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Risk Management Analysis Based on ISO 31000:2018 at Andi Djemma Masamba Airport, Luwu Regency

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Abstract

The density of activities that take place around the operating facilities at Andi Djemma Masamba Airport so that the Management of the Andi Jemma Airport Operator Unit Office has launched the development of Andi Djemma Masamba Airport as an aviation company so that it continues to carry out various facility improvements, especially in risk prevention with potential activities with high losses, therefore it is necessary to conduct research to find out how to map, risk assessment and design a risk control and mitigation system at the Operations facility at Andi Djemma Masamba Airport caused by activities that have the potential to cause risk. The stages of the risk management process refer to ISO 31000: 2018 including risk identification, risk analysis and risk evaluation. Risk analysis aims to assess risks from a list of confirmed risks. This is done by multiplying the magnitude of the risk impact by the probability of its occurrence, to determine the severity of the risk. The input for this stage is a list of confirmed risks. Expected impact and likelihood of occurrence are mapped through the risk matrix from the Federation Aviation Administration (FAA). The results showed that at the andi djemma masamba airport there were 6 events that fell into the red category, namely Aircraft accidents during take off/landing, Aircraft accidents in the apron area, Escape of dangerous goods into the aircraft, Fuel Spills on the Apron/Taxiway, Lack of building maintenance, The security inspection process is less than optimal.

1. INTRODUCTION

Each airport can address risks based on its location, size, and operational environment. Therefore, it is important to carry out a comprehensive and specific risk analysis according to the situation of each airport, so that the development of a Safety Management System is formed following these characteristics. To anticipate all existing risks, it is necessary to carry out risk management so that work accidents and their potential impacts can be avoided. This will not hinder the smooth running of the work (Rahajaan et al., 2019).

The dense activity that takes place around the operational facilities at the airport can create risks. It is important to implement risk management, or efforts to deal with risks that will arise so that it is hoped that workers will be able to handle emergencies to avoid work accidents and be able to resume operational activities. (Dayu et al.,2022).

Good risk management in companies is very important for the sustainability of projects and departments themselves, especially in management bureaus (Debrina et al., 2016). The ISO 31000 approach aims to help resolve problems related to all forms of risk in a structured manner and various scopes and contexts of problems (Anita et al., 2021). The aim of ISO 31000 is to help organizations identify, assess, and manage risks in a systematic, structured, and integrated manner.

Andi Jemma Airport plays an important role as an air transportation place and a driver of economic progress, considering the needs of the community, especially the people of Masamba, Seko and Rampi for transportation access in the area. Andi Jemma Masamba Airport is a technical implementing unit within the

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Directorate General of Civil Aviation which of course administratively and operationally is under the Directorate General of Civil Aviation, Ministry of Transportation

The condition of Andi Jemma Airport is currently operating from Monday to Saturday, with an average of 4 to 6 flights a day and the services provided are passenger and cargo services. The high flow of passenger and cargo services means that the Management of the Andi Jemma Airport Management Unit has launched the development of Andi Djemma Masamba Airport as an aviation company so that it continues to make various improvements to facilities, especially in preventing risks with potential activities with high losses and overcoming them in order to support airport services. Air to the maximum, safety aspects are a high priority which must be prioritized for the sake of sustainable air transportation activities (Cahayani et al., 2022). Therefore, it is necessary to carry out research to find out how to carry out mapping, risk assessment and design of control and risk management systems at operational facilities at Andi Djemma Masamba Airport caused by activities that have the potential to cause risk.

Based on this background, the researcher carried out research with the title "Iso 31000: 2018 Based Risk Management Study at Andi Djemma Masamba Airport, North Luwu Regency". With this research, it is hoped that benefits will be obtained in the form of a good understanding of risk management, risk assessment using the ISO 31000:2018 standard, mapping risks into the *Federal* Aviation Administration (FAA) risk matrix, designing risk controls, and providing clear direction, boundaries and responsibilities for the implementation of Risk Management. The aim of this research is to analyze the mapping and risk assessment of operational facilities at airports and determine a list of potential risks, risk assessment of operating facilities at airports based on ISO 31000 standards and determine risk control against potentially dangerous risks at operating facilities. The Federal Aviation Administration (FAA) uses the risk matrix as a tool to evaluate and assess the risks associated with various aviation activities and operations. A risk matrix is a visual representation that helps identify the likelihood and severity of a risk that may occur.

2. METHODS

2.1 Types Of Research

Judging from the type of data, the research approach used in this research is qualitative. Based on the problems studied, this research from the sampling aspect is included in the survey research category. Respondents in this study were employees who had experience operating facilities to obtain subjective answers. Then the qualitative data will be processed into quantitative data based on categories.

