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The Effect of Air Transport to Economic Development in Indonesia

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Abstract

Air transport in Indonesia shows exponential growth over the last decade. The geographical condition as an archipelago country has made air travel the most popular way of transport. Thus leads the government to put a lot of expectation to air transport industry as the engine of economic growth. This paper analyzed the effect of air transport to the economic development which is represented by the industry sectors. The interaction between air transport and economic development has been said to be a two-way mutual benefit relationship. Thus, first this study examines which industry sectors have effect on air transport, which then will shed a light on how air transport effects economic development.

The analysis of the data was based on Indonesia's annual data, retrieved in 2012. The Bardsen transformation proved that only tourism sector has a significant effect on air transport, while other sectors did not. Indonesia being a tourism oriented country, air transport would most likely affect economic development by providing a platform for tourism sector to grow.

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Table of Contents

1 Introduction

As an archipelago country, Indonesia faces serious limitation in connecting the whole country. Over the last decade, air transport has become a reliable solution as a mean to connect each area and province. Nowadays, it is the cheapest and fastest way to travel all around Indonesia. The air transport liberalization in 2004 has doubled the number of air passenger from 12 million in 2003 to 26 million in 2004 (World Bank, 2012).

Acknowledging the large potential of air transport users, Indonesian government is trying to accommodate the air transport growth by rebuilding its Infrastructure. Currently, Indonesian government is trying to rebuild its air transport industry by building new airports throughout the archipelago and renovate their major airports to increase their capacity. As a tourism-oriented country, Indonesia's tourism sector is seen as the main contributor to the economic development. It is currently the second largest contributor to the national account of total Gross Domestic Product (Bank of Indonesia, 2011).

Various studies (e.g. Ivanov & Webster, 2006; Brida et al., 2011) have found that tourism does have an impact to Gross Domestic Product (GDP), as the common measurement for the economic growth. Therefore, the Indonesian strategy to stimulate tourism sectors by developing better air transport industry could indeed increase the economic development. However, it is necessary to understand how and in what way air transport may have impact to the development of economy in Indonesia. Such understanding might assist government in determining policy strategy in air transport as well as tourism and air transport infrastructure development.

Numerous studies have been conducted to find the relationship between air transport and economic development (Ishutkina & Hansman, 2008; Britton et al., 2005). Moreover, there are other studies that focused their research on the impact of air transport to tourism industry (Bieger & Wittmer, 2006; Konecnik, 2002). However, little has been done on finding how air transport impacts economic development in a country that depends greatly on their tourism aspect. Such study will give a better

picture of how air transport impacts economic growth, more specifically to learn which industry influenced most by it.

This study will focus on air transport and economic growth in Indonesia. Based on the facts and problems elaborated above, this study is conducted to answer the following questions*: How does air transport impacts the economic development in Indonesia? And could government stimulate growth in air transport?* Thus we hypothesize that Air Transport could facilitates economic growth in Indonesia by being a platform for Indonesian tourism sector and Government policy is important to stimulate growth in air transport.

Finding the effect of air transport in economic development in the tourism-oriented country will be based on Indonesian annual data retrieved in 2012 from Indonesia's statistic center. For this matter, the annual data would be analyzed using Bardsen error correction model to find the contribution of industry sectors to air transport. Conducting this research would most likely give a better picture for Indonesian government, to make selective infrastructure development, which would enhance economic growth.

This study is organized as follows: section two will discuss previous research examining the relationship between air transport and economic development, section three will discuss the economic background of Indonesia as well as air transport industry in Indonesia, calculation of data using available method will be elaborated in section four, and lastly in section five conclusions of this study will be discussed.

2 Air Transport and Economic Development

In this study we will discuss the impact of air transport to the economic development. However, air transport could not grow without interaction with other industry sectors; this is due to its nature as a transportation mean rather than an industry that produces goods and services to the market. The market of air transport itself is the output of other industry sectors. Therefore, first, we will discuss the interaction of air transport with factors of economic development, and then we will specifically discuss the impact of air transport to tourism sector.

2.1.1 The Effect of Air transport and Economic Development

Various studies were conducted to find the correlation between air transport and economic development. They have found that air transport is positively correlated with economic development (Button & Taylor, 2000; Bowen, 2000; Kasarda & Green, 2005). The unique characteristic of air transport has differentiated itself from other modes of transport. The needs of society for fast, cheap, efficient and reliable mode of transport has made the role of air transport more crucial for the society nowadays (Ishutkina & Hansman, 2008). The society dependency to air transport is predicted to be even larger in the future. It is predicted that air transport in US alone will double in two decades[1]. From the economic point of view, the growth on air transport industry has created jobs opportunity in the aviation sector, and other spillover effect such as connecting people and goods to the new market. In return, the economy will provide capital and demand for air transport (Ishutkina & Hansman, 2008). Therefore, air transport certainly has an impact to the economic development through series of mutual relationship.

According to ATAG (2005), air transport industry contributes direct, indirect, and induced impact, to global GDP in 2004 approximately 2.2%. Moreover, ACARE[2] (2003) estimates that air transport contribute 2.6% of EU GDP. The reports imply that air transportation can contribute to the economic development through three ways, which is:

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[1] "FAA forecast fact sheet fiscal year 2011-2031", retrieved from www.faa.gov in 2012
[2] "The Economic impact of Air Transport on the European Economy", ACARE September 2003

- Direct impact, where air transport creates jobs opportunity on the aviation sectors, generate taxes pay to the government, and other output such as a mean for transporting peoples and goods.

- Indirect impact, where air transport provides jobs opportunity and output in the supply chain of the air transport industry, such as travel agents, catering services, airplane manufacturer, etc.

- Induced impact, in where air transport has created the series of new economic activity in the region, to fulfill the demand for goods and services for those who works directly and indirectly in the aviation industry.

However, Britton et al., (2005) argued that besides the three ways mentioned above, there is what they called the catalytic impact of air transport, which is probably the largest impact air transport could contribute to the economic development. The catalytic impact itself by definition means *"The net economic effect (e.g. on employment, incomes, government finance etc.) resulting from the contribution of air transport to tourism and trade (demand-side effects) and the long run contribution to productivity and GDP of growth in air transport usage (the supply-side performance of the economy)"* (Britton et al, 2005). Therefore air transport could influence the performance of other industries.

According to the various studies mentioned above, it is clear that air transport is not the driver for economic growth, since its direct impact has been consider very little. However, another impact of air transport such as the catalytic impact, could affect the performance of other industries, which are contributing to the economic development. Hence air transport is acting more as a platform for other industry sectors to grow rather than the driver for the economic development.

2.1.2 The Composition of the Total National GDP

Since air transport may affect economic development by influencing its industry sectors, first it is important to understand which industry sectors are most likely to be influenced by the air transport. Therefore this section will discuss the composition of

national GDP, the impact of tourism sector to the GDP, and the relationship between those sectors and air transport.

Various industries are contributing to the national total GDP. World bank decomposes the total GDP into three categories of industry that are the following:

- Agriculture industry is an industry that produces output through various industries such as foresting, fishing, hunting, and any other industry that cultivates corps and livestock.
- Manufacturing industry consists of the sectors producing output through mining, manufacturing, construction, electricity, water and gas.
- Services Industry, contains industries that are producing output through wholesale and retail trade, transportation, communication, tourism (included as a sub category), and any other services such as government, finance, and business services.

