BUSINESS PROCESS REENGINEERING OF AVIATION WASTE MANAGEMENT BASED ON ISO 14001: 2015 AT SOEKARNO-HATTA AIRPORT

Reza Rezekia, Umi Kaltum, Iman Chaerudin
STIE Unisahduguna, Jakarta, Indoensia
reza.rezekia@gmail.com, umi.kaltum@fe.unpad.ac.id, imanchaerudin@gmail.com

Abstract

Introduction: The average daily flight waste at Soekarno-Hatta Airport is ±315 tons and will have an impact on passengers and the environment. This is due to the low recycling rate of waste management at Soekarno-Hatta Airport.

Objective: This study aims to determine Business Process Reengineering (BPR) based on ISO 14001:2015, cost efficiency, and waste management performance at Soekarno-Hatta Airport. The method used in this research is an explanatory survey using descriptive and verification analysis.

Results: The analytical approach uses Partial Least Square (PLS). Test the validity and reliability as well as data processing using WarpPLS 7.0 software. As a result, the performance of BPR, ISO 14001:2015, cost efficiency, and waste management at Soekarno-Hatta Airport has not been optimal. BPR has a positive and significant influence partially on cost efficiency and waste management performance. ISO 14001:2015 also has a significant and positive effect on cost efficiency and waste management performance. Cost efficiency has a positive and significant effect on the performance of waste management. However, it does not mediate the relationship between BPR variables and waste management performance and ISO 14001:2015 with waste management performance.

Conclusion: BPR for aviation waste management at Soekarno-Hatta Airport was appropriate. This is proved by the management of PT AP-II already having an eco-airport master plan. However, it has not been socialized to the smallest unit, nor has HR training been carried out to carry out waste management. Soekarno-Hatta Airport already has ISO 14001: 2015 certificate, so the clauses in the form of variable dimensions ISO 14001: 2015 are by the manual or guidelines. Cost-efficiency for aviation waste management at Soekarno-Hatta Airport is not optimal considering that there is still a significant gap between waste management costs at Soekarno-Hatta Airport and waste management in other places. Soekarno-Hatta Airport's waste management performance is also not optimal with indicators of low recycling rates and high waste generation.

Keywords: Business Process Reengineering, ISO14001:2015, Cost Efficiency, Waste Management

Pendahuluan

The more several flights are directly proportional to the passengers' number, the more garbage at the airport, both from the plane and the terminal passengers. International Air Transport Association (IATA) data in 2017 showed the amount of cabin debris for short-haul flights was 0.52 kg per passenger and ranged from 0.63 to

1.81 kg per passenger for long-haul flights (International Air Transport Association, 2017). Waste management at the airport is one of the critical environmental issues that need more attention (Gonzalo Blanca-Alcubilla et al., 2018). (Michael Pitt, 2003) stated that despite the rapid flights' growth at airports, the attention paid to solid waste management was less than noise, aircraft emissions, and water consumption (Glenn Baxter & , Panarat Srisaeng, 2018). The results of (Glenn Baxter & , Panarat Srisaeng, 2018) show that cross passenger and air cargo are expected to increase and produce a greater waste volume at the airport. To reduce aviation's environmental impact, all significant airports should consider introducing sustainable waste management policies and systems by complying with the relevant waste management regulatory framework. Successful airport waste management will have a positive impact on the surrounding environment (Glenn Baxter & , Panarat Srisaeng, 2018). (CHAERUDIN, 2021) argues that waste management is an opportunity and not a burden (Raharjo, Matsumoto, Ihsan, Rachman, & Gustin, 2017). Waste management at international airports is recognized as one of the critical aspects of sustainability performance (Chor-Man Lam, Iris K.M. Yu, Francisco Medel, Daniel C.W. Tsang & Poon, 2018).

PT Angkasa Pura II (Persero), called PT AP-II, is a state-owned enterprise engaged in airport services and work to contact passengers' service is committed to carrying out social responsibility to the environment to reduce the environmental impact of airport activities and human activities in general. Soekarno-Hatta International Airport is the largest airport in Indonesia. Highly passenger traffic has been creating aviation waste, so Soekarno-Hatta Airport must manage its garbage. Furthermore, the debris coming from this flight is called airside garbage. Airside garbage is solid waste derived from airplanes' remaining flight activities and office activities of airside areas. It consists of tissues, plastic, paper, bottles, etc. Airside waste is distinguished into international, domestic, and B3 debris (PT Angkasa Pura II, 2018).

