (0.67)	-0.112 (1.49)	-0.083 (1.07)	-0.114 (1.60)*	
<i>lnInfraExp</i>	0.086	0.074	0.062	0.072	0.084	H8

	(1.81)*	(1.56)	(1.37)	(1.76)*	(1.92)*	
Accom		0.001 (4.08)***		0.001 (2.96)***		H5
Inter. Airport			-0.296 (0.47)		-0.430 (0.70)	
Hajj Airport			-0.248 (0.36)		-0.343 (0.51)	
Govt. Priority Airport			2.170 (2.01)**		2.083 (2.04)**	
InWorkers			0.547 (3.55)***		0.455 (2.76)***	H3
InHHCapExp				0.876 (2.16)**		H1
_cons	14.277 (3.99)***	13.849 (4.13)***	10.000 (2.95)***	-2.156 (0.35)	4.830 (2.24)**	
N	208	208	208	208	208	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

dependent variable: *InPassengers*

Table 7: Regression Analysis Results (Passenger) using Infrastructure Expenditure as GovtInv function

In Table 7, we similarly repeat the regression structure that provided in Table 6 by still using *InPassengers* as the dependent variable. The differences located on different variable that we use for *GovtInv* function: instead of using *InTourismExp*, we now use *InInfraExp*. Based on our arguments in hypothesis section, we think that government expenditure has positive relationship to the dependent variables. Overall, both variables have met the expected results. Arguably, *InInfraExp* is less strong in affecting the volume of passengers compared to *InTourismExp* since the first has a lower average of coefficient and less significance level rather than the latest. The best achievement of infrastructure expenditure lying on sixth regression: when infrastructure expenditure by the provincial government increase by one-percent, then the volume of passengers will rise 0.09% higher.

According to ten different combinations of regression provided in Table 6 and Table 7, we can say that all variables were performing, more or less, as well as the first five regressions: adequate significance level with expected sign.

The results of analysis using cargo as dependent variables elaborated in Table 8. Before jump into the interpretation, it is important to note that using a similar approach; this analysis is

more limited than the previous. In this analysis, household per capital expenditure is the only proxy for the economic condition since there is no significant level gained while using *InPoor-Pop*. One percent increase in average household per capita expenditure in one province will increase the total amount of cargo carried by 0.86%. Regardless the fact that *InHHCapExp* only can obtain a ten-percent level of significance level, this result met expectation.

Variable	1	2	Hypothesis
<i>InHHCapExp</i>	0.857 (1.72)*		H2
Airports	2.202 (3.30)***	2.712 (2.75)***	H7
CivilAviationAct2009	0.085 (0.82)	0.014 (0.12)	
Train	-2.728 (1.55)	-3.061 (2.37)**	
Main Seaport & Train	-3.005 (1.74)*	-4.674 (2.99)***	
ForceMajeure	-0.047 (0.52)	-0.063 (0.72)	
<i>InInfraExp</i>	0.228 (1.87)*	0.239 (1.84)*	H9
Inter. Airport		-0.417 (0.45)	
Hajj Airport		-0.699 (0.69)	
Govt. Priority Airport		2.479 (1.42)	
<i>InWorkers</i>		0.541 (3.37)***	H4
_cons	-4.676 (0.50)	1.044 (0.23)	
<i>N</i>	210	210	

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

dependent variable: *InCargo*

Table 8: Regression Analysis Results (Cargo)

More than that, we also can only use *InInfraExp* as a proxy of government expenditure function since it is hard to theoretically relate cargo operational with tourism function. Infrastructure expenditure is significant due to first and second regression. According to the second, when infrastructure expenditure by the provincial government increase by one percent, it

creates 0.24% increase on volume of cargo-freight carried by air. To increase the scope of analysis, it is also possible to argue that infrastructure spending by the government may take more time before can effectively affect the economy. Hence, we also try to use a year lag of *lnInfraExp*. The result went significant while several variables are also losing its significance level. Therefore, we did not consider to put that model here since it does not provide a stable result.

