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THE IMPACT OF AIRPORT FACILITIES ON NON-AERONAUTICAL REVENUE THROUGH AIRPORT TRAFFIC AND AERONAUTICAL REVENUE AS MEDIATING VARIABLES

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Abstract.
Airport revenue, which consists of aeronautical and non-aeronautical revenue, is very important for airport operations and expansions. Once built, an airport must earn sufficient revenue to cover operating expenses and pay back infrastructure development capital from both public and private sources. Airport facilities and airport traffic determine revenue. The study aimed to analyze the impact of airport facilities on non-aeronautical revenue with airport traffic and aeronautical revenue as mediating variables. The research used a quantitative approach, where the population was Indonesian airports and the samples taken were from 27 Indonesian international airports and 8 Indonesian domestic airports in 2020. The result of this study discovered that non-aeronautical revenue at Indonesian airports can be affected directly and indirectly by airport facilities, airport traffic and aeronautical revenue. Airport facilities had a positive and significant direct effect on airport traffic. Airport traffic had a positive and significant direct effect on aeronautical revenue. Aeronautical revenue had a positive and significant direct effect to the Non-Aeronautical Revenue. However, only airport traffic had an indirect and significant effect on non-aeronautical revenue with aeronautical revenue as the mediating variable.

Keywords: Airport Facilities, Airport Traffic, Airport Revenues, Aeronautical Revenue, Non-Aeronautical Revenue

1. Introduction

The aviation industry has a fairly large impact on the economy of a region or a country, because it becomes a node of economic driving that allows the movement of people and goods in a fairly short time (PT Angkasa Pura II, 2018). Airports and the transportations system are the arteries of distribution of goods and people in the regions and countries (S. Handayani et al., 2020). Thus, this industry also creates jobs in large numbers, and at the same time has a direct or indirect effect on residents, passengers, airlines, shipping companies, airport contractors, vendors, airport employees and related sectors.

As a regulated industry, demand is something that is beyond the control of airport operators, but it still gets special attention to achieve a certain level of demand (A. D. Handayani et al., 2019). Therefore, the output form is exogenous, so it will be more relevant if airport operators are more oriented towards endogenous inputs (Tovar & Martín-Cejas, 2009). McEachern in 2014 stated that price elasticity of demand is the percentage change in total market demand that occurs with 1% increase in average price charged (Diepenbrock, 2015).

Airport business is a highly asset-intensive business that over 30% of total expenses comprise capital costs to maintain the service quality and the pre covid-19 scale of demand (Margret, 2020). The number of airlines operating in Indonesian skies is estimated to reach 3082 aircrafts in 2020 (Indonesia Pathway Calculator, 2015). However, during the pandemic, aviation has been one of the worst affected sectors, including airlines and airports, that face urgent challenges today without a clear timescale to recovery (AlixPartners UK LLP & ACI, 2020). A series of recovery scenarios must obtain the government's endorsement to reduce financial pressure so that airports can Focus on operational costs and airport recovery strategies (Serrano & Kazda, 2020).

The airport as one of the cores in the aviation industry, has experienced a drastic decline in the number of passengers and is taking various ways to remain competitive and if possible, also generate profits. As a capital-intensive infrastructure (Margret, 2020), airports must keep operating cost low by continuing to operate serving airport services, in addition to seeking breakthroughs by paying more attention to revenue from non-aeronautical activities during a shortfall in passenger numbers (Kania, 2018).

Research conducted by Diepenbrock (2015) at Swiss International Airlines stated that at the global level during the period of 2007-2014 cargo traffic was more deeply affected by the last economic downturn and has recovered less strongly than passenger traffic. However, he concluded that cargo operations can provide important supplemental revenues, especially through wide bodied aircraft. These supplemental revenues could benefit both airlines and also the airports. In addition, his research also confirmed the research of Dennis, 2013 that geographic location plays an important role for an airport to develop as a hub, so that it can bring in traffic and to attract transfer passengers.

Lei & Papatheodorou (2010) stated that airport business had changed in the last decade, not only to meet the basic and essential need of passenger, airlines, freight forwards and other direct consumers or users, but also to create commercial area to maximize economic benefit and particularly revenues associated with retail services.

They found that many regional airports experienced a lack of substantial traffic, which made commercial revenue generation difficult. They also found that the rise of low-cost carriers (LCC) had a significant contribution to airport commercial revenue.