The most massive onset of airside waste was in November 2019, which was 10,898 tons, and the smallest volume of waste in February 2019, which was 8,684 tons. The average daily onset of airside waste is ± 315 tons. The operational costs incurred for airside waste management at Soekarno-Hatta Airport are quite burdensome to Soekarno-Hatta Airport and PT AP-II budget. In 2019, PT AP-II experienced a traffic tsunami, in which air traffic movement decreased significantly. This traffic tsunami condition caused the top management of PT AP-II to issue a policy by publishing cost leadership instructions, which significantly impacted its operations. Cost-efficiency is necessary due to cutting the work program with a plan in the RKAP in the year. The Environment Unit of Soekarno-Hatta Airport's Main Branch Office, as a technical unit directly responsible for airside waste management, has the budget to carry out maintenance work.

Soekarno-Hatta Airport (CGK) currently produces a 14% recycling rate of the total airside waste. Compared to Munich Airport (MUC), the value is shallow, with a very high recycling rate, 79%. Baxter, Wild, and Sabatini (2014), in a Munich Airport study, stated that the continuous improvement in recycling rates was achieved by performing a strict separation from recoverable fractions with trained staff divided into 6 (six) stations located around the airport. Besides, logistics optimization measures are carried out by minimizing container loads, shortening transportation lines to reduce greenhouse gas emissions (S. Sreenath, K . Sudhakar, 2020). Gatwick Airport (LGW) saw a 6% increase in recycling rates in 2018 to 64%, and the remaining 36% had been converted to electric energy (Performance Report Gatwick Airport, 2018). Gatwick Airport also became the first airport to be certified "Carbon Trust Standard-Zero Waste to Landfill" (Gatwick Airport Limited, 2018).

The Miedico Study (2017) at Naples Airport (NAP) stated that through the application of sorted garbage collection and recycling rates of 62%, the remaining 38% is handed over to third parties for energy production (Bernadette Biondi, George J Kahaly, 2019). According to the Heathrow 2.0 Sustainability Progress 2018 report, Heathrow Airport's recycling rate (LHR) reached 47.7%, increasing from 39.7% the previous year. LHR has a target of 70% for the recycling rate by 2020 (Airport, 2019). Hong Kong Airport (HKG) has a recycling rate of about 46% of the total waste produced, mostly food waste and paper. HKG set a target of achieving a recycling rate of 50% of the complete waste in the terminal by 2021 (Chor-Man Lam, Iris K.M. Yu, Francisco Medel, Daniel C.W. Tsang & Poon, 2018).

In his study, (Glenn Baxter & , Panarat Srisaeng, 2018) stated that the Copenhagen Airport (CPH) has defined and implemented policies to ensure sustainable development at the airport. Copenhagen Airport has achieved a significant increase in the recycling rate of 28% (Glenn Baxter & , Panarat Srisaeng, 2018). (Glenn Baxter & , Panarat Srisaeng, 2018) in a research study of Kansai Airport (KIX), stated that the Kansai airport recycling rate is about 13% of the total arising garbage. This figure is only slightly below the Soekarno-Hatta airport recycling rate of 14%. However, Kansai Airport is still superior in terms of having incinerators. It installs incinerators with fluidized bed combustion (FBC) system. The incinerator's remaining gas precipitator-filtered are the catalysts to reduce NOx emissions of wet ash stabilization technology (Baxter, Glenn, 2018). Sarbassov, Venetis, Aiymbetov, Abylkhani, Yagofarova, Tokmurzin, Anthony, and Inglezakis (2020), in the study of Astana Airport (TSE), stated that although recycling rates are meager 11.5%, the composition of recyclable waste reaches 54%, which is comparable to some other airports (Yerbol Sarbassov, Christos Venetis, Berik Aiymbetov, Bexultan Abylkhani, Almira Yagofarova, Diyar Tokmurzin, Edward J. Anthony, 2020). Astana Airport recycling rate is lower than Soekarno-Hatta Airport, but the coefficient used is 0.24 kg per passenger. In comparison, Soekarno-Hatta Airport uses 0.52 kg per passenger concerning IATA Cabin Waste standard. Table 1 shows the comparison of waste management performance with recycling rate indicators at several airports in other countries, including Indonesia.