However, the level of contribution of these sectors to GDP is different for each country. Some countries are industry reliant, where the economic development is dependent on the ability of its manufacturing industry to produce goods, like Japan and China. Other countries may rely on their business services and financial sectors like Hong Kong and Singapore. While some other depends on their tourism sectors as the main contributor to the economic development, such as Indonesia, Thailand, and Spain. Since this study is trying to find the impact of air transport to the economic development through tourism industry, the focus will be on the contribution of tourism industry to the GDP.

World Tourism Organization (2002) estimated that 693 million international tourists were traveling in 2001, and spent \$462 billion, or \$1.3 billion per day worldwide, which indicates the size of tourism industry worldwide. However, various studies have found mix results on the relationship between tourism and GDP. One study found that they are negatively correlated (Oh, 2005), while some others found that tourism did contribute significantly to the GDP (Ivanov & Webster, 2006; Balaguer & Cantavella-Jorda, 2002). The different results indicated that there are various factors

that attributes to the impact of tourism to GDP. Since tourism industry is different compared to any other industry, in a way that it is more of an activity that take place over series of industry sectors (including trade, accommodation, restaurant, and transportation), measuring the impact of tourism to economic development is a very complex matter (Brida et al., 2011).

The study conducted by Brida et al. (2011) suggested that the biggest impact of tourism to the GDP is by altering the composition of economic activity. This means that in a tourism-oriented country, there are many industries designed to accommodate the incoming tourist. For example: building restaurant, hotel, providing rent car services, and the emergence of tourist and travel agents. Thus this series of industries is dependent on the incoming tourist as their market; the more tourists coming, the bigger these industries will become. Hence, since these industries were designed to cater tourists, they become dependent to them. This is different than countries who are non-reliant to the tourism industry sectors, as for those tourism sectors may act as side industry. The success story of tourism industry, should not be generalize. In order to have significant contribution from tourism sector, tourism should play a big role in the economic development. If a country really focuses on exploiting its tourism industry, then it could have bigger contribution to the economic development.

2.1.3 Air Transport and Tourism

Meanwhile, to understand how air transport could relate to the sectors industry, one should understand the type of passengers related to each sectors. According to Ishutkina and Hansman (2008), there are four types of air transport users:

- Business passenger, are those with a motivation to travel because of economic reasons, such as reaching new markets, selling its product, building new factories; which enables the movement of capital and labor. Therefore, the industry which likely to be affected by these types of passenger movements are business and service sectors.

- Personal business passenger have the motivation to travel is for personal reasons, such as visiting friends and relatives, receiving medication treatments

from other city or country, and studying abroad. These purposes do not have any direct impact to any industry sectors. However, Ishutkina and Hansman (2008) also included personal investment such as opening new business in the foreign country in this sub category. These particular kinds of travelers may affect the business sector.

- Leisure passengers, who are travelling with the purpose to reach their tourist destinations, this type of passengers is affecting the tourism industry.
- Air Cargo, which is quite different with the previous three mentioned above. Instead of transporting air passengers, this type of air transport transports high value goods. The industry that is affected by air cargo is likely to be manufacturing, agriculture, and trade industry.

Since, each country has their own characteristics, it is important that air transport industry in a country, is able to serve the air transport user that represent the biggest contributor to the national economic development in that country. The ability of air transport to accommodate such users will influence the level of impact air transport has on economic development. For example, if a country is reliant on exporting its high value products, the country itself should developed better platform to promote its air cargo industry. Such government policy is important to make sure that the air transport development is in line with the economic development strategy, because only then can the impact of air transport to the economic development reach its maximum potential

Air transport itself is an important factor for tourism. As a mean of transportation, it provides the most efficient way of travel. Its ability to reach long destination in relatively short time with cheap price, has made it the most favorite mean of transport to the tourism destination. In some countries it constitutes up to 100% of tourist share coming by air transport (Bieger & Wittmer, 2006).

The relationship between air transport and tourism industry sectors has been the case for debate. Various studies show that transportation and tourism industry are significantly correlated (Chew, 2000; Hall, 1991; Inskep, 1991). However little is known on how air transport and tourism industry interacts. Freyer (1993) for example,

argued that transportation is part of the tourism activity, and air transport is only a mean for transporting tourist from its origin to their leisure destination, hence the growth of air transport is dependent on the growth of tourism industry. On the contrary, later study conducted by Bieger and Wittmer (2006) found that the relationship between air transport and tourism development is more sophisticated than just as a mean of transport. Air transport and tourism are actually interacting in a two-way relation, while tourism may be the driver for the new airlines services, air transport may be contributing in opening new routes and new markets. The introduction of long-range airplane could enable long-haul excursion.

The introduction of LCC for example, since the nature of LCC is to offer low fare cost by avoiding direct competition with incumbent and full service carrier on the major route, their strategy is to serve unpopular tourist destination, or even sometimes it opens a new tourist destination, allowing new market segment, and budget travelers to emerged.

This has been the case for Pisa, Italy, where the low fare carrier has increase the tourist flow coming to Pisa and helps revitalize the local tourism industry (Signorini et al., 2002). Another study conducted by Prideaux (1999) highlighted the importance of having access to air transport for tourist destinations because without air transport, the market will be highly restricted to road and sea transport which is not the common mean of transport to tourist destination. He also argues that air transport is holding a key role in opening new market, especially those that are located in a further distance.

Therefore, it is safe to say that there is change of role in the relationship between air transport and tourism, the invention of new technology such as long-range aircraft and better fuel efficiency aircraft, has enable airlines to innovate by providing new services, which allows new type of costumers to emerge. Budget travelers for example, which have benefits not only on the airlines, but also for the destination, as it gain more popularity by the incoming tourist flow. In some cases, airlines even help to promote the underexposed tourist destination in order to increase their traffic, which eventually increase their income. Hence, the first hypothesis for this study is that air transport would facilitate economic growth in Indonesia by being a platform for Indonesian tourism sector.

2.1.4 The Role of the Government

Since the air transport acts like a platform for economic development, in order for air transport to have significant impact to economic development, government intervention is needed to synchronize the development of both economic development and air transport industry. From the point of view of economic development, government could stimulate growth through regulations, free trade policy, and trade agreement with partner countries. While from the side of air transport, government could stimulate it through regulation, infrastructure development and incentive that is in favor with the economic development policy (Ishutkina and Hansman, 2008). Hence, the growth on economic development could be accommodated by air transport.

The case of liberalization agreement between Caribbean countries and U.S. could be the example of the government policy on air transport that is linear with the economic development strategy. In which Caribbean countries depend on its tourism industry and liberalization in air transport successfully increase the air traffic inflow from US to the Caribbean island countries (Warnock-Smith & Morrell, 2008).

Even though Government policy could certainly influenced the growth on air transport, like any other industries, growth on air transport could not happen indefinitely. There is some point where the industries become mature and constrained by many factors, thus become stagnant. According to S-growth theory (Sterman, 2000), there are three phase of growth, namely development phase, growth phase, and maturity phase. When a government issues policy to stimulate growth in air transport such as liberalization, air transport will grow significantly as they continue to expand their market by opening new destination and increasing the seat capacity on their existing route. Hence they will be able to serve more air passenger that will increase the traffic for air passengers. However, at some point, the air transport growth will be limited by the availability of supporting infrastructure such as airports. This is where government intervention is needed, to provide sufficient infrastructure like airport, so that air transport could accommodate the growth of economic development.

Therefore, it is expected that government policy would hold an important role in stimulating growth in air transport.