Similar to the passenger-side model results, the cargo-side model also prove that airport and service-industry workers are both have a positive relationship with volume or air cargo. From the second model, we can interpret that every new airport can bring 271.2% increase of air cargo volume while a percent increase on total employee working on service sectors will bring 0.54% increase in the volume of air cargo.

Interestingly, several strong control variables that used to be significant in passengers-side regression has now lost its significance such as *CivilAviationAct2009* and *Govt.PriorityAirport*. However, all the sign has still met the expectation. Possible insights to explain these is because Indonesian government seems wasn't put focus to improve air cargo performance with the implementation of Civil Aviation Act in 2009. The fact that government priority airport also didn't significant has strengthened the possible explanation for the results.

5. Conclusion

5.1 Conclusion

It is clear that commercial operation in air transport industry has brought more benefit to the overall economy rather than the military operation. With the natural condition of having a premium price compared to their main competitors such as train and seaport, it is important for air transport management to make sure that everyone can afford their fare to maintain their demand. Better economic condition, whether it explained by less poor population or larger average level of consumption per capital, are helping the air transportation to grow and run the economy within the industry.

The significant results that have been explained in Section 4 also have revealed that this industry is not only affected by economic condition but also policy and government spending. Provincial government authorities can actively contribute to the particular industry with their own budget spending after fiscal decentralization policy in 1999. With different characteristics and budget, those provincial governments can aim their own focus in spending a good investment, whether it is into the infrastructure or tourism function. More than that, quantity of accommodation also has attracted more people to visit Indonesia especially international tourist which looking for good resorts that can provide complete experience²⁸. Those explained above be classified as a significant catalytic impact of air transportation to the economy.

With all explanation and results that have been gained from previous sections and analysis, the catalytic effect seems have more power to affect Indonesia economy compared to the other. Several infrastructure and industries successfully growing as huge contributors to the economic performance of Indonesia after improvements in air transportation industry. Speed and delivery service to the remote areas, which is still common in Indonesia, are two of the main reasons to use air cargo. Hence, this can be a trigger to everyone to establish supply

²⁸ For example, Nihiwatu Resort in Nusa Tenggara Timur, Indonesia was the first hotel in the world according to Travel + Leisure magazine in 2016. This achievement interestingly used by one of airlines company from Australia, Qantas, to promote their business through Facebook. Details on Appendix I.

chain link and improve tourism sector in many areas which can help Indonesia to achieve greater economy.

However, performance might be stagnant without real investment spending from the government and adequate policy. As we can understand, air cargo performance was not affected much after 2009 because Civil Aviation Act 2009 wasn't made to improve the air cargo performance.

Results also suggest that different standard and facilities over infrastructure such as airport can bring different impact to overall passengers and cargo performance. With this, we can understand that having an airport might be not enough: The airport need to meet some standard or be the priority airport to can be a good catalyst for the economy. However, it is also understandable that having too many good standard quality of airport within the same area to some extent might 'steal' consumers between can create an almost zero-sum game if we assume there is no effect from job creation on the service industry.

5.2 Policy Proposition

With 298 airport infrastructure in total, only less than thirty that operates in a proper business manner under Indonesian state-owned enterprises. This study shows that increasing amount of airport infrastructure under the management of state-owned enterprise significantly boost industry performance. With the fact that Indonesia also nowadays focus on the tourism industry, re-assigning and re-developing several airports to be managed by state-owned companies might enlarge the chance to sustainably improve the economy. However, this recommendation should only be brought into consideration after demand planning and financial performance analysis. A wrong decision might cost the government too much subsidy and burdening their revenue.

5.3 Limitation and Recommendation for Further Research

Directly, this study has successfully brought extensive knowledge about air cargo performance in Indonesia due to the limitation on Darmawan (2012). However, it might be interesting to add accommodation variable on cargo-side analysis, such as the amount of warehouses

which can bring more insights about factors that affect air cargo performance. Another limitation is the incompleteness data of Kalimantan Utara province, which probably will be solved automatically in the future.

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Appendix

Appendix I: Qantas Video Promotion About Nihiwatu Resort