Table 1. Comparison of Recycling Rates at International Airports

International Airport	Code Letter IATA	Country	Recycling Rate (%)

Munich	MUC	Germany	79
Gatwick	LGW	England	64
Naples	NAP	Italy	62
Heathrow	LHR	England	47.7
Hong Kong	HKG	Hong Kong	46
Copenhagen	CPH	Denmark	28
Soekarno-Hatta	**CGK**	**Indonesia**	**14**
Kansai	KIX	Japan	13.2
Astana	TSE	Kazakhstan	11.5

Source: Sarbassov et al., Gatwick Report, Heathrow 2.0, PT AP-II 2020, data re-processed

It is suspected that the cause of the recycling rate of 14% is unprepared human resources both in terms of knowledge and working procedures that have not been socialized to the smallest units. The recycling rate is related to employee's behavior aspect with a lack of concern for shared responsibility. Coordination between related teams in waste management is still fragmented in different organizations, making it challenging to coordinate hygiene operations governance. Poor internal communication affects external relations due to different understandings and information of both individuals and related work units. Besides, the lack of training is also another inhibitory factor for efficient operation. PT AP-II has not focused on cost-efficiency related to waste management, which can be a domino effect not only on passengers but also on the environment.

With the comparison stipulated earlier and listed in the table above, it is suspected that the performance and business processes of waste management at Soekarno-Hatta Airport have not been effective and efficient. This condition is a challenge for waste management at Soekarno-Hatta Airport, which will be used as a pilot project for other airports in the environment of PT AP-II. There is a gap related to waste management between Soekarno-Hatta Airport and waste management that should be done, especially at the airport. Therefore, it is interesting to review BPR and ISO 14001:2015 on cost-efficiency and waste management performance.

Metode

The research method is a scientific way to obtain data with specific purposes and uses (Sugiyono, 2017). The type of research used is quantitative and descriptive. The methods used in this study are the census and explanatory research methods. Explanatory research can be conducted through surveys and experiments. The descriptive method is used to get an overview of Business Process Reengineering, ISO 14001:2015, cost-efficiency, and flight waste management performance at Soekarno-Hatta Airport to answer the first research points' purposes. This study consists of 2 (two) exogenous variables, namely Business Process Reengineering and ISO 14001:2015. At the same time, endogenous variables are Waste Management

Performance and intervening variables, namely, Cost Efficiency, as shown in Figure 1 below.

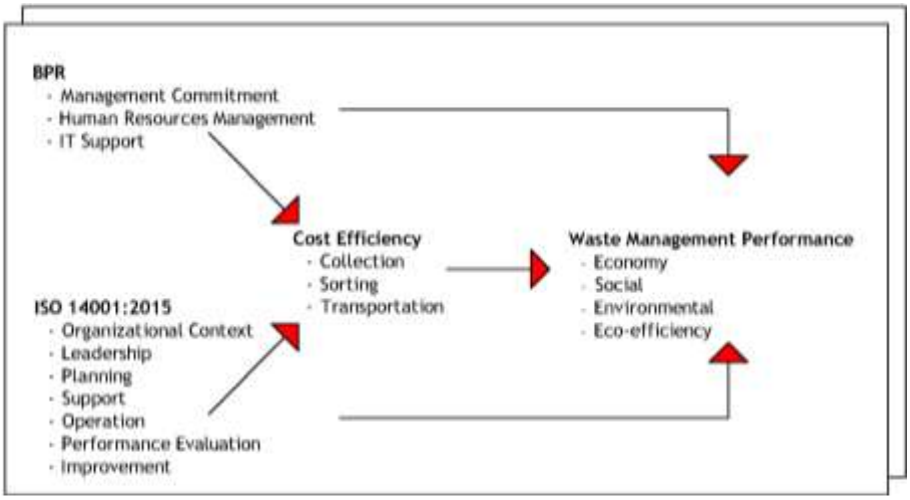

Figure 1. Research Paradigm

Descriptive Design Analysis

Descriptive analysis is used for qualitative variables and includes exploring the causative factors' behavior and answering the first research objectives. This analysis is presented in graphs, tables, and statistical measures, for example, the average index. The calculated average index is used to test descriptive hypotheses referring to the Likert scale using the ordinal scale. Syofian, Setiyaningsih, and Syamsiah (2015) stated that the Likert scale was related to agreeing or disagreeing with something. Hence, the questionnaire's neutral statements were eliminated to avoid mistakes made in analyzing data for respondents who answered neutrally (Suzuki Syofian & Syamsiah, 2015). Based on research experience at Soekarno-Hatta Airport, respondents often answer neutral or enough. To avoid such respondents' answers, a value range of 1 to 4 was employed. Table 3.3 shows the value categories for the following descriptive analysis with value intervals.