3   Indonesia

3.1   Indonesia Economic Background

With 13.000 islands scattered throughout the country, Indonesia is currently the biggest archipelago country in the world. It is also the fourth most populated country in the world after China, India, and United States of America (World Bank, 2012).

Figure 1: Maps of Indonesia

(Source: maps.google.com)

After struck by Asian economic crisis in 1998, the economy of Indonesia has performed well with steady growth in the last decade, posted 6.1% growth in 2011 and expected to increase by 6.4% in 2013 (World Bank, 2012). It is even one of the small groups of countries in the world that enjoys steady economic growth during the world economic crisis in 2008.

Indonesia's economic is relying on manufacture, mining & energy industry, as well as services and tourism. The manufacturing industry is the major contributor to the national GDP with 25% contribution. Tourism sectors contribute 19% to total GDP which is the second biggest contributor to the total GDP. However, as could be seen in figure 2, agriculture industry is still the biggest employer of the total population with 39 million workers, which is 35% of the total population. Tourism sector is the second largest employer with 23 million workers, or attribute to 21% of the total population.

Figure 2: The composition of workforce from industry sectors
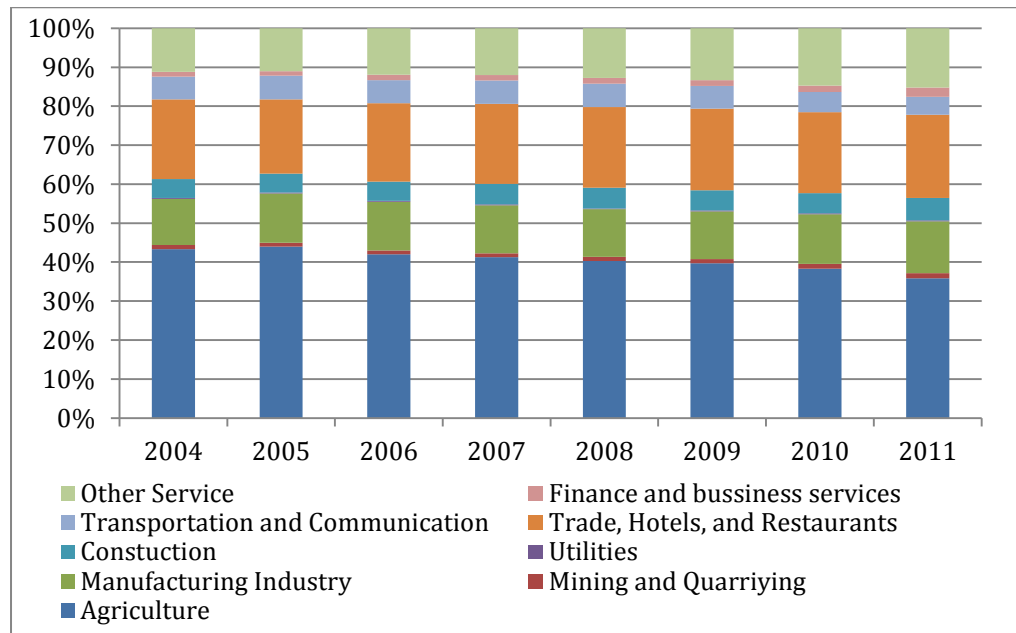
3.1.1 Air Transport on the economy

Fast growing GDP over the last decade, has increased the needs of Indonesian citizens to be mobile and to be able to reach their destination as fast as it possible. Geographical condition and the increasing welfare have made air transport more affordable, and became the number one preference mode of transport.

The relationship between air transport industry and GDP of Indonesia is positively correlated. As presented in figure 3, the number of air passenger in the period 1992-2010 is very much affected by the GDP growth. During the economic crisis in 1997, GDP of Indonesia fell to 4.7% and show negative growth of 13% in 1998. It is though, not until 1999 the air passenger number fell significantly, count to only 8 million from 17 million in 1996. However, it is possible that during the economic crisis in 1998, air transport was not the only industry that affected by the crisis, but also other industries as the economic crisis in 1998 was so severe that the GDP could fell drastically.

Figure 3: Comparison between air transport passenger carried and GDP growth
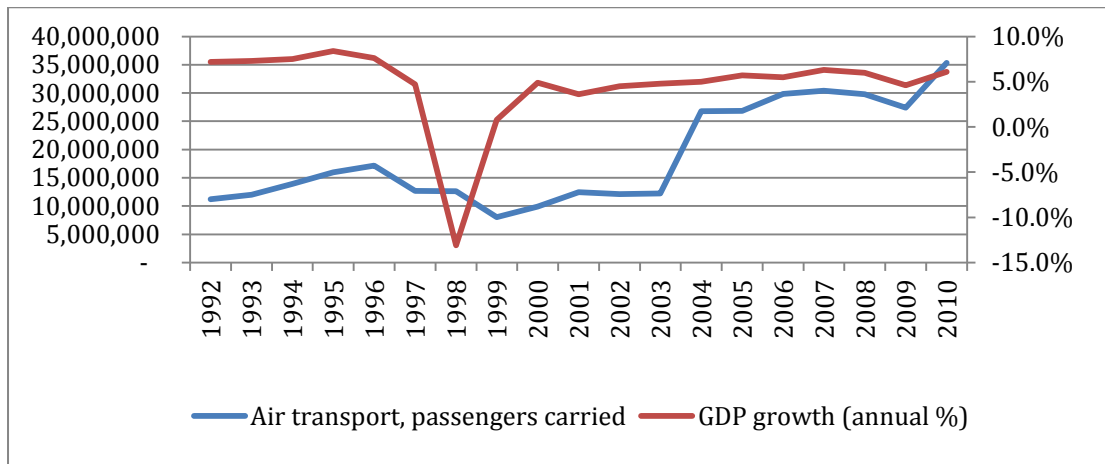
Source: World Bank (2012)

The event of global economic recession in 2008 could be used to give more perspective on the relation of GDP and air transport. A better economic platform and fast growing air transport industry could be the reason why the GDP and air passenger could bounce back immediately after the economic recession in 2008.

The two events show us that air transport and GDP is related, but air transport industry is the same as any other industry that would have a negative impact if the GDP fell. To acquire a better understanding on the relationship, we need to examine to what extent air transport is accountable to GDP.