Higher passenger volume drives increased airport revenue through passenger chargers, landing fees, car parking, food and beverage spending and other revenues come from commercial area, and it usually expressed in passenger, movements, or freight tones, that will be influence asset utilization and airport cost per passenger of movement (AlixPartners UK LLP & ACI, 2020) (Aci et al., 2012).

Non-aeronautical income is influenced by the size of an airport, the influence of different types of passengers, and type of the contract used (Volkova, 2009). Non-aviation revenue should increase more than proportional with the size of the airport, simply because a larger retail area could only be supported by larger airports. Another study found that business diversification can help airports achieve higher operational efficiency due to complementary activities between aeronautical services and other services (Tovar & Martín-Cejas, 2009), where revenue form commercial service increases in line with the number of international passengers (Volkova, 2009).

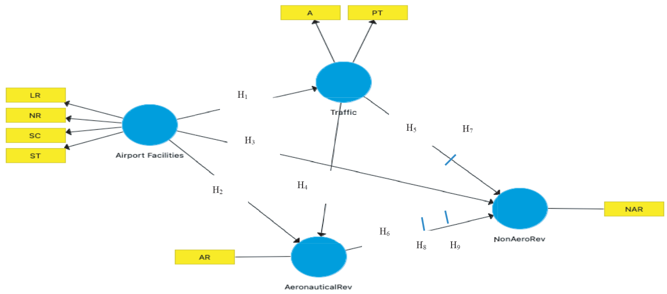
In managing airports in Indonesia, PT Angkasa Pura II (Persero) divides the operating segment into four (Angkasa Pura II, 2016). An operating segment is a component of an entity that (1) engages in business activities from which it may earn revenues and incur expenses; (2) Its operating results are viewed regularly by the chief operating decision maker to make decisions about resources to be allocated to the segment and assess its performance; and (3) separable financial information is available. Angkasa Pura II has reported business segments according to the Application of Financial Accounting Standards (PSAK) (PT Angkasa Pura II, 2020b). The operating segments are the aeronautical segment, the non-aeronautical segment, the cargo segment and the ground handling segment (Angkasa Pura I et al., 2020) (PT Angkasa Pura II, 2020a). However, in general, Angkasa Pura II's main production is supported by the production of the aeronautical services business segment and the non-aeronautical services business segment. The aeronautical segment provides aircraft passenger services (PJP2U), landing, placement and other aeronautical services. The non-aeronautical segment provides rental services, concessions, billboards, parking and other non-aeronautical services. The ground handling segment provides ground handling and aircraft handling additional note (AHAN) services. Meanwhile, the cargo segment provides cargo services. However, for airports under the management of PT Angkasa Pura I (Persero) the revenue separation based on operating segment includes the aeronautical, non-aeronautical and cargo operations segments.

In this study, for reasons of uniformity, ease of calculation and analysis, the revenues grouping is divided into aeronautical and non-aeronautical segments only. This study aims to test the direct effects and indirect effects of airport facilities on non-aeronautical revenue through airport traffic and aeronautical revenue as intervening variables. The variable used in this study include airport facilities (number of runways, length of runway, square of terminal, and square of cargo area) as exogenous variable; non-Aeronautical revenue as endogenous variable; Airport Traffic (passenger traffic and number of airlines in the airports) and Aeronautical Revenue as intervening variables. To answer the research questions, the hypotheses drawn are as follows:

Table 1

Hypothesis 1	H_{01}:$\beta = 0$ The Airport Facilities do not have direct impact on the Airport Traffic H_{a1}:$\beta \neq 0$ The Airport Facilities have direct impact on the Airport Traffic
Hypothesis 2	H_{02}:$\beta = 0$ The Airport Facilities do not have direct impact on Aeronautical Revenue H_{a2}:$\beta \neq 0$ The Airport Facilities have direct impact on Aeronautical Revenue
Hypothesis 3	H_{03}:$\beta = 0$ The Airport Facilities do not have direct impact on Non-Aeronautical Revenue H_{a3}:$\beta \neq 0$ The Airport Facilities have direct impact on Non-Aeronautical Revenue
Hypothesis 4	H_{04}:$\beta = 0$ The Airport Traffic does not have direct impact on Aeronautical Revenue H_{a4}:$\beta \neq 0$ The Airport Traffic has direct impact on Aeronautical Revenue
Hypothesis 5	H_{05}:$\beta = 0$ The Airport Traffic does not have direct impact on Non-Aeronautical Revenue H_{a5}:$\beta \neq 0$ The Airport Traffic has direct impact on Non-Aeronautical Revenue
Hypothesis 6	H_{06}:$\beta = 0$ The Aeronautical Revenue does not have direct impact on Non-Aeronautical Revenue H_{a6}:$\beta \neq 0$ The Aeronautical Revenue has direct impact on Non-Aeronautical Revenue
Hypothesis 7	H_{07}:$\beta = 0$ The Airport Facilities do not have indirect impact on Non-Aeronautical Revenue through the Airport Traffic as mediating variable H_{a7}:$\beta \neq 0$ The Airport Facilities have indirect impact on Non-Aeronautical Revenue through the Airport Traffic as mediating variable
Hypothesis 8	H_{08}:$\beta = 0$ The Airport Facilities do not have indirect impact on Non-Aeronautical Revenue through the Aeronautical Revenue as mediating variable H_{a8}:$\beta \neq 0$ The Airport Facilities have indirect impact on Non-Aeronautical Revenue through the Aeronautical Revenue as mediating variable
Hypothesis 9	H_{09}:$\beta = 0$ The Airport Traffic do not have indirect impact on Non-Aeronautical Revenue through Aeronautical Revenue as mediating variable H_{a9}:$\beta \neq 0$ The Airport Traffic have indirect impact on Non-Aeronautical Revenue through Aeronautical Revenue as mediating variable

The criteria used in the nine hypotheses are that H_0 is rejected or H_a is accepted if the significance is < 0.05; $H_0$is accepted or H_a is rejected if the significance is ≥ 0.05



Source: Ouput Program Smart PLS, processed, 2021

Figure 1: Research Framework.

2. Method

Quantitative approach was used to answer the research questions and calculate the secondary data from Angkasa Pura I (Angkasa Pura I et al., 2020) dan Angkasa Pura II (PT Angkasa Pura II, 2020b) where the population was Indonesian airports and the samples taken were from 27 Indonesia international airports and 8 Indonesia domestic airports in Indonesia in 2020. In this study, the data is processed and presented in the form of diagrams and used for path analysis with a structural equation model (SEM-PLS) through the statistical software Smart PLS Version 3.3.3.

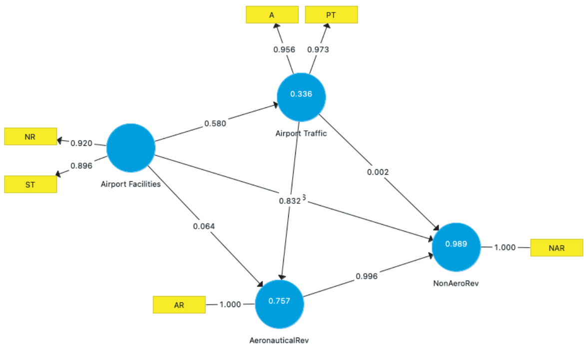
Statistical analysis using path analysis is carried out by testing the path construct, whether it is empirically tested or not, by looking for direct and indirect effects through correlation and regression so that it must be known to arrive at the last dependent variable, whether to go through the direct path or through intervention variable. The data analysis technique using the Structural Equation Model (SEM) was carried out to thoroughly explain the relationship between the variables in this study. SEM is used to examine and justify a model, but not to design a theory.

In this study, the research year is 2020 and there are four variables, consisting of 1 independent variable and at the same time exogenous variable, namely the Airport Facilities (X); two intervening variables as well as endogenous variables, namely Airport Traffic (Z_1) and Aeronautical Revenue (Z_2); and 1 independent variable as well as endogenous variable, namely Non-Aeronautical Revenue (Y).

In the Structural Equation Model, there are two types of models formed, namely the measurement model (outer model) and structural model (inner model). The measurement model explains the proportion of variance for each manifest variable (dimension) that can be explained in the latent variable. Through the measurement model, it will be known which dimensions are dominant in the formation of latent variables. After the measurement model for each latent variable is described, then a structural model is described that will examine the effect of each exogenous latent variable on the endogenous latent variable.

3. Discussion and Result

Measurement model testing (outer model) is used to determine the specification of the relationship between the latent variable and the manifest variable, this test includes convergent validity, discriminant validity and also reliability.



Source: Ouput Program Smart PLS, processed, 2021

Figure 2: Convergent Reliability.

Convergent validity of the measurement model can be seen from the correlation between the item/dimension score and the construct score. Smart PLS Output for the loading factor in table 1 shows that all indicators have a loading factor > 0.70; which shows that all indicators are valid to measure the construct.