Table 2. Grade Categories and Intervals for Descriptive Analysis

Value	Categories	Interval
1	Very Inappropriate	**1.00 – 1.75**
2	Inappropriate	**1.76 – 2.50**
3	Appropriate	**2.51 – 3.25**
4	Very Appropriate	**3.26 – 4.00**

Verification Analysis Design

In this study, the verification analysis used a partial least square (PLS) method. (Ghozali, 2016) state that Partial Least Squares Structural Equation Modeling (PLS-SEM) is an alternative method for structural equation modeling (SEM) to test the relationship between latent constructs in linear or non-linear relationships and many indicators simultaneously (Ghozali, 2016).

Hypothesis

The following hypothesis test design is a hypothesis that is tested based on the formulation and research objectives:

Hypothesis 1

BPR toward waste management performance through cost efficiency in aviation waste management at Soekarno-Hatta Airport.

H0: BPR (X1) does not affect waste management performance (Z) through cost-efficiency (Y) aviation waste management at Soekarno-Hatta Airport.

H1: BPR (X1) affects waste management performance (Z) through cost-efficiency (Y) in aviation waste management at Soekarno-Hatta Airport.

Hypothesis 2

ISO 14001: 2015 affects waste management performance through cost-efficiency in aviation waste management at Soekarno-Hatta Airport.

H0: ISO 14001: 2015 (X2) does not affect waste management performance (Z) through cost-efficiency (Y) aviation waste management at Soekarno-Hatta Airport.

H1: ISO 14001: 2015 (X2) affects waste management performance (Z) through cost-efficiency (Y) aviation waste management at Soekarno-Hatta Airport.

Results and Discussion

a. **Business Process Reengineering (BPR)**

BPR in this study is restructuring and transforming a company's business process to improve performance and efficiency. Hashem (2020) stated that BPR has several dimensions of management commitment, IT infrastructure, people management, organizational readiness for change, and organizational structure . The BPR dimensions in this study are management commitment, human resource management, and IT support. The construction selection is based on the dimensions suitability for measuring BPR variables at Soekarno-Hatta Airport. The respondent's opinion regarding the management's commitment to improving waste management aligns with the company Eco-Airport Master Plan. Its Plan is concerning with the airport environment (airport environmental plan) both by airport operators and stakeholders by complying with applicable environmental laws nationally and internationally. Human resource management still did not follow the objectives of repair and waste management. This is indicated by most respondents who stated that it was not appropriate. Performance in waste management, particularly in the management of impacts arising from service delivery and airport operation activities, cannot be separated from the ability of the supporting equipment used, including personnel as the main element.

For this reason, human resource development through training programs is necessary in order to obtain competent, qualified, and accountable human resources for airport waste management. In general, training is part of investing in human resources (human investment) to improve job abilities and skills. Thereby, improving personnel and work units or organizations more broadly is required. Future-oriented environmental management training can help personnel who handle this field to master specific skills and abilities (competencies) to support the sustainable development of every operational activity and airport development.

By carrying out PT AP-II's vision, namely "The Best Smart Connected Airport in the Region," it is not suitable if it is not equipped with IT support. PT AP-II applies the concept or model of Digital Transformation, with three main components: Digital Strategy, Digital Leadership, and Digital Culture. The three components work together to support the PT AP-II Digital Transformation Model. Its implementation can be carried out up to the executive level. However, in contrast to the respondent's opinion, the average value for the dimension of IT support related to BPR for aviation waste management at Soekarno-Hatta Airport was only 2.47, so the category is not suitable. Meanwhile, the average value of management commitment was 2.63, which means the category is appropriate, and the HR management is 2.38, which means inappropriate.

b. ISO 14001:2015

The ISO 14001: 2015 dimensions used in this study are based on the clauses in the manual or ISO 14001: 2015 guidelines, namely Organizational Context, Leadership, Planning, Support, Operations, Performance Evaluation, and Improvement. The following figure shows the average value of the ISO 14001: 2015 variable dimensions. The operating dimension has the highest average value, which is 2.72.

Figure 2. ISO 14001:2015 Variable Dimension Mean Value
Source: Data re-processed, 2020

c. Cost Efficiency

The most suitable dimension for calculating the cost efficiency variable at Soekarno-Hatta Airport is the concept of Yang et al. (2014), namely, obeying, sorting, and transporting to measure the dimensions of the cost level indicator and the level of waste maintenance costs.