Figure 4: The composition of Indonesia GDP
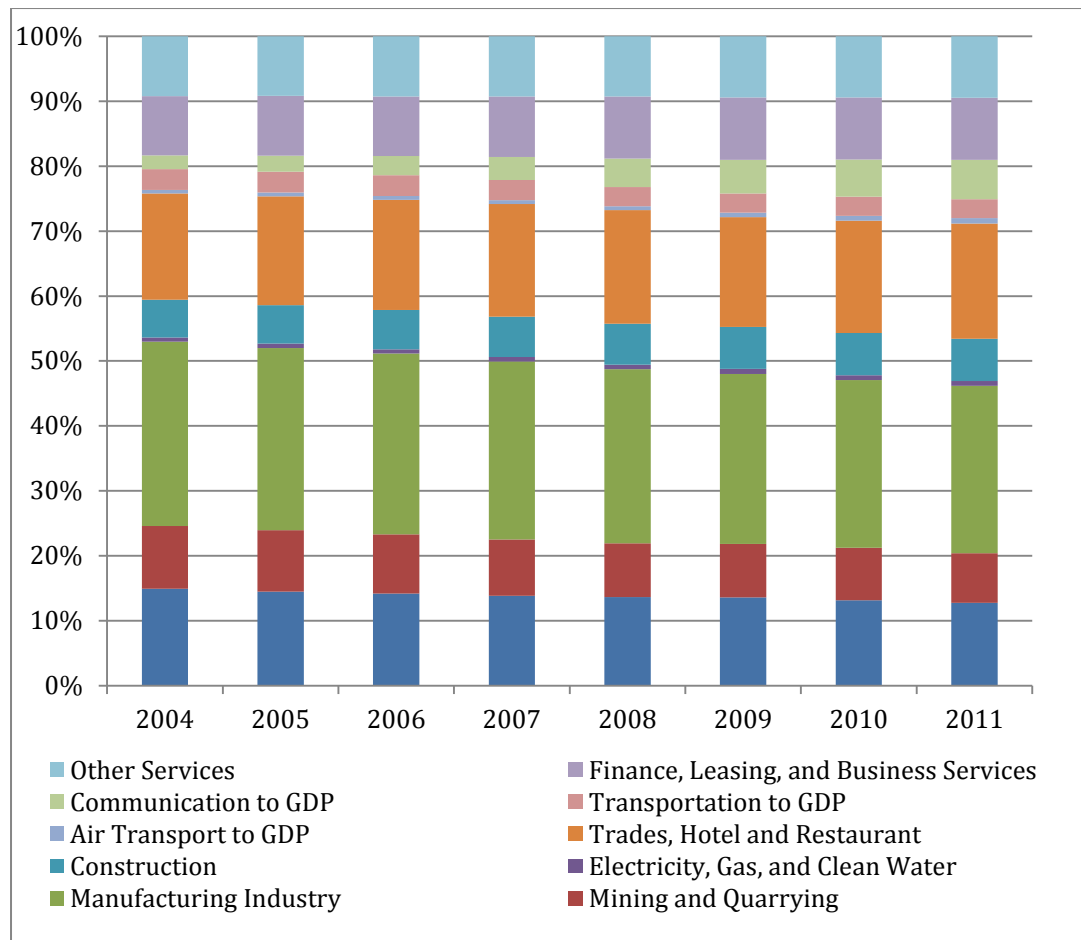
As shown in the figure 4 above, the contribution of Indonesia's transport industry to the total GDP is not as large as previously assumed; less than 4% of the total GDP (source: Bank of Indonesia, 2011). Air transport has a lower contribution, with approximately 1% of the total GDP. However, with an increase of welfare in the period of 2004-2011, the demand for air transport also increases, proven by the growth in the contribution of air transport to the total of GDP with a value of 11%. This growth rate was relatively higher compared to the contribution of other industry sector. Hence, it can be said that in the future, air transport has a potential in contributing more to GDP than other industry sectors[3].

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[3] Source: World Bank, 2012 (See Appendix 2)

Realizing the potential of air transport in Indonesia, Indonesian government issued air transport anti-monopoly act in 2004 or commonly known as liberalization, that liberate airline industry from hefty government regulation. The new regulation, no longer limit the number of airlines serve on the domestic route, and the number of route allow to serve by an airline. The only remaining constraint is the capacity of the airport. The story was different before the liberalization. During the 90's, Indonesia's air transport industry was constrained by the hefty government regulations that limit the number of airlines, route, and air transport fare. Back then, air transport growth rate is limited by the government regulation. The impact of air transport liberalization could be felt immediately, with the increase of air passenger double almost twice in 2004 compare to 2003[4]

3.1.2 Air Transport and Tourism

As an archipelago country, the Indonesian geographic landscape consist of thousands island scattered throughout the country (figure 1). The fastest, easiest, efficient, and in the last couple of years also become the cheapest transportation mode, is by air transport. Indonesian geographic condition and lack of infrastructure on other mode of transport, has made it difficult for tourist to reach their destination other than by air travel.

These appealing factors of air transport along with the lack of other means of transportation infrastructure in Indonesia has limiting both domestic and International tourist to only use air transport as their main transportation to travel to and across the country. In fact, all of foreign tourist come to Indonesia by air transport[5]. If we look at the number of tourist coming to Indonesia in 2010, which is 7 million, while the international air transport passenger in the same year is 9 million, and if we assume that air transport passenger consist of two types, one is on leisure purpose and the other one is on business purposes, we could roughly count that from total air transport passengers come to Indonesia in 2010, 78% of it were on leisure purpose. It shows how significant air transport is for Indonesia's tourism sector, and how dependent

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[4] Source: World Bank, 2012 (See Figure 3)
[5] Source: Ministry of Cultural and Tourism, 2012

tourism sector to air transport. In other word, most of the consumers of tourism sector are actually the consumers of air transport.

Figure 5: Air Passenger and International Tourist Growth

Description	2003	2004	2005	2006	2007	2008	2009	2010
Air Passenger Arrival	4,214,278	5,380,779	5,812,458	5,748,730	6,552,583	7,303,343	8,068,039	9,559,458
Air Passenger Departure	4,281,049	5,359,675	5,744,631	5,672,214	6,581,348	7,297,757	8,016,229	9,465,611
International Tourist Arrival	4,467,000	5,321,000	5,002,000	4,871,000	5,506,000	6,234,000	6,324,000	7,003,000
International Tourist Departure	3,478,000	3,941,000	4,106,000	4,967,000	5,158,000	5,486,000	5,053,000	6,235,000

Source: Compile from Statistic Indonesia & World Bank, 2012

3.1.3   Tourism Sector on National development

Indonesia in the 70's fueled its economic development through its natural resources exploitation, back then it was expected that exporting its natural resources would generate income to build public infrastructure and prepare the nation to industrialization country. Among other things, one of the exploitation of natural resources was at tourism sector. In the early 90's, international tourist come to Indonesia contribute up to 10% of the total national export commodity, it was then until the economic recession hit Indonesia in 1998 the number fell to 7% and eventually fell to just 4-5% after the event Bali bombing struck Indonesia in 2002, the number then never recovered[6]. However, it does not mean that the contribution of tourism sector became less than before. Tourism industry is still among the top 5 of Indonesia's total national income, just since 2006 has the number of other export product such as crude palm oil has rise significantly (source: Ministry of Cultural and Tourism).

The indirect contribution of tourism industry is probably bigger than its direct impact. According to Ministry of cultural and tourism, the multiplier effect generate from the tourism industry is large and most beneficial to the national economic development. Still according to the ministry, the number of investment in the tourism infrastructure has increased more than two times in 2010 from 2006. It is expected through the

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[6] Source: Indonesia Ministry of Culture and Tourism, 2012 (see appendix 3)

investment in infrastructure it will create more jobs, generate taxes, and income to the local state. On the other hand, the government budget in tourism promotion also increased in order to generate more demand.

3.2 Indonesian Framework on Air transport infrastructure development

3.2.1 Direct and Indirect impact

Ministry of transport predicted that during 2010—2014 period Indonesia will serve 78 million domestic passengers or an increase of almost 10% annually, and 38 million international passengers or 12.3% growth annually (Ministry of Transportation, 2005[7]). The high numbers prediction was due to several factors, which among other things are Indonesian economic growth, free trade, ASEAN open sky policy, and investment in the ASEAN region. The economic growth in Indonesia allows middle class citizens to afford air travel for their business purposes and tourism, while the free trade and the fast growing ASEAN region push the demand for international passengers. While we can see those factors contribute on generating the demand side of air transport, ASEAN open sky policy could be seen as the growth incentive from the supply side. Therefore, Indonesian government see the potential of air transport in contributing to the national economic growth, even though it is still unclear which are the determinant factor. Indonesian government learned the correlation between the two, as Indonesian Air transport industry suffered heavily from the economic crisis in 1998, and immediate resurrect in 2001 which shown by the steady passengers growth ever since until now, as Indonesian economy also began to recover at the same time.

