THE INFLUENCE OF SURVEILLANCE USING CLOSED CIRCUIT TELEVISION (CCTV) ON AIRSIDE SAFETY AT BLU UPBU CLASS I UTAMA JUWATA TARAKAN

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ABSTRACT

This study aims to analyze the influence of surveillance using Closed Circuit Television (CCTV) on the safety of the airside area at Juwata Tarakan Airport. The focus of the research is to evaluate the effectiveness of the CCTV surveillance system in supporting safety operations, particularly in the apron area. This study was conducted due to existing limitations in the coverage and quality of CCTV, which potentially reduce the optimization of surveillance. The research method used is descriptive quantitative, with data collected through observation and questionnaires. The respondents consisted of 88 personnel from Apron Movement Control (AMC) and Aviation Security (AVSEC), selected using a saturated sampling technique. Data were analyzed using validity and reliability tests, simple linear regression, and t-test.The results showed that CCTV had a significant influence on the safety of the airside area, with a coefficient of determination (R^2) of 89.9%. The t-test value (19.080 > 1.662) and a significance level of 0.000 (< 0.05) confirm a positive relationship between the two variables. The conclusion of this study is that CCTV surveillance has a significant impact on improving airside security. However, its effectiveness is still hindered by limitations in the number of cameras, areas not yet covered, and technical disruptions. Therefore, it is recommended to increase the number of CCTV units, improve device quality, and conduct periodic evaluations to maximize the surveillance function. These findings can serve as a reference for airport management in enhancing the security system.

Keywords: *Close Circuit Television, Apron Movement Control, Supervision*

1. INTRODUCTION

An airport is an area on land and/or waters with certain boundaries that is used as a place for aircraft to land and take off, to board and to drop off passengers, to load and unload goods, and to move intra and intermodal transportation, which is equipped with aviation safety and security facilities, as well as basic facilities and other supporting facilities [1]. The air side is one of the main aspects of flight operations at the airport. Based on KM 39 of 2024 concerning the National Aviation Security Program, it is explained that the air side is the area of aircraft movement at the airport, including the surrounding area and the buildings or parts of it where the access to the area is controlled and security checks are carried out.

Aviation safety and security is a series of activities that are interrelated and affect each other, which in the process includes the operation of aircraft, aircraft support facilities, and flight personnel.

Juwata International Airport in Tarakan, classified as a Class I Main Airport and the third busiest airport in Kalimantan after Supadio and Syamsudin Noor Airports, has implemented CCTV systems in the apron area through the Apron Movement Control (AMC) Unit. This unit is responsible for regulating and monitoring the movement of people and vehicles in the airside area. However, based on the researcher's observations during an *On-the-Job Training* period, the current CCTV system still has significant limitations in terms of the number of cameras, surveillance coverage, and technical quality. Currently, there are only nine CCTV cameras covering two apron zones—main apron and west apron—which are insufficient to provide complete surveillance of the area.

Given the importance of airside surveillance and the strategic role of CCTV in supporting aviation security, it is necessary to conduct an in-depth analysis of the impact of CCTV implementation on the safety of airside operations at Juwata Airport. This research not only highlights the physical presence of CCTV but also evaluates its effectiveness as a security infrastructure, including prevention, detection, and enforcement functions.

Based on the background described above, this study formulates two main research questions:

1. How does CCTV surveillance affect the safety of the airside area at Juwata Airport, Tarakan?
2. How effective is the CCTV security system in supporting safety in the airside area at BLU Kantor UPBU Class I Utama Juwata Tarakan?

The objectives of this research are as follows:

1. To examine and analyze the influence of CCTV surveillance on airside safety.
2. To evaluate the effectiveness of the CCTV system in supporting airside security operations.

This study is essential because surveillance is a key component of aviation safety management. Using a descriptive quantitative approach and statistical analyses such as simple linear regression and t-tests, this research is expected to provide strategic recommendations for airport management to improve surveillance systems and mitigate operational risks. The study also contributes to the field of air transport management by offering empirical insights into the application of surveillance technology and its impact on airside operational safety.

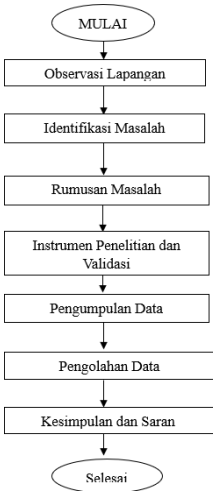
2. METHOD

2.1 Research Method

This study employed a quantitative research method. The quantitative method was chosen because it can produce valid data that reflects actual field conditions. In addition, this method enables the researcher to present facts related to the issues being studied. Quantitative research is based on the philosophy of positivism, focuses on a specific population or sample, uses research instruments, and analyzes data statistically with the aim of testing predetermined hypotheses [2].

2.2 Research Design

The research design is a strategy used by the researcher to systematically connect each element of the research to be more effective and efficient [3]. This study used a quantitative method with a descriptive approach, starting with field observation followed by the distribution of questionnaires. The research design is flexible, allowing adjustments according to field conditions and the results of data processing.