Figure 3. Soekarno-Hatta Airport Waste Management Fee (IDR/Ton/Day)
Source: Data re-processed, 2020

The picture above shows that aviation waste management at Soekarno-Hatta Airport is ± IDR 144,000/ton/day. If the process of improving waste management were carried out with the BPR, it would get a waste management fee of IDR 94,135/ton/day. Consisting of transportation costs of IDR 66,835/ton/day, costs of sorting and packing IDR 525/ton/day, maintenance costs of trash IDR 273/ton/day, and a waste collection fee of IDR 26,150/ton/day. Thus, the resulting cost efficiency was 34.6%.

d. Waste Management Performance

Referring to the concept of Rodrigues et al. (2018), the waste management performance dimension consists of environmental, economic, and social. Meanwhile, according to Tsai et al. (2019), the dimensions of waste management performance include financial support, economic benefits, sustainable stakeholders' cooperation, eco-efficiency, environmental performance, and innovation capacity. Adopting these two studies, the dimensions of waste management performance deemed appropriate to Soekarno-Hatta Airport's conditions are economic, social, environmental, and eco-efficiency. The dimensions of waste management performance deemed appropriate to Soekarno-Hatta Airport's conditions are economic, social, environmental, and eco-efficiency. The economy has 4 (four) indicators: budget, investment, costs, and economic benefits. The social dimension consists of management and competence—indicators of waste handling and environmental impacts for environmental dimensions. Meanwhile, eco-efficiency has indicators of waste produced and the rate of recycling.

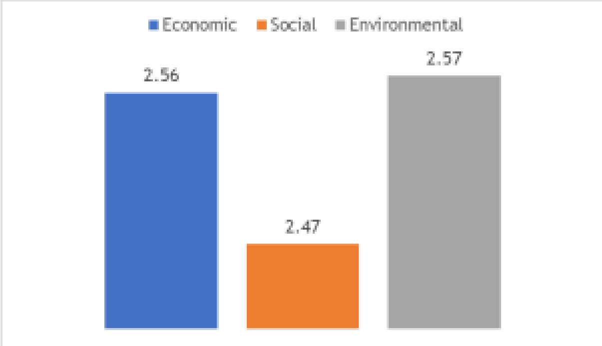

Figure 4. Waste Management Performance Variable Dimension Mean Value
Source: Data re-processed, 2020

In 2019, there was a significant decrease in the number of passenger movements by 20.5%. The recycling rate in 2019 increased to 14% but remained in the inferior category. The highest recycling rate performance occurred in May 2019 at 16%, with the lowest generation, which was directly proportional to passengers' movement. The lowest recycling rate of 12% occurred in December 2019. This rate is inversely proportional to the number of passenger movements in December, which was the highest of more than 5 million movements. Every year, the airport will experience an increase in passenger movement, which is directly proportional to the increase in waste generation, so it is necessary to improve waste management performance, especially airside waste at Soekarno-Hatta Airport

Table 3. Recycling Rate at Soekarno-Hatta Airport in 2019

Year	Month	Passengers' Movement	Waste Generated (ton)	Clean Up Waste (ton)	%
2019	January	4,469,144	69,719	9,636	14%
	February	3,954,419	61,689	8,684	14%
	March	4,323,316	67,444	9,602	14%
	April	4,153,825	64,800	9,32	14%
	May	3,739,420	58,335	9,36	16%
	June	4,644,108	72,448	9,36	13%
	July	4,930,975	76,923	9,653	13%
	August	4,797,530	74,841	9,658	13%
	September	4,559,858	71,134	9,343	13%
	October	4,868,166	75,943	9,649	13%
	November	4,937,451	77,024	10,898	14%
	December	5,118,413	79,847	9,658	12%
		RECYCLING RATE			***14%***

Source: Data re-processed, 2020

The following is a total recapitulation of airside waste generation at Soekarno-Hatta Airport from 2015 to 2019. The total generation of airside waste during those years was 4,612,399 tons.

Table 4. Recapitulation of Waste Generation

Years	**Waste Generation (Ton)**
2015	846,945
2016	907,850
2017	983,044
2018	1,024,413
2019	850,147
Total	**4,612,399**

Source: Data re-processed, 2020

e. Model Fit Test

This test is intended to check the PLS model's feasibility using WarpPLS, whether the model is good or not. The following table shows the data calculated by the WarpPLS for the PLS model fit test