Unfortunately, the demand growth was not followed by the growth of supply in the infrastructure side, both in airport infrastructure and navigation system. Jakarta International Airport for example, as the main airport and the biggest in the country, served 52 million passengers and listed as 12th busiest airport in the world in 2011 (Airports Council International, 2012). The number is staggering considering the airports were only designed to accommodate 19 million passengers annually. The condition of Jakarta airports is the portrait of almost every airports in Indonesia, and the result are low service quality, bottleneck on the airway, and long delay almost on every route.

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[7] Source: *The blue print of air transport 2005-2024*, Ministry of Transportation, 2005

Considering the circumstances, Indonesia want to revitalize its air transport industry so they could maximize the potential of air transport in economic development. In order to achieve that, the government will be investing more on air transport infrastructure, and at the same time will giving up its role as a service provider to be a full time regulator. It is hoped that by revitalize air transport industry, they could provide a better industry environment to achieve better service, better safety records, more efficient and able to accommodate the passengers growth as well as cargo growth. Ministry of transport argue that by achieve those and preparing the industry for open sky policy, they could allow more passengers movement and encourage people to travel domestically, especially to travel more to un-popular area, and increasing trade between domestic region, or in other words, to allow income distribution in Indonesian cities. Therefore, by the time open sky implemented in ASEAN, Indonesia will be better prepared domestically and able to maximize the potential trade and tourism industry growth should it happened (See Appendix 1).

3.2.2 Evaluation Framework

Underdeveloped transportation infrastructure in the last decade has made the priority of the infrastructure investment in the coming years to promote safety, efficiency, and to accommodate the explosion of air travelers in the country, for both domestic and international passenger [8]. Currently, Indonesia have many airports scattered throughout the archipelago, and these airport divided into two categories according to its role, distribution center, and non-distribution center, which distribution here mean a hub for the distribution of passenger, cargo, and baggage throughout the country.

The distribution center or hub airports as we called it, is a main hub airport which has role to collect, redistribution and connecting to other airport or any other mode of transportation. These types of airports are mostly International airports in Indonesia or major airports in Indonesia, and currently it become the main priority by the government to put more investment on this type of airport, since according to its role to distribute passengers and goods between cities in Indonesia as well as connecting to the other countries, any kind of inefficiencies in the airports could lead bottleneck

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[8] Source: *The blue print of air transport 2005-2024*, Ministry of Transportation, 2005

of airways that will have impact on the whole air transport network, as it already happened today.

Meanwhile, the non-distribution airport main role is to open new place, the rural area in Indonesia that hasn't been able to reach by other mode of transportation due to the difficult geographical condition, like remote islands or villages in the mountain.

3.2.3   Finance

As stated earlier, the ministry of transport main priority is to promote safety and efficiency, as well to accommodate the explosion of air travelers. In order to achieve that, Indonesian government will reduce its role from service provider and regulator to only act as a regulator; meanwhile it will leave the service provider sector to the private sector. Having said that, Indonesian government will still help fund the non-navigational air transport infrastructure such as airport during the transitional period, especially for the non-distribution center airports category.

According to ministry of transportation blue print (2005), the transitional period from service provider to be fully regulator will be done in three phases, this include the government role in funding the airport development. During the first phase (2004-2009) the development priority will be to accommodate the growing demand of air passengers, in this phase government will still help funding the infrastructure development by injecting initial capital to airports development, these though will only happened if the airports has steady growth in demand (10% in the last 5 years), with its contribution to the national passengers less than 0.11% or 50,000 passengers annually. In the second phase (2010-2014), the airport development funding will be funded by "hybrid" method with government and private sector will fund the project equally. In this period government will prioritize airport development according to the business plan and market analysis. Only on the third phase (2015-2024), government will let the private sector to fully provide air transport infrastructure according to market-demand analysis, in this phase, government will no longer fund the airports development.

4   Methodology

4.1   Data

Analysis will be based on the annual data of Indonesia spanning from 2000-2010. Due to lack of data available, panel data which includes data from Malaysia and Thailand is constructed to enhance robustness of this study. The decision to use of these three countries is because they are located in the same region and have similar characteristics, namely they have a big tourism industry, they see the tourism industry as a big contributor to the national economic development, have a solid production output and a stable economic growth.

To analyze the effect of air transport and economic development, we have to determine a model with air passengers and the value of industries presented on the national account such as agriculture, manufacturing, mining, construction, trade and hotels, and utilities. Therefore, this model is written as the following,

$$Pax = f(Agr, Man, Min, Cons, trd\_htls, uti)$$

Where Pax is Air passenger, Agr is agriculture, Min is mining, Man is manufacturing, Cons is construction, trd_htls is trade and hotels, and Uti is utilities. Since the unit of measurements in the dependent and independent variables are different, where the unit of measurement for air passenger is unit passenger (person), while unit measurement for all the other variables is currency (in millions USD), it is necessary to transform the variable into its natural logarithm. Thus it will be easier to make interpretation based on the elasticity of the data.

Table 1: The Correlation test

Correlation Probability	LNAGR	LNCONS	LNMAN	LNMIN	LNTRD_HTLS	LNUTI
LNAGR	1.00					

LNCONS	0.97	1.00				
	0*	-----				
LNMAN	0.82	0.77	1.00			
	0*	0*	-----			
LNMIN	0.58	0.72	0.25	1.00		
	0*	0*	0.16	-----		
LNTRD_HTLS	0.78	0.68	0.93	0.03	1.00	
	0*	0*	0*	0.86	-----	
LNUTI	-0.75	-0.77	-0.27	-0.80	-0.20	1.00
	0*	0*	0.14	0*	0.27	-----

Note: * significant at 10% significant level (p-value < 0.10)

The result in table 1 shows that all variables are correlated. However, since this study is trying to determine whether or not tourism industry have influences on air transport, it is necessary to focus on the relationship between *pax* and *trd_htls*. Hence, it would be easier to make an analysis if the other industries that have similar characteristics are merged into one variable. The variables of agr, man, min, and cons have similar characteristic, they represent manufacturing industry or industries that produce goods rather than services.

Therefore, we will combine those four variables into *pc1* variable using PCA (principle component analysis), a procedure that aims to extract a new linear variable from a set of observed variables. The function then, rewritten as follow:

$$lnpax = f(pc1, lntrd\_htls, lnuti)$$

4.1.1 Dependent Variable

As seen in the model above, *lnpax* is used as the dependent variable. Pax is the number of passenger movement both in domestic and international route. It is seen as a viable representation of air transport industry since the number of air passengers travelling by air symbolized the frequency usage of air transport. It has a different

point of view from airplane traffic. Here, it only shows the number of airplanes commuting; either it is a commercial plane, cargo, domestic, or international.

The data of air passenger is acquired from the bank data provided by the World Bank website, using the measurement method commonly used by the World Bank, therefore the validity of the data is reliable and can be utilized as representation of air transport industry.