Outer Loadings

Matrix

	AeronauticalRev	Airport Facilities	NonAeroRev	Traffic
A				0.956
AR	1.000			
NAR			1.000	
NR		0.920		
ST		0.896		
PT				0.973

Source: Ouput Program Smart PLS, processed, 2021

Figure 3: Outer Loading.

Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
AeronauticalRev	1.000	1.000	1.000	1.000
Airport Facilities	0.788	0.797	0.904	0.825
Airport Traffic	0.927	0.968	0.964	0.931
NonAeroRev	1.000	1.000	1.000	1.000

Source: Output Program Smart PLS, processed, 2021

Figure 4: Construct Reliability and Validity.

Next, the discriminant validity test was carried out using the cross-loading value. A dimension is declared to meet discriminant validity if the value of the cross-loading dimension on the variable is the largest compared to other variables. Table 3 below is the cross-loading value of each indicator.

	AeronauticalRev	Airport Facilities	NonAeroRev	Traffic
A	0.719	0.512	0.711	0.956
AR	1.000	0.546	0.994	0.869
NAR	0.994	0.539	1.000	0.864
NR	0.536	0.920	0.552	0.515
ST	0.451	0.896	0.419	0.541
PT	0.933	0.598	0.930	0.973

Source: Output Program Smart PLS, processed, 2021

Figure 5: Discriminant Validity (Cross Loading Factor).

Evaluation of the structural model (inner model) is carried out to ensure that the structural model built is robust and accurate. The stages of analysis carried out in the evaluation of the structural model can be seen from several stages, namely Coefficient of Determination (R^2); Goodness of Fit; Hypothesis Test

3.1. Coefficient of Determination (R^2)

The inner model testing or structural model testing was carried out to see the relationship between constructs, significant values and R-square of the research model. The structural model was evaluated using R-square for the dependent construct of t-test statistic and the significance of the coefficient of the structural path parameters. Based on data processing that has been carried out using the Smart PLS 3.3.3 program, the R square value was obtained as follows:

Based on table 4 and Figure 3 above, it shows that the R square value for the Aeronautical Revenue (Z_2) variable was 0.757 which means that the Airport Facilities (X) and Airport Traffic (Z_1) variables affect Aeronautical Revenue (Z_2) by 75.7% while

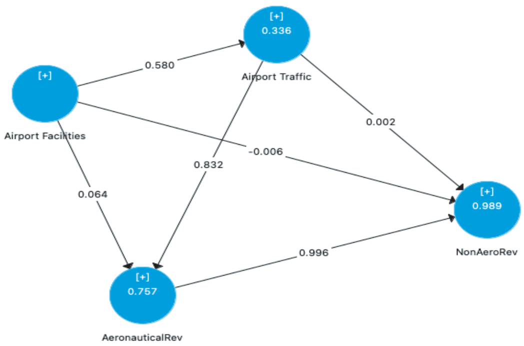
R Square

Matrix | R Square | R Square Adjusted

	R Square	R Square Adjusted
AeronauticalRev	0.757	0.742
NonAeroRev	0.989	0.988
Traffic	0.336	0.316

Source: Output Program Smart PLS, processed, 2021

Figure 6: R Square.



Source: Output Program Smart PLS, processed, 2021

Figure 7: Inner Model.

the remaining 24.3% is explained by other variables outside the model. For the Non-Aeronautical Revenue (Y) variable, the R Square value was 0.989 which means that the Airport Facilities (X), Airport Traffic (Z_1) and Aeronautical Revenue (Z_2) variables affect Non-Aeronautical Revenue (Y) by 98.9% while the remaining 1.1% explained by other variables outside the model. Then the Airport Traffic (Z_1) variable the value of R square is 0.336 which means that the Airport Facilities (X) variable has an effect on Airport Traffic (Z1) 33.6 % while the remaining 66.4% is explained by other variables outside the model.

3.2. Goodness of Fit

The goodness of fit test of the model can be seen from the NFI $\geq$ 0.795 which is declared fit. Based on data processing, it can be concluded that the model has a high goodness of fit and is suitable for testing research hypotheses.

Model_Fit

Fit Summary | rms Theta

	Saturated Model	Estimated Model
SRMR	0.067	0.067
d_ULS	0.093	0.093
d_G	0.393	0.393
Chi-Square	67.763	67.763
NFI	0.795	0.795

Source: Output Program Smart PLS, processed, 2021

Figure 8: Model Fit.