Table 5. Model Fit Indicator

Indicator	**Value**	**Rule of Thumb**	**Result**
Average Path Coefficient (APC)	p=0.004	p< 0.05	Fit
Average R-squared (ARS)	p<0.001	p< 0.05	Fit
Average adjusted R-squared (AARS)	p<0.001	p< 0.05	Fit
Average block VIF (AVIF)	2.872	acceptable if ≤ 5, ideally ≤ 3.3	Ideal
Average Full Collinearity VIF (AFVIF)	3.452	acceptable if ≤ 5, ideally ≤ 3.3	Acceptable
Tenenhaus GoF (GoF)	0.643	small ≥ 0.1 medium ≥ 0.25 large ≥ 0.36	Large
Simpson's Paradox Ratio (SPR)	1.000	acceptable if ≥ 0.7, ideally = 1	Ideal
R-squared Contribution Ratio (RSCR)	1.000	acceptable if ≥ 0.9, ideally = 1	Ideal
Statistical Suppression Ratio (SSR)	1.000	acceptable if ≥ 0.7	Acceptable
Nonlinear Bivariate Causality Direction Ratio (NLBCDR)	1.000	acceptable if ≥ 0.7	Acceptable

Source: Data re-processed, 2020

f. Validity and Reliability Tests

The results of the validity test consisted of convergent and divergent. For convergent validity requirements used in this study, the loading value must be > 0.4 and the p-value < 0.05. Another requirement for convergent validity is that AVE's value (Average Variance Extracted) must be greater than 0.5. Meanwhile, the discriminant validity is determined based on the square roots AVE value > 0.5. The overall type of indicator for the BPR variable is reflective. The calculation results show that these indicators have a more significant loading factor than the value of 0.7; besides that, it also has a high significance because of the p-value <0.001.

Another validity requirement is to compare the t-value (stat) with the t-table. Referring to the table above, the t-stat is greater than the t-table value, which is 1.96. The same applies to the variable ISO 14001: 2015, cost efficiency, and waste management performance. Therefore, all variable indicators used in this study meet the convergent validity requirements. Meanwhile, discriminant validity compares the square roots AVE value between variables and conformity with the validity requirements, namely> 0.5. Therefore, all indicators of variables used for this study are valid, both convergent and discriminant. For the value of AVE and square roots, AVE can be seen in the following table

Table 6. AVE dan Square Roots AVE Value

	BPR	**ISO 14001**	**CE**	**WMP**
AVE	0.505	0.521	1.000	0.583
Square Roots AVE	0.710	0.722	1.000	0.764
Rule of Thumb	AVE > 0.5			
Validity	**Valid**	**Valid**	**Valid**	**Valid**

Source: Data re-processed, 2020

Reliability test dimensions and indicators in measuring the research variables were determined based on the composite reliability value and Cronbach's alpha value> 0.7. For the composite reliability value, the research variables were BPR 0.889, ISO 14001 0.957, cost efficiency 1, and waste management performance 0.931. Meanwhile, Cronbach's alpha's value is BPR 0.856, ISO 14001 0.952, cost efficiency 1, and waste management performance 0.915. The overall value of each variable for composite reliability and Cronbach's alpha value> 0.7 so that all variables and indicators used in this study are reliable. The following image shows data on composite reliability and Cronbach's alpha in the form of a bar chart.

The figure below is a model of the analysis results using the WarpPLS 7.0 software. This figure shows the number of each indicator making up the latent variable, the path coefficient value, and the p-value between the latent variables used in this study. A significance value or R-squared of running on the correlation between latent variables is also shown.

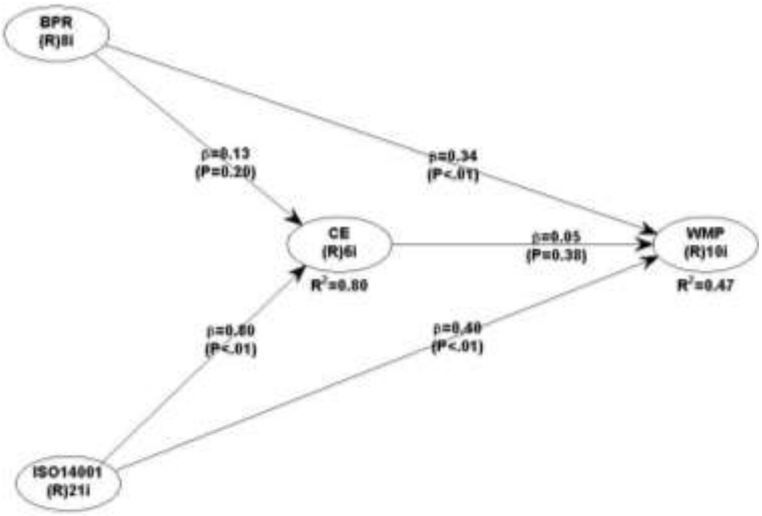

Figure 5. PLS Model Analysis Results (WarpPLS 7.0)
Source: Data re-processed, 2020