4.1.2 Independent Variable

The independent variables *pc1, lntrd_htls*, and *lnuti* are collected from the annual National account report published in 2011 by the national data statistical center by each country. The unavailability of single data center covering South East Asia region such as Eurostat in Europe, has forced us to get the data of each countries on its own statistical data center. However, the data collection and measurement methodology is using the national account data guide book provided by the World Bank, therefore the validity of the data is reliable. The national account consists of the GDP contribution per sector industry on the constant price basis in its own currency, therefore we convert the currency to US$ to make it comparable between countries.

Pc1 is the combination of contribution from agriculture, manufacturing, mining, and construction industries to the GDP. These industries are the biggest contributors to the GDP and considered as the biggest employable sectors in Indonesia. However, it is unlikely that these sectors contribute much to air transport industry because the majority type of workers in these sectors is blue collar worker. Thus, the inclusion of these variables is important to find out the contribution from major industries in Indonesia to air transport industry.

lntrd_htls is the variable we use to measure the tourism industry. According to the Indonesia data statistic center (www.bps.go.id), the trade and hotels consist of all the income generated by the general trade, restaurant and hotel industries, which are the industry that depend on tourists, both domestic and international tourist. Hence, it is a good indicator to represent the tourism industry as opposed to other indicators such as

number of tourist arrival and hotel occupancy that do not represent the whole supply chain of tourism industry.

lnuti is the income generated by the utilities industry. This type of industry is not qualified to be merged into *pc1* due to its different characteristic. Utilities industry focuses more on providing services to the public needs, which is contrary to pc1 industry that focuses more on providing goods. In additions, it is considered as the lowest contributor to the GDP. However, the inclusion of this sector is necessary so that comparison between industries could be made.

Dind is a dummy variable that represents the event of 2004, where Indonesia liberalized its air transport industry.

4.2 Model

During this study, we will use the error correction model in which the model will feed back the long run equilibrium into short run dynamics so that long run relation tends to be maintained (Stock, 1987). Therefore, error correction model will enable us to find the dynamic relationship of the variables both in the long run and short run. Then, unit root test is performed to test the stationary of variables. The test using Augmented Dickey-Fuller shows mixed result of stationary series, the variable of *lntrd_htls* is stationary, while *lnpax, pc1,* and *lnuti* are non-stationary data.

Table 2: Augmented Dickey-Fuller unit root test

Variable	T-stat	Probabilty
lnpax	1.84656	0.9333
pc1	2.54862	0.863
lntrd_htls	10.714	0.0976*
lnuti	4.64967	0.5895

Note : * significant at 10% significant level (p-value < 0.10)

Since there are multiple results of unit-root test, where some variables are non-stationary and some stationary, we cannot use the general error correction model.

Instead, we use the transformation error correction model that is linear with general ADL model. A linear transformation of ADL called Bardsen error correction model is then used in the analysis since it is more suitable for estimating model that consists of both stationary and non-stationary data (Banerjee et.al, 1993).

First, we start with the general ADL model in which we set the number of appropriated lag at 1. The model can be written as follows,

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \beta_0 x_t + \beta_1 x_{t-i} + \varepsilon_t$$

Then, the general ADL model will be transformed into the Bardsen error correction model which can be written as follows,

$$\Delta y t = \alpha_0 + \alpha_1^* y_{t-1} + \beta_1^* \Delta x_t + \beta_2^* x_{t-1} + \varepsilon_t$$

The Bardsen error correction model is similar to autoregressive distributive lag model, which allows us not only to minimize the problem of collinear regression and reduce the risk of spurious regression due to the presence of non-stationary data, but also to simplify the calculation of long-term multiplier (De Boef, 2005). Therefore, the estimated regression function based on Bardsen error correction model can be written as:

$$\Delta lnpax = \alpha_0 + \Delta pc1 + \Delta lntrd_{htls} + \Delta lnuti + lnpax_{t-1} + pc1_{t-1} + lntrd\_htls_{t-1} + lnuti_{t-1} + \mu_1 \varepsilon_1$$

In the Bardsen error correction model, the long run coefficient, k_1, is calculated with,

$$k_1 = \frac{\beta_2^*}{\alpha_1^*} = \frac{(\beta_1 + \beta_0)}{(\alpha_1 - 1)}$$

4.3   Analysis

Before running the model, the fixed-effect specification is tested using Hausman method, which shows enough evidence against the Bardsen model[9] with random effect. The next step is calculating the residual variance. Assuming the presence of heteroskedasticity in the model's residual, we run the GLS specification test with the cross-section panel corrected. Then, we check for autocorrelation using correlogram on the residual series. In the Bardsen model, the coefficient of the difference variable shows the short-run elasticity, while the lagged variables show the long-run elasticity. The result is as mentioned in table 3:

Table 3: The result of Bardsen Error Correction

Variable	Coefficient	Probability
Constant	11.46	0.01
$\Delta pc1$	-0.06	0.81
$\Delta lntrd\_htls$	1.18	0.01*
$\Delta lnuti$	-0.28	0.61
$lnpax_{t-1}$	-1.08	0.00
$pc1_{t-1}$	0.04	0.80
$lntrd\_htls_{t-1}$	0.86	0.01*
$lnuti_{t-1}$	-0.28	0.43
dind	0.73	0.00*
R2	0.91	

Note : * significant at 10% significant level (p-value < 0.10)

The Bardsen test indicates a significant effect of tourism sectors (lntrd_htls) on air transport in short-run, which coefficient shows a value of 1.18. It means that when trd_htls increase by 1%, the lnpax will increase by 1.18%. The result shows that tourism is influencing the growth of air transport, which is expected as travelers being highly dependent on air travel. As explained in the previous chapter, tourism sector is one of the biggest contributors to the Indonesia national GDP. Therefore, the increasing welfare on tourism sectors will likely affect the total national economic

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[9] See Appendix 4

development. Hence it will enable more people to travel by air due to the increase of needs to travel fast while in the same time, air travel becomes more affordable.

The tourism effect in the short run could also be explained based on the argumentation of Brida et al. (2011), who argues that tourism sector is actually a series of economic activity that happened in one place. Hence, as a tourism-oriented country where tourism industry plays a big role in its economic development, Indonesia is full of economic activities that relying its existence on the incoming tourist. Therefore, in order to maintain steady growth, the economic activities that rely on tourism sector will continue to improve their capacity to accommodate incoming tourist. Therefore, the expanding tourism sector will drive the number of incoming tourist, which will increase the demand for air transport as well.

The *pc1* which represents manufacturing and agriculture industry did not show significance effect in both short-run and long run. It may be due to the majority of the employee on this sector is a blue collar worker. Since in Indonesia, the labor cost is considered among the lowest in the region, the increasing welfare of labor is not significant enough to change their preference of transportation modes, which mainly are land transportations like busses and trains, or sea transport. Those two transportation modes are still considered the cheapest mode of transport. Moreover, it is unlikely that labors in Indonesia need air travel, since travel time is not the big incentive to choose transportation mode.

However, the result may be different if air cargo is included as the dependent variable is in this study. Since the output of the agriculture and manufacturing sectors is in form of goods and product, it is likely that these industry sectors prefer to use air cargo rather than air passenger transport, especially if the output of manufacturing and agriculture industry are product with high values. Kasarda and Green (2005) emphasized the importance of efficiency in air cargo in order to enhance the economic development. This is because air cargo offers competitive advantage of transporting high value products in a fast matter of time.