3.3. Hypotheses Testing

After assessing the inner model, the next thing to evaluate was the relationship between latent constructs as has been hypothesized in this study. Hypothesis testing in this research is carried out by looking at the t-Statistics and the value of ρ

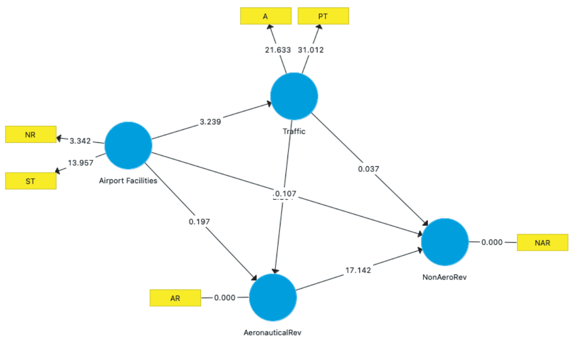
Path Coefficients

Matrix | Path Coefficients

	AeronauticalRev	Airport Facilities	NonAeroRev	Traffic
AeronauticalRev			0.996	
Airport Facilities	0.064		-0.006	0.580
NonAeroRev				
Traffic	0.832		0.002	

Source: Output Program Smart PLS, processed, 2021

Figure 9



Source: Output Program Smart PLS, processed, 2021

Figure 10: Model.

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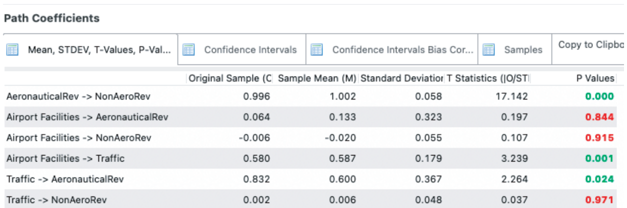
Table 2: Path Coefficient (Direct and Indirect Effects)

Direct Effect	Parameter Coefficient	t-Statistics	ρ *values*	Result
H_{01} The Airport Facilities (X) →Airport Traffic (Z_1)	0.580	3.239	0.001	H_o is rejected, H_a is accepted X had a positive and significant direct effect on Z_1
H_{02} The Airport Facilities (X) →Aeronautical Revenue (Z_2)	0.064	0.197	0.844	H_o is accepted, H_a is rejected X had a positive but not significant direct effect on Z_2
H_{03} The Airport Facilities (X) →Non-Aeronautical Revenue (Y)	-0.006	0.107	0.915	H_o is accepted, H_a is rejected X had a negative and not significant direct effect Y
H_{04} The Airport Traffic (Z_1) →Aeronautical Revenue (Z_2)	0.832	2.264	0.024	H_o is rejected, H_a is accepted Z_1 had a positive and significant direct effect on Z_2
H_{05} The Airport Traffic (Z_1) →Non-Aeronautical (Y)	0.002	0.037	0.971	H_o is accepted, H_a is rejected Z_1 had a positive and not significant direct effect on Y
H_{06} The Aeronautical Revenue (Z_2) →Non-Aeronautical Revenue (Y)	0.996	17.142	0.000	H_o is rejected, H_a is accepted Z_2 had a positive and significant direct effect on Y
		Indirect Effect		
H_{07} The Airport Facilities (X) →Airport Traffic (Z_1) →Non-Aeronautical Revenue (Y)	0.545	1.630	0.104	H_o is accepted, H_a is rejected X had a positive and not significant indirect effect on Z_1
H_{08} The Airport Facilities (X) →Aeronautical Revenue (Z_2)	0.482	1.865	0.063	H_o is accepted, H_a is rejected X had a positive and not significant indirect effect on Z_2
H_{09} The Airport Traffic (Z1) →Non-Aeronautical Revenue (Y)	0.829	2.216	0.027	H_o is rejected, H_a is accepted Z1 had a positive and significant indirect effect on Y



	Original Sample (C	Sample Mean (M)	Standard Deviatior	T Statistics (|O/STI	P Values
AeronauticalRev -> NonAeroRev	0.996	1.002	0.058	17.142	0.000
Airport Facilities -> AeronauticalRev	0.064	0.133	0.323	0.197	0.844
Airport Facilities -> NonAeroRev	-0.006	-0.020	0.055	0.107	0.915
Airport Facilities -> Traffic	0.580	0.587	0.179	3.239	0.001
Traffic -> AeronauticalRev	0.832	0.600	0.367	2.264	0.024
Traffic -> NonAeroRev	0.002	0.006	0.048	0.037	0.971

Source: Output Program Smart PLS, processed, 2021

Figure 11: Path Coefficient.