The Effect of BPR on Waste Management Performance through Cost Efficiency

This hypothesis examines the BPR variable's indirect effect on the waste management performance variable through cost efficiency with the following results:

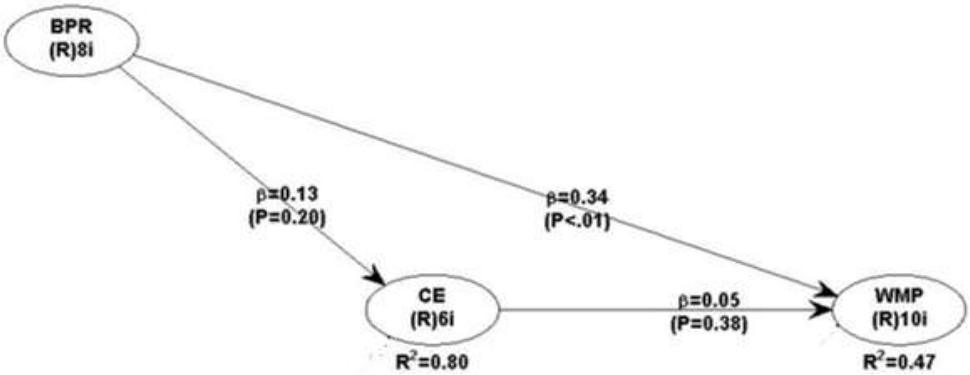

Figure 6. Indirect Effect of BPR on Waste Management Performance through Cost Efficiency

After conducting mediation testing with the WarpPLS 7.0 program, as shown in Figure 6 above, the correlation between BPR and waste management performance was 0.34 and significant with a p-value <0.01. Meanwhile, the direct effect between BPR on waste management performance without involving the intervening cost-efficiency variable was 0.57. There was a decrease between the direct effect = 0.57 and the indirect effect = 0.34. Thus, it can be concluded that mediation is in partial form (partial mediation). This is because the path coefficient value decreases. However, in more detail, it is necessary to calculate the amount of the indirect effect variance by using the Variance Accounted For (VAF) formula. The VAF value interval is between 0 and 1. The higher the VAF value, the higher the effect of the mediating effect. The formula to calculate VAF:

$$VAF = \frac{\alpha \times \beta}{\alpha \times \beta + \zeta} \times 100\%$$

$$VAF = \frac{0.13 \times 0.05}{(0.13 \times 0.05) + 0.34} \times 100\%$$

$$VAF = 2\%$$

The magnitude of BPR's indirect effect on waste management performance through the variable cost-efficiency is only 0.02 or 2%. Therefore, it is concluded that there is no mediating effect of the cost-efficiency variable to BPR's indirect effect on waste management performance. This result is because BPR does not directly reduce aviation waste management costs but covers the costs incurred with aviation waste processing profits.

The results of testing Hypothesis 1 above have the following structural model:

$$\mathbf{Z=0.006X_1 +\zeta_1}$$

The results of testing for hypothesis 1 indicate that BPR had no direct effect on waste management performance through cost efficiency with a significance of 47% and p-values (0.478)> 0.05, so the conclusion is that H0 is accepted. Based on the simultaneous hypothesis testing above, BPR (X1) did not affect waste management performance (Z) through cost efficiency (Y) aviation waste management at Soekarno-Hatta Airport. This is because BPR and waste management performance for waste management require significant investment costs. Personnel or employees from the strategic level to the operational level must have the same understanding and abilities to realize proper aviation waste management. To meet these criteria, PT AP-II requires a budget to conduct related training or training. Therefore, BPR and cost efficiency can affect waste management performance partially but not simultaneously. Although PT AP-II already has an Eco-Airport master plan and ISO 14001: 2015 certification for Soekarno-Hatta Airport, it has not prioritized BPR waste management. Because it still prioritizes aspects that are directly related to services to passengers and airlines. Meanwhile, waste management is an aspect that does not directly affect services and airlines. However, if it is not given special attention, there will be a problem if an accident occurs, causing financial loss or a bad image.