The result of utilities industry (lnuti) also did not have significant effect to the air transport, both in short-run and long run. The number is expected because the

contribution of such industry to the national GDP is very low and this industry did not use the air transport as much as any other industry. Therefore, the result is reasonable.

For the long run effect, it could be calculated as follows,

$$k_1 = \frac{-0.86}{-1.08} = 0.79$$

The result above indicates that in the long run, tourism has a positive and significant effect on air transport. A 1% increase in tourism could increase air transport passenger by 0.79%. However, the effect of tourism in the long run, which value at 0.79, is less than the effect in the short run, which value is 1.18. One possible explanation for the less effect in the long run, is because air transport eventually become saturated, hence it will start to mature and the growth will diminish. This may support the argumentation of Ishutkina and Hansman (2008) about the limit of growth in air transport that already explained in the previous chapter.

The dummy variable, which corresponds to the liberalization of air transport that happened in 2004, shows a highly significant effect at 0.73 values. It means that since the liberalization in 2004, air transport industry growth level increase to 0.73%. The result proves that government intervention through policy could stimulate growth in air transport. In this case, liberalization that happened in Indonesia in 2004, has managed to double the number of air passenger from 12 million in 2003, to 26 million in 2004.

The sudden increase of air passenger from 12 million in 2003 to 26 million in 2004 indicates that there was already a big demand for air transport before the liberalization, but it was never materialized because before the liberalization, air transport industry is constrained by government regulation. It is not until the air transport liberalization in 2004, which eliminated the government hefty regulations; air transport industry could finally be able to serve the demand from industry sector for air transport.

5 Conclusion

The significant result of the contribution of tourism sectors to the air transport industry has revealed that there is a positive correlation between air transport and the economic development. However, air transport did not affect the entire industry sector; it could only affect industry that is most likely needing air transport.

The purpose of this study is to find the effect of air transport in Indonesia's economic development. The analysis of the data using Bardsen transformation model has found that tourism industry is the only industry that significantly affects air transport in the short and long run. This is due to the fact that the contribution of tourism sectors to the national total GDP is relatively high, while it is also the second largest industry sector that employs most of the worker in Indonesia. Thus tourism sectors could be seen as a viable representation of the national economic development.

With the national dependency to air transport due to geographical condition and lack other modes of transport, air transport could affect the economic development by being a platform for the tourism industry. Hence, hypotheses one is accepted, and it can be concluded that any constraint or inefficiency on air transportation industry, could limit the economic development of Indonesia.

The results also revealed that there is no contribution from other industries such as manufacturing, mining, agriculture, construction and utilities to the air transport. This is due to the fact that the majority of workers in these industries are blue collar worker, which is unlikely to be the users of air transport.

However, the event in Indonesia in 2004 has provided us some information. First it proved that the government influence in the air transport industry is very important to the development of the industry. In the case of Indonesia, the government policy intention to eliminate barrier in air transport industry to increase the traffic flow of air passenger, is in line with their economic development that promote the tourism industry. The Bardsen model analysis also showed that government policy has significant impact in stimulating air transport growth. Therefore, without the

intervention from the government, the contribution of air transport to the economic development will be limited, which supports the acceptance of hypothesis 2.

The event in 2004 also proved the contribution of air transport to GDP, though it did not contribute directly. Air transport provides a good platform for the tourism industry to grow which subsequently increase the national GDP, therefore any constraint or inefficiency on the air transportation sectors, could limit the economic development of the country.

5.1 Limitation

The limitation to this study is that it only measures the air transport industry using the number of air passengers. This has limited the scope of this research in understanding the effect of air transportation industry to the economic development. Adding air cargo as the representation of air transport industry might give a more detailed information by showing the impact of other industries such as PC-1 to the air transport.

5.2 Policy Recommendation

The exponential growth of air transport in the last decade has made the Indonesian government to put a lot of expectation in air transport to be the driver of national economic development. However, this study has indicated that air transport should not be seen as the core driver for economic development, rather as the platform that allowing economic development to grow. Hence, the focus of the development should be pointed at the industry sector itself.

In order for air transport to take effect to the economic development, air transport should be stimulate by adequate infrastructure and provided with the supporting government policy.

Appendix 1:

Indonesia Air Transport Development Framework

Appendix 2:
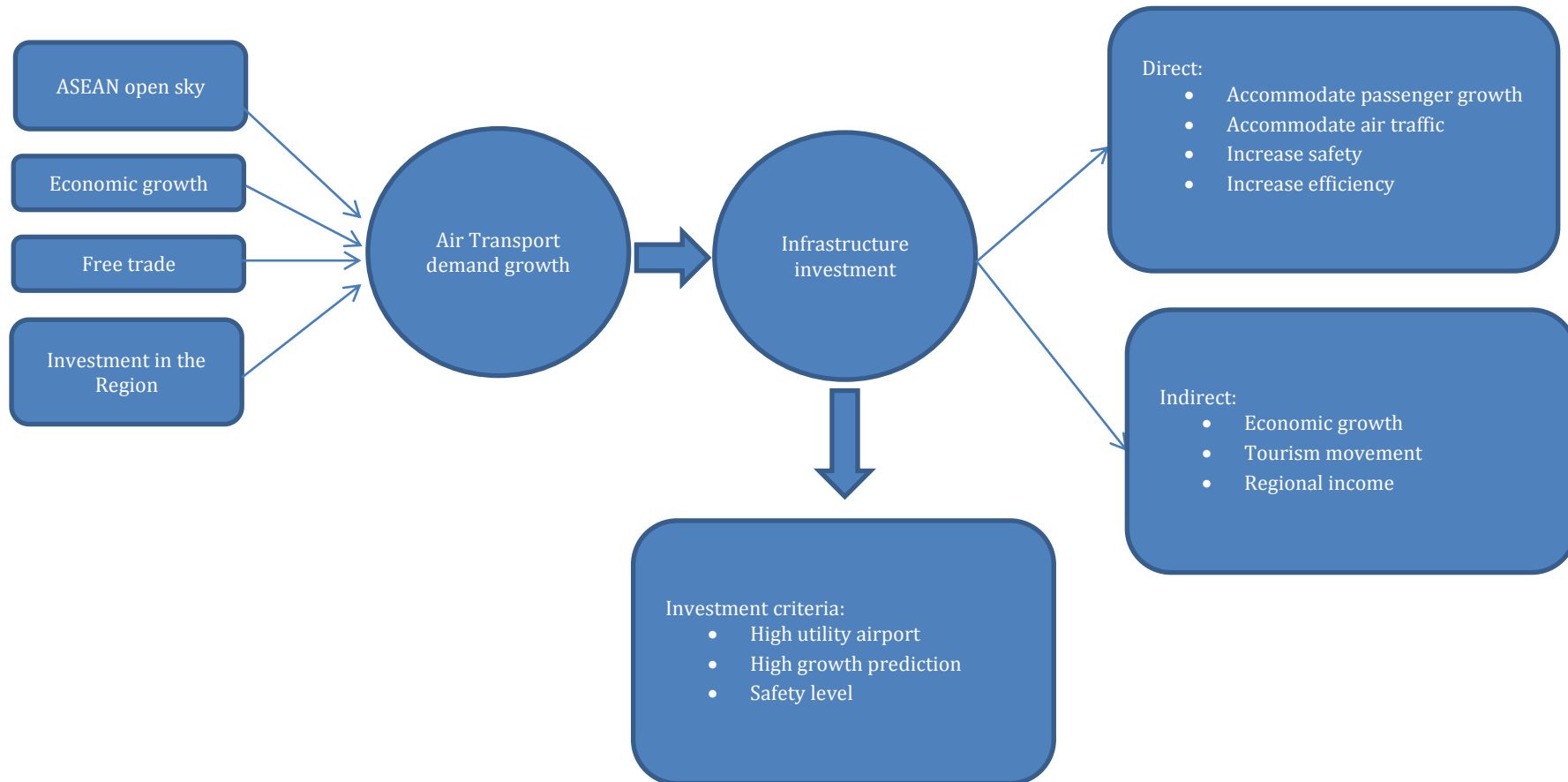
Industry sector	2004	2005	2006	2007	2008	2009	2010	2011	Growth Rate
Industry Value Added to Indonesia National GDP at Constan price (2000) 2004-2011									
1. Agriculture	247,163.6	253,881.7	262,402.8	271,509.3	284,619.1	295,883.8	304,736.7	313,727.8	3%
2.Mining and Quarrying	160,100.5	165,222.6	168,031.7	171,278.4	172,496.3	180,200.5	186,634.9	189,179.2	2%
3. Manufacturing Industry	469,952.4	491,561.4	514,100.3	538,084.6	557,764.4	570,102.5	597,134.9	634,246.9	4%
4. Electricity, Gas, and Clean Water	10,897.6	11,584.1	12,251.0	13,517.0	14,994.4	17,136.8	18,050.2	18,920.5	8%
5. Construction	96,334.4	103,598.4	112,233.6	121,808.9	131,009.6	140,267.8	150,022.4	160,090.4	8%
6. Trades, Hotel and Restaurant	271,142.2	293,654.0	312,518.7	340,437.1	363,818.2	368,463.0	400,474.9	437,250.7	7%
a. Trades	222,290.0	241,887.1	257,845.0	282,115.0	301,941.3	302,028.4	331,312.9	364,449.9	7%
b. Hotel	11,590.7	12,313.2	12,950.5	13,645.6	14,261.5	15,200.8	16,230.9	17,696.2	6%
c. Restaurant	37,261.5	39,453.7	41,723.2	44,675.7	47,615.4	51,233.8	52,931.1	55,104.6	6%
7. Transportation and Communication	96,896.7	109,261.5	124,808.9	142,326.7	165,905.5	192,198.8	217,977.4	241,285.2	14%
a. Transportation	62,495.7	66,404.7	70,796.0	72,791.1	74,786.9	79,571.5	85,290.4	91,796.5	6%
1). Railway Transportation	603.3	585.3	623.0	631.0	721.3	792.2	832.0	798.8	4%
2). Roads Transportation	27,056.6	28,367.1	29,764.2	30,868.2	32,391.4	34,226.5	35,974.4	38,339.3	5%
3). Sea Transport	8,142.9	8,855.8	9,497.4	9,278.7	8,809.7	8,855.6	8,864.6	9,115.1	2%
4). River, Lake and Water Crossing Transport	2,254.0	2,342.7	2,431.9	2,512.5	2,631.8	2,760.7	2,962.0	3,078.5	5%
5). Air Transport	9,384.3	10,362.3	11,466.2	12,385.3	13,044.4	14,564.3	17,330.4	19,817.8	11%
Air Transport to GDP	**0.57%**	**0.59%**	**0.62%**	**0.63%**	**0.63%**	**0.67%**	**0.75%**	**0.80%**	5%
6). Transporation Support Services	15,054.6	15,891.5	17,013.3	17,115.4	17,188.3	18,372.2	19,327.0	20,647.0	5%
Transportation to GDP	**3.8%**	**3.8%**	**3.8%**	**3.7%**	**3.6%**	**3.7%**	**3.7%**	**3.7%**	0%
b. Communication	34,401.0	42,856.8	54,012.9	69,535.6	91,118.6	112,627.3	132,687.0	149,488.7	23%
8. Finance, Leasing, and Business Services	151,123.3	161,252.2	170,074.3	183,659.3	198,799.6	209,163.0	221,024.2	236,076.7	7%
9. Other Services	152,906.1	160,799.3	170,705.4	181,706.0	193,049.0	205,434.2	217,782.4	232,464.6	6%
GDP	1,656,516.8	1,750,815.2	1,847,126.7	1,964,327.3	2,082,456.1	2,178,850.4	2,313,838.0	2,463,242.0	6%

Source: Bank of Indonesia

Appendix 3

Indonesia's Export Commodity 2006-2010														
Rank	**2006**		**Rank**	**2007**		**Rank**	**2008**		**Rank**	**2009**		**Rank**	**2010**	
	Commodity	Value (in Millions USD)		Commodity	Value (in Millions USD)		Commodity	Value (in Millions USD)		Commodity	Value (in Millions USD)		Commodity	Value (in Millions USD)
1	Oil and Gas	21,209.50	1	Oil and Gas	22,088.60	1	Oil and Gas	29,126.30	1	Oil and Gas	19,018.30	1	Oil and Gas	28,039.60
2	Clothes	5,608.16	2	Crude Palm Oil	7,868.64	2	Crude Palm Oil	12,375.57	2	Crude Palm Oil	10,367.62	2	Crude Palm Oil	13,468.97
3	Rubber	5,465.14	3	Rubber	6,179.88	3	Rubber	7,579.66	3	Tourism	6,298.02	3	Rubber	9,314.97
4	Crude Palm Oil	4,817.64	4	Clothes	5,712.87	4	Tourism	7,377.00	4	Clothes	5,735.60	4	Tourism	7,603.45
5	Electronics	4,448.74	5	Tourism	5,345.98	5	Clothes	6,092.06	5	Rubber	4,870.68	5	Clothes	6,598.11
6	Tourism	4,447.97	6	Electronics	4,835.98	6	Electronics	5,253.74	6	Electronics	4,580.18	6	Electronics	6,337.50
7	Texstile	3,908.76	7	Texstile	4,177.97	7	Texstile	4,127.97	7	Texstile	3,602.78	7	Texstile	4,721.77
8	Woods	3,324.97	8	Chemical	3,402.58	8	Paper	3,796.91	8	Paper	3,405.01	8	Paper	4,241.79
9	Paper	2,859.22	9	Paper	3,374.84	9	Proccessed Food	2,997.17	9	Proccessed Food	2,960.73	9	Proccessed Food	3,620.86
10	Chemical	2,697.38	10	Woods	3,076.88	10	Woods	2,821.34	10	Woods	2,275.32	10	Woods	3,381.85
11	Proccessed Food	1,965.56	11	Proccessed Food	2,264.00	11	Chemical	2,754.30	11	Chemical	2,155.41	11	Chemical	2,870.49

Source: Indonesia Ministry of Culture and Tourism

Appendix 4: Cross-Section Random Effect Test

Variable	Fixed	Random	Var(Diff.)	Prob.
D(PC1)	-0.06	-0.24	0.00	0.01*
D(LNTRD_HTLS)	1.18	1.32	-0.01	NA
D(LNUTI)	-0.28	-0.26	-0.01	NA
LNPAX(-1)	-1.08	-1.05	0.00	0.15
PC1(-1)	0.04	-0.14	0.01	0.09*
LNTRD_HTLS(-1)	0.86	0.74	0.00	0.00*
LNUTI(-1)	-0.28	0.14	0.06	0.09*
DIND	0.73	0.72	0.00	0.15

Note : * significant at 10% significant level (p-value < 0.10)

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