The population that will be used in this study is officers within the technical scope of the airport consisting of:

Population	Position	Sum
Head of class III airport office	Head of Airport Management Andi Djemma Masamba	1
Aviation Security and Safety Sub-Section	Head of Aviation Security and Safety Subsection Petugas senior AVSEC Senior PKP-PK officer Petugas junior AVSEC Petugas junior PKP-PK Apron attendant Hygiene and sanitation officer Airport mechanic level 1	25
Aviation technician functional position group	Supervisory flight technician Advanced executing flight technician Executing flight technician	5
Administrative affairs	Head of Administrative Affairs Financial manager Personnel manager	9

	General administration	
Overall total		40

Of the total population, there are 40 people, so according to the opinion above and considering the number of samples for this study, there are only 22 employees who are directly related to activities that can pose risks

2.2 Data Analysis Technique

The risk management research method is carried out referring to ISO 31000. The stages start from risk identification, risk analysis and risk evaluation. All identified risks take into account their impact on the goals the company wants to achieve. Risk identification is the process of identifying all possible risks that may occur in a project or organization. Risks can come from a variety of sources, such as government policy, industry competition, market changes, or internal problems such as system failure or data loss.

Risk analysis aims to assess risks from a list of confirmed risks. This is done by multiplying the magnitude of the risk impact by the probability of its occurrence, to determine the severity of the risk. The input for this stage is a list of confirmed risks. Risk mapping is carried out between the impact value and the probability value of the event using the risk matrix provided. From the risks mapped, the types of risks can be seen from the most potential or dangerous to those that are normal or tolerable.

Control systems are created to assist in making decisions. The control system takes the form of preventing risk events that have not yet occurred and handling risks that have occurred, through a risk control plan. At the risk control planning stage, a validation process and ongoing discussion with the company is required. This aims to ensure that the control and mitigation plans designed are relevant and possible for the company to implement.

The research instrument is a questionnaire with a questionnaire method and the score results are carried out using the Likert Scale. All results of the respondent questionnaire were then tabulated to become import data for *software programs*. A research instrument is a tool that uses a scale to measure the value of the variables being researched with the aim of producing accurate qualitative data. By using the questionnaire method as a data collection tool with the Likert Scale and in order to make the coverage of information more complete and on the target, before the preparation of the instrument grid includes the variable instrument of possible risk on the *runway*, the variable instrument of possible risk around the apron and the variable instrument of possible risk in the terminal building.

3. RESULT AND DISCUSSION

3.1 Respondent Profile

The respondents in this study were officers at Andi Djemma Masamba Airport who worked at airport operations facilities and based on the existing population, the sample used was 22 people. The 22 respondents who participated in this research were further grouped based on gender, age, education, length of work and experience with risk management at Andi Djemma airport.

Table 1. Respondents by Gender

No	Gender Category	Amount	Percentage (%)
1	Male	10	46
2	Female	12	54
	Total	22	100

Table 2 Respondents Based on Age

No	Age Category	Amount	Percentage (%)
1	20 – 24 years old	13	59
2	25 – 30 years old	5	23
3	> 30 years old	4	18
	Total	22	100

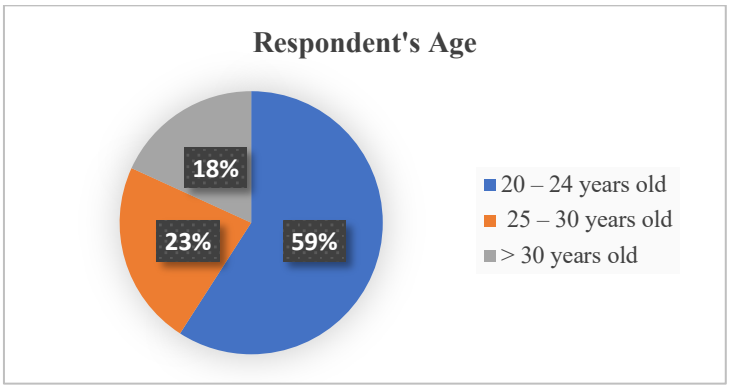


Figure 1. Percentage of Respondents by Age

Table 3 Respondents Based on Education

No	Education Category	Amount	Percentage (%)
1	Senior High School	7	32
2	Diploma Level	7	32
3	Undergraduate Level	8	36
	Total	22	100