The Effect of ISO 14001: 2015 on Waste Management Performance through Cost Efficiency

This hypothesis examines the effect of the ISO 14001: 2015 variable on the waste management performance variable through cost efficiency with the following results:

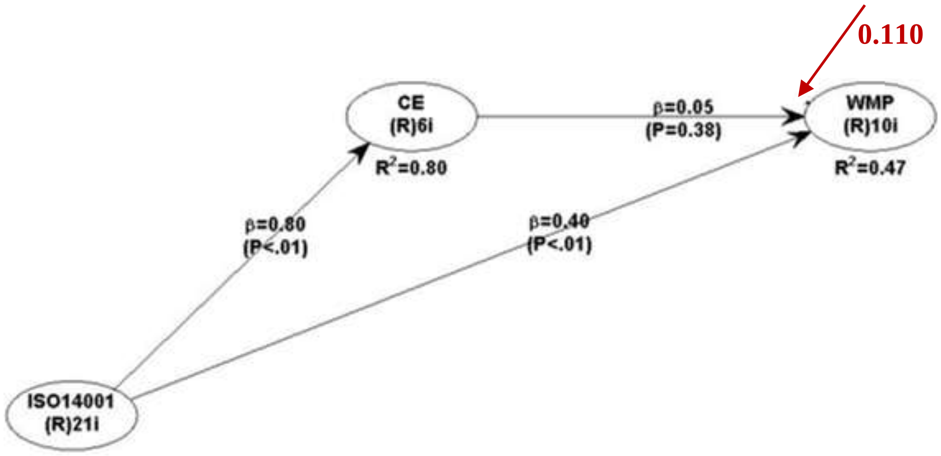

Figure 7. The Indirect Effect of ISO 14001 on Waste Management Performance through Cost Efficiency

After conducting mediation testing with the WarpPLS 7.0 program, as shown in the picture above, the correlation between ISO 14001: 2015 and waste management performance was 0.40 and significant with a p-value <0.01. Meanwhile, the direct effect between ISO 14001: 2015 on waste management performance without involving the intervening cost-efficiency variable was found to be 0.62. There was a decrease between the direct effect = 0.62 and the indirect effect = 0.40. As for the calculation of the VAF value, the following results were obtained.

$$VAF = \frac{0.80 \times 0.05}{(0.80 \times 0.05) + 0.40} \times 100\%$$

$$VAF = 9\%$$

The indirect effect of ISO 14001: 2015 on waste management performance through variable cost-efficiency was only 0.09 or 9%. Therefore, it is concluded that there is no mediating effect of the cost-efficiency variable on the indirect effect between ISO 14001: 2015 on waste management performance. This is because ISO 14001: 2015 emphasizes technical guidelines in aviation waste management at Soekarno-Hatta Airport

The results of testing Hypothesis 2 above have the following structural model:

$$\mathbf{Z=0.038X_2 +\zeta_2}$$

The testing results for Hypothesis 2 show that ISO 14001: 2015 did not directly affect waste management performance through cost-efficiency with a significance of 47% and p-values (0.365)> 0.05, so the conclusion is that H0 is accepted. Based on the simultaneous hypothesis testing above, ISO 14001: 2015 (X2) did not affect waste management performance (Z) through cost-efficiency (Y) aviation waste management at Soekarno-Hatta Airport. This is because the waste management performance at Soekarno-Hatta Airport has not received full attention from PT AP-II. PT AP-II is more focused on primary and complimentary services and facilities for passengers traveling at the airport. Meanwhile, waste management is another supporting aspect that passengers may not experience directly. The contribution of cost efficiency has not played a role in waste management performance, so ISO 14001: 2015 can have a more direct effect. This reflects PT AP-II's focus, which has not entirely focused on waste management and processing. However, this condition cannot be ignored because the impact is not only on passenger comfort but will also have a significant effect on environmental conditions.

Conclusion

BPR for aviation waste management at Soekarno-Hatta Airport was appropriate. This is proved by the management of PT AP-II already having an eco-airport master plan. However, it has not been socialized to the smallest unit, nor has HR training been carried out to carry out waste management. Soekarno-Hatta Airport already has ISO 14001: 2015 certificate, so the clauses in the form of variable dimensions ISO 14001: 2015 are by the manual or guidelines. Cost-efficiency for aviation waste management at Soekarno-Hatta Airport is not optimal considering that there is still a significant gap between waste management costs at Soekarno-Hatta Airport and waste management in other places. Soekarno-Hatta Airport's waste management performance is also not optimal with indicators of low recycling rates and high waste generation.

BPR had no indirect effect on waste management performance through cost-efficiency. Therefore, it is concluded that there is no mediating effect of the intervening cost-efficiency variable on BPR's indirect effect on waste management performance. Waste management performance was not influenced by ISO 14001: 2015 through cost-efficiency. Therefore, it is concluded that there is no mediating effect of the intervening cost-efficiency variable on BPR's indirect effect on waste management performance.

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