2.3 Population and Sample

Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by researchers for study and then draw conclusions. So, population is not just people, but also objects and other natural things. Population is not just the number of objects or subjects, but encompasses all the characteristics possessed by those objects or subjects [4].

The population in this study consists of all Apron Movement Control (AMC) and Aviation Security (AVSEC) personnel at Juwata Tarakan Class 1 Airport, totaling 88 individuals. The sampling technique used was saturated sampling, in which all members of the population were included as the research sample due to the relatively small population size, making it feasible to study all of them.

2.4 Data Collections Techniques

2.4.1 Questionnaire

Questionnaires are a data collection technique carried out by asking questions or written statements to respondents for them to answer. Questionnaires can consist of statements or closed or open-ended questions, and can be given to respondents directly or sent via mail or the internet [5]. The Likert scale is used to measure the attitudes, opinions, and perceptions of an individual or a group of people about social phenomena. With the Likert scale, the variable to be measured is elaborated into variable indicators [2]. The answer choices are categorized as an attitude of SS (strongly agree), S (agree), N (neutral), TS (disagree), STS (strongly disagree).

2.5 Data Analysis Techniques

2.5.1 Validity

Validity testing is a test used to determine whether a measuring instrument is valid (authentic) or not valid. The measuring instrument referred to is the questions contained in the questionnaire that has been distributed. A valid instrument means that the measuring tool used to obtain data (measure) is valid. Valid means that the instrument can be used to measure what it is supposed to measure.

Validity testing aims to assess the extent to which the measurement instrument used can accurately express the variables or concepts being studied. The validity test in this research was conducted using the bivariate Pearson correlation formula. The data is considered valid if the calculated r value (r hitung) is greater than the table value (r tabel) at a significance level (α) of 0.05. In this study, the number of respondents (n) is 88 at a significance level (α) of 0.05. Based on the Pearson r distribution table, the table value (rtabel) for n = 85 and (α) = 0.05 is 0.213. An item is considered valid if rhitung > rtabel, that is, greater than 0.213.

2.5.2 Reability

Reliability testing is a test to determine the extent to which the measurement results using the same object will produce the same data. If the Cronbach's Alpha value >0.60, the research is considered reliable; conversely, if the Cronbach's Alpha value <0.06, the research is considered less reliable. Reliability testing is useful for measuring the reliability of a questionnaire that can be used to explain the research that has been conducted [6].

2.5.3 Simple Linear Regression

Regression analysis is a statistical process for estimating the relationship between variables, which consists of techniques for modeling and analyzing several variables based on the form of the relationship between one dependent variable and one independent variable [7]. Analisis regresi digunakan untuk mengukur kekuatan hubungan antara dua variabel atau lebih, juga menunjukan arah hubungan antara variabel dependen dengan independent [8]. To see the relationship between variable X (the influence of surveillance with CCTV) and variable Y (safety of the airside area) at the Class 1 Juwata Tarakan Airport, the researcher used simple linear regression tests.

3. RESULT AND DISCCUSION

3.1 Result

3.1.1 Questionnaire

In this research, a questionnaire was used to obtain information regarding the influence of supervision with Closed-Circuit Television (CCTV) on the security of the airside area at Juwata Tarakan Airport. Each variable in this study has problem indicators found directly in the field. Based on the indicators found in each variable, the researcher compiled two types of questionnaires as research instruments, namely the CCTV Supervision Questionnaire and the Airside Security Questionnaire, with a total of 16 questions.

Data collection was carried out during the author's On The Job Training (OJT). The questionnaire was distributed to 88 Aviation Security (AVSEC) and Apron Movement Control (AMC) personnel as respondents. The questionnaire data was processed using a Likert Scale which was then analyzed descriptively by calculating the total index of variables x and y. The total index is calculated using the following formula:

Rumus Indeks % = Total Skor / X x 100

3.1.2 Validity Test

No	Variabel	Item	r hitung	r tabel	Kesimpulan
1	Pengawasan Dengan CCTV	X.1	0,789	0,213	Valid
		X.2	0,834	0,213	Valid
		X.3	0,769	0,213	Valid
		X.4	0,782	0,213	Valid
		X.5	0,796	0,213	Valid
		X.6	0,802	0,213	Valid
		X.7	0,771	0,213	Valid
		X.8	0,830	0,213	Valid
2	Keselamatan Area Sisi Udara	Y.1	0,844	0,213	Valid
		Y.2	0,800	0,213	Valid
		Y.3	0,818	0,213	Valid
		Y.4	0,867	0,213	Valid
		Y.5	0,835	0,213	Valid
		Y.6	0,844	0,213	Valid
		Y.7	0,827	0,213	Valid
		Y.8	0,743	0,213	Valid

The results of the above analysis show that all 16 items of questions and statements, consisting of 8 items of questions related to the CCTV monitoring variable and 8 items of statements for the airside security variable, have a rhitung value > rtabel at a significant level of 5% (0.213). Thus, it can be concluded that all statement items are declared valid and the questionnaire in this study can be used for further analysis.