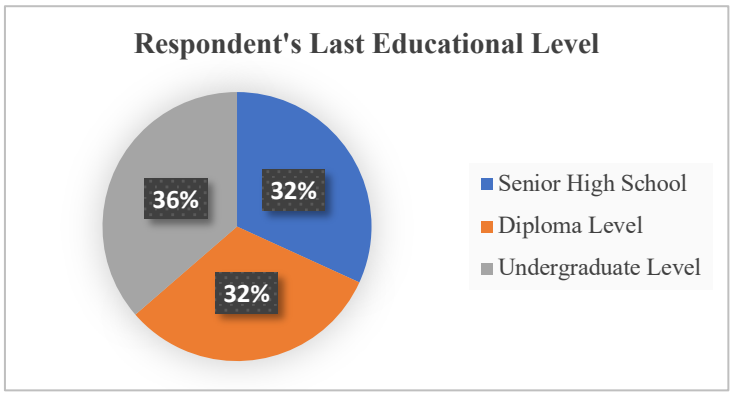


Figure 2. Percentage of Respondents Based on Education

Table 4 Respondent Based on Length of Work

No	Length of Work Category	Amount	Percentage (%)
1	1 – 3 years	12	55
2	4 – 6 years	4	18
3	6- 10 years	6	27
	Total	22	100

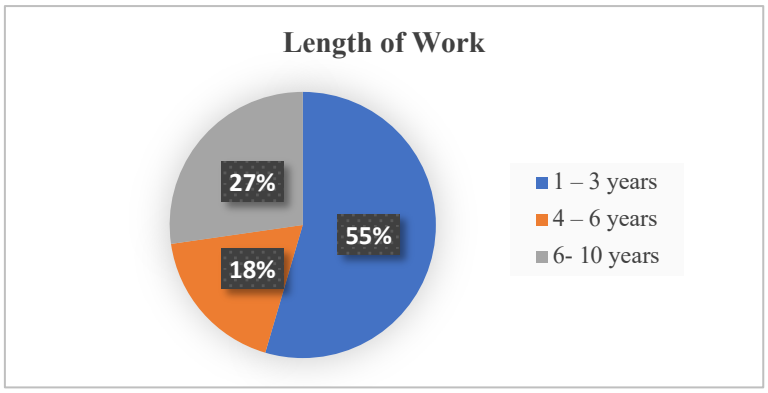


Figure 3. Percentage of Based on Length of Work

Table 5 Respondents Based on Experience with Risk Management at Andi Djemma Airport

No	Risk Management Experience Category	Amount	Percentage (%)
1	1 – 3 years	15	68
2	4 – 5 years	4	18
3	5- 10 years	3	14
	Total	22	100

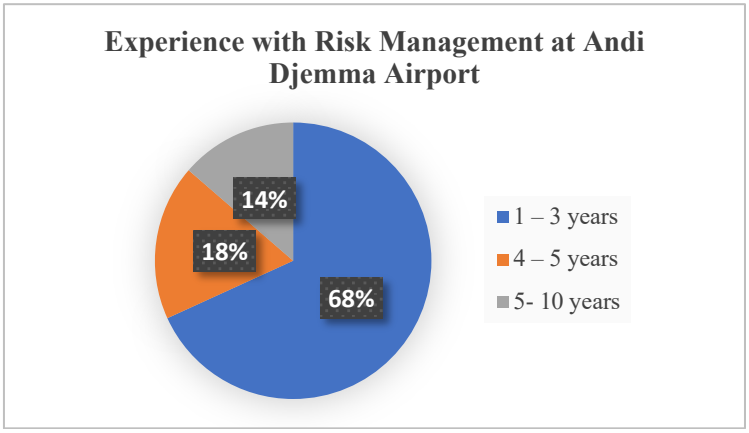


Figure 4. Percentage of Respondents Based on experience with risk management

3.2 Instrument Testing

3.2.1 Validity Test

The validity test is used to measure whether the questionnaire used is valid or not. The analytical tool used to measure the validity of the data is the correlation coefficient depicting α = 5% with the condition that it is said to be valid if the calculated r > r table and the significant value is > 0.5.