Total Indirect Effects

Mean, STDEV, T-Values, P-Val... | Confidence Intervals | Confidence Intervals Bias Cor... | Samples | Copy to Clipboa

	Original Sample (C	Sample Mean (M)	Standard Deviatior	T Statistics (|O/STI	P Values
AeronauticalRev -> NonAeroRev		0.000	0.000		
Airport Facilities -> AeronauticalRev	0.482	0.361	0.259	1.865	0.063
Airport Facilities -> NonAeroRev	0.545	0.505	0.334	1.630	0.104
Airport Facilities -> Traffic		-0.000	0.000		
Traffic -> AeronauticalRev		-0.000	0.000		
Traffic -> NonAeroRev	0.829	0.603	0.374	2.216	0.027

Source: Output Program Smart PLS, processed, 2021

Figure 12: Total Indirect Effect.

Specific Indirect Effects

Mean, STDEV, T-Values, P-Val... | Confidence Intervals | Confidence Intervals Bias Cor... | Samples | Copy to Clipboard: | Excel Format

	Original Sample (C	Sample Mean (M)	Standard Deviatior	T Statistics (|O/STI	P Values
Traffic -> AeronauticalRev -> NonAeroRev	0.829	0.603	0.374	2.216	0.027
Airport Facilities -> Traffic -> NonAeroRev	0.001	0.001	0.028	0.037	0.971
Airport Facilities -> Traffic -> AeronauticalRev -> NonAeroRev	0.480	0.365	0.266	1.806	0.071
Airport Facilities -> Traffic -> AeronauticalRev	0.482	0.361	0.259	1.865	0.063
Airport Facilities -> AeronauticalRev -> NonAeroRev	0.063	0.139	0.327	0.194	0.846

Source: Output Program Smart PLS, processed, 2021

Figure 13: Specific Indirect Effect.

Total Effects

Mean, STDEV, T-Values, P-Val... | Confidence Intervals | Confidence Intervals Bias Cor... | Samples | Copy to Clipb

	Original Sample (C	Sample Mean (M)	Standard Deviatior	T Statistics (|O/STI	P Values
AeronauticalRev -> NonAeroRev	0.996	1.002	0.058	17.142	0.000
Airport Facilities -> AeronauticalRev	0.546	0.494	0.328	1.664	0.097
Airport Facilities -> NonAeroRev	0.539	0.485	0.324	1.665	0.096
Airport Facilities -> Traffic	0.580	0.587	0.179	3.239	0.001
Traffic -> AeronauticalRev	0.832	0.600	0.367	2.264	0.024
Traffic -> NonAeroRev	0.830	0.609	0.362	2.293	0.022

Source: Output Program Smart PLS, processed, 2021

Figure 14: Total Effects.

4. Conclusion

Huge transformation in the airport industry indicates that revenue from airports per square meter space is very important, therefore management has to pay attention to all activities of an airport both aeronautical and non- aeronautical activities to generate revenue. This study analyzed the direct effects and indirect effects of airport facilities on non-aeronautical revenue through airport traffic and aeronautical revenue as mediating variables. Based on the calculation and several hypotheses testing, this study found that: Airport Facility has a positive and significant direct effect on Airport Traffic; the Airport Traffic has a positive and significant direct effect on Aeronautical Revenue; and the Aeronautical Revenue has direct effect and significant to non-aeronautical revenue. Meanwhile for indirect effect, only the Airport Traffic that had been proven to give indirect effect and significant to Non-Aeronautical Revenue.

The Aeronautical Revenue (Z_2) can be explained by the variation of the Airport Facilities (X) and Airport Traffic (Z_1) by 75.7% while the remaining 24.3% is explained by other variables outside the model. The Non-Aeronautical Revenue (Y) variable can be explained by the variation of the Airport Facilities (X), Airport Traffic (Z_1) and Aeronautical Revenue (Z_2) variables by 98.9% while the remaining 1.1% explained by other variables outside the model. Then Airport Traffic (Z_1) can be explained by the variation of the Airport Facilities (X) variables by 33.6 % while the remaining 66.4% is explained by other variables outside the model.

Non-aeronautical revenues at Indonesian airports can be increasing by providing a stimulus to the variables of Airport Facilities, Airport Traffic and Aeronautical Revenue. It was slightly different form (Volkova, 2009) research that the effect of the airport size and different passengers has a direct impact on commercial revenue. In this research, the effect is more indirectly through the airport traffic variable and aeronautical revenue variable.

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