3.1.3 Reability Test

Variabel	*Cronbach's Alpha*	Kesimpulan
Pengawasan dengan CCTV	0,930	Reliabel
Keselamatan Area Sisi Udara	0,946	Reliabel

Based on the analysis results above, it is noted that the Cronbach's Alpha value related to CCTV monitoring for the safety of the airside area is >0.6. This value indicates that all indicators of this study are reliable,

meaning that all respondents provided consistent answers. Therefore, the questionnaire used in this study can be categorized as having a very high level of reliability.

3.1.4 Simple Linear Regression

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	6.245	1.499		4.167	.000
	Pengawasan dengan CCTV (X)	.845	.044	.899	19.080	.000

a. Dependent Variable: Keamanan Sisi Udara

The coefficient value of the regression for variable X is 0.845. This indicates that for each increase of one unit in variable X, variable Y experiences an increase of 0.845. In other words, 84.5% of variable Y is influenced by variable X.

Since the regression coefficient is positive, it can be concluded that the direction of the influence of variable X on variable Y is positive; as the level of supervision with closed-circuit television (CCTV) increases, the level of safety in the airside area at Juwata Tarakan Airport also increases.

Based on the analysis results, the calculated t value is 19.080 > t table (1.662) and the sig value obtained is 0.000 < 0.05, thus Ho is rejected and H1 is accepted, leading to the conclusion that 'There is an Influence of Supervision with Closed-Circuit Television (CCTV) (X) on the Safety of the Airside Area (Y)'.

3.2 Disccusion

Based on the results of statistical analysis, monitoring with CCTV has a significant impact on the safety of the airside area at the BLU UPBU Class 1 Utama Juwata Tarakan Office. This is evidenced by a calculated t value of 19.080 > table t value of 1.662 and a significance of 0.000 < 0.05. The regression equation Y = 6.245 + 0.845X shows that increasing the effectiveness of CCTV has a positive impact on safety. This result is supported by the theories proposed by (Akhmad, 2021) and (Indah, 2024), that optimal monitoring with closed-circuit television (CCTV) will increase levels of safety, security, and order in the airside area. In this study, there are indicators that have a high value regarding airside safety; one such indicator states that the use of closed-circuit television (CCTV) helps detect violations such as smoking / disposing of FOD in the apron area has the greatest impact. Thus, the relationship between these two variables has been proven.

Based on the results of the questionnaire indicating that 83% of respondents stated that monitoring through CCTV in the movement area is currently not optimal, it can be concluded that the effectiveness of the CCTV security system still needs to be improved to maximally support the safety of the airside area at the BLU Office of UPBU Class I Main Juwata Tarakan. Although most areas are already equipped with CCTV, the quality of monitoring is not yet fully adequate. This is shown by the majority respondents (as many as 41 people) who rated the effectiveness of CCTV surveillance as low. The factors influencing this include the limited number of cameras, viewpoints that do not cover all crucial areas, and the potential delay in response to visual findings. Thus, the impact of CCTV effectiveness on airside safety is very significant, where an unoptimized system can increase the risk of security and flight safety disturbances. Therefore, a comprehensive evaluation and improvement of the CCTV system is necessary, including adding the number of units, improving image quality, and enhancing response speed to recorded incidents.

4. CONCLUSIONS

There is a significant influence of CCTV monitoring on the security of the airside area. This is evidenced by the results of a simple linear regression analysis, with a t-test value of 19.080 and a significance level of 0.000, which is less than 0.05. Therefore, it can be concluded that the alternative hypothesis (H1) is accepted and the null hypothesis (H0) is rejected. This means that there is an impact of CCTV monitoring on the safety of the airside area and that CCTV monitoring provides a significant contribution.

The effectiveness of the CCTV security system has been proven to support operational oversight in the airfield, including monitoring aircraft movement, Ground Support Equipment (GSE) vehicles, and personnel activities. This reinforces the role of CCTV as a preventive and responsive surveillance tool against potential violations and safety incidents. However, the effectiveness of CCTV surveillance still faces challenges, such as the limited number of cameras, areas that are not yet under monitoring, and technical disturbances. This condition indicates that surveillance is not yet fully optimal and still requires infrastructure improvements and continuous evaluation.

5. SUGESTIONS

The increase in the effectiveness of surveillance using CCTV needs to be a priority for the management of Juwata Tarakan Airport. This can be achieved by adding more cameras in areas that are not yet covered, improving the quality of the equipment, and conducting regular maintenance to avoid technical disruptions.

For future researchers, it is recommended to conduct further studies on the ideal and effective number of CCTV cameras to monitor the airside area, particularly the apron, in accordance with the area size and complexity of operational activities. This further research is expected to produce technical recommendations in the form of a minimum number of CCTV and optimal strategic installation positions, so that oversight can be carried out comprehensively and maximally.

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