Table 6 Results of Runaway Variable Statement Item Validity Test (X1)

Indicator	$r_{count\ (KK)}$	$r_{count\ (D)}$	r_{table}	Significance Value	Information
X1.1 = *Runway* Surface Breaks	*0.747*	*0.502*	*0.404*	*0.000*	Valid
X1.2 = Occurrence of Obstacles on the *Runway*	*0.839*	*0.554*		*0.000*	Valid
X1.3 = Plane Crash During Take Off or Landing	*0.816*	*0.559*		*0.000*	valid

Table 7 Results of the Validity Test of Variable Statement Items of the Passenger Terminal (X3)

Indicator	$r_{count\ (KK)}$	$r_{count\ (D)}$	r_{table}	Significance Value	Information
X3.1 = Operational disruption and terminal services	*0.786*	*0.598*	*0.404*	*0.000*	Valid
X3.2 = Stacking of goods in cargo	*0.694*	*0.582*		*0.000*	Valid
X3.3 = The security check process is not optimal	*0.613*	*0.537*		*0.002*	Valid
X3.4 = Slipping of dangerous goods into the plane	*0.715*	*0.615*		*0.001*	Valid

X3.5 = Shortage of employees	*0.601*	*0.806*	*0.003*	Valid
X3.6 = Lack of building maintenance	*0.650*	*0.578*	*0.001*	Valid
X3.7 = Passenger density at the terminal	*0.669*	*0.738*	*0.003*	Valid

Based on the table above which is the result of the validity test, it can be seen that all statement items have a correlation coefficient value (*rcount* > *rtable*) and a significance value below 0.050 so that it indicates that the data obtained is valid.

3.2.2 Reability Test

Reliability is a tool used to measure a questionnaire which is an indicator of a variable. A questionnaire is said to be reliable or reliable when the respondent's answers to statements are consistent or stable over time. To measure reliability with the Cronbach Alpha (α) statistical test, a construct or variable is said to be reliable if it provides a Cronbach Alpha value > 0.60 (Ghozali, 2011: 48). The results of reliability testing in this research are as follows:

Tabel 8 Reaibility Statistics

Variabel	Cronbach's Alpha	N Of Items
X	**0.832**	12
Y	**0.898**	3

The results of the reliability test show that the Cronbach's Alpha value (0.832 & 0.898) > 0.60, thus it can be concluded that all reliable X and Y measurements in the questionnaire are reliable

3.3 Risk Mapping

According to Darmawi (2008) "Risk identification is a process that is systematically and continuously carried out to identify the possibility of risk arising." The risk identification method is an interview with the head of aviation security and safety, who is considered competent in understanding the sources of risk, events, causes and potential consequences.

According to Darmawi (2008) "Risk identification is a process that is systematically and continuously carried out to identify the possibility of risk". The risk identification method is an interview with the head of the aviation security and safety section, who is considered qualified in understanding the source of risk, events, causes and potential consequences. Data on all possible negative risk events can be seen as follows:

Table 9 List of Risk Events and Causes and Its Impact

NO	LIST OF EVENTS	CAUSES OF RISK	RISK IMPACT
1.	Runway surface breaks	· Increase in traffic · Declining groundwater level · Dummy joint missed · Technical Age	· Loss of company assets Declining service levels · Loss of property and human life · *Runway* closed
2.	Obstacles on the *runway*	· Less than optimal supervision from airport officers · Barriers to coordination with related institutions · Socialization to the community is not good	· There was a plane accident
3.	Plane crash during take-off/landing	· FOD · *Runway* Incursion · Bird Strike · Kite · Standing water	· Loss of property and human life · Disruption of corporate image

4.	Plane accident in the apron/taxiway area	· Miscommunication about the movement of aircraft and vehicles in the apron area · Marking and sign are not clear · Inadequate groundhandling facilities · Limited area of the Appron	· Loss of property and human life · Complaints from airlines · Disruption of corporate image
5.	There is a fuel spill on the apron/taxiway	· Negligence of the refueling officer · Problematic fuel hose · Aircraft fuel tank leaks	· Loss of property and human life · Flight delays due to control
6.	Operational and service disruptions at the terminal	· Limited number of competent human resources · The development of airport facilities is not balanced with the growth of airport service users	· Complaints from airlines · Disruption of corporate image
7.	Stacking of goods in cargo	· The number of X-rays is only 1 unit · Cargolast minute freight forwarding culture · The condition of the X-Ray is old · Insufficient warehouse area	· Declining service levels · Disruption of corporate image
8.	Inspection process Security is not optimal	· The number of human resources is inadequate · The performance of security facilities declined · The quality of officer service is inadequate	· Disruption of corporate image · There was a queue of passengers
9.	Slipping of dangerous goods into the plane	· X-ray technology cannot detect DG · Agent doesn't understand DG handling · Limited number of DG-certified AVSEC HR	· Loss of property and human life · Complaints from airlines
10.	Shortage of employees	· Changes in organizational structure · The employee needs map has not been implemented optimally · The recruitment pattern has not been balanced with the formation	· Work results are not optimal
11.	Lack of building maintenance	· Unpredictable weather · Lack of optimal performance of maintenance staff	· Loss of company assets · Disruption of corporate image
12.	Passenger density at the terminal	· Limited check-in counter facilities · Airline demand during golden time · Inadequate security equipment	· Disruption of corporate image

3.3.1 Risk Evaluation

Risk evaluation aims to select the most potential risks from the list of existing risks. The way to do this is by mapping the list of risks resulting from the risk analysis into the FAA risk matrix. Risk mapping is carried out between the impact value and the probability value of the event using the risk matrix provided. From the risks mapped, the types of risks can be seen from the most potential or dangerous to those that are normal or tolerable.

The value of each respondent's answer to the event that has been obtained is then calculated by calculating the median, mode, standard deviation, highest value and lowest value using Microsoft Excel worksheet software. This attribute value is obtained from subjectivity through the process of filling out a questionnaire with the calculation results as shown in Tables 7 and 8 below:

Table 7 Calculation of Probability Statistics

Event No.	Possible Event

	Median	Mode	ST Dev	maximum	minimum	Mode Values Are Rounded
1	3	4.0	0.9258	2	4	4
2	3	3.5	1.0538	1	4	3
3	2.5	3.0	0.9351	1	4	3
4	2	2.5	1.0022	1	4	2
5	2.5	2.0	1.0075	1	4	2
6	3	2.0	1.4111	1	5	2
7	2	2.0	1.2792	1	5	2
8	2.5	2.0	1.4683	1	5	2
9	2	2.0	1.1010	1	4	2
10	2	2.5	1.1406	1	4	2
11	2	2.0	0.8985	1	4	2
12	2	3.0	1.1358	1	5	3

Table 8 Calculation of Impact Statistic

Event No.	Impact					
	Median	Mode	ST Dev	maximum	minimum	Mode Values Are Rounded
1	3	3.0	0.7516	4	2	4
2	2	3.5	0.9989	5	2	3
3	5	4.5	0.9069	5	3	3
4	5	5.0	0.945	5	3	2
5	4	4.0	0.7025	5	1	2
6	2	2.0	0.7327	3	1	2
7	2	2.0	0.5284	3	1	2
8	3.5	3.0	0.7854	4	2	2
9	3	4.0	0.8985	5	3	2
10	1	2.5	0.9715	4	1	2
11	3	3.0	1.0414	4	1	2
12	3	3.0	0.9946	4	1	3

3.3.2 *Risk Matrix From the Federation Aviation Administration (FAA)*

The FAA risk matrix is used because the FAA already has good experience in aviation matters. The scale criteria refer to the FAA, namely 1-5 as in Table below:

Table 9 Scale of Probable Events and Impact

No.	Possibility	Score	Impact
1	Often	5	Big Disaster
2	Possible	4	Dangerous
3	Small possibility	3	Big
4	The possibility is very small	2	Small
5	Very Impossible	1	There is No Serious Impact

Table 10 Risk Level

No	Risk Level	Information
1	HIGH RISK	Risks that really need to be handled as quickly as possible, and the impact is very large
2	MEDIUM RISK	Risks that require handling and their impact are large
3	LOW RISK	Risks that can be avoided and can be overcome

Table 11 Risk Mapping uses the FAA Risk Matrix

POSSIBLE EVENT	IMPACT					
		1	2	3	4	5
	1					
	2	**10**	**6,7**	**8,9,11**	**5**	**4**
	3		**2**	**12**		**3**
	4			**1**		
	5					

Based on table 11, it was found that there were 6 risk events that fell into the red category, while 3 were in the yellow category, and 1 was in the green category. All risks in the red zone receive special treatment, namely in the form of further treatment. All risks in the red zone are then recorded in the list of potential risks. The following is a table listing the potential risks that have been obtained:

Tabel 12 List of Potential Risk

No	Name of The Risk Event	Possibility	Impact
1	The security inspection process is less than optimal	2	3
2	Passage of dangerous goods into the aircraft	2	3
3	Minimal building maintenance	2	3
4	There is a fuel spill on the apron/taxiway	2	4
5	Plane accident in the apron/taxiway	2	5
6	Plane accident during take off/landing	3	5

3.3.3. Operating Planning

The operating system is made to assist in decision-making. The control system is in the form of prevention of risk events that have not yet occurred and the handling of risks that have occurred, risk control plans. At the risk control planning stage, a validation process and continuous discussion are needed with the company. This is so that the control and mitigation plan designed can be relevant and possible for the company to implement. Here are the control systems created for all six types of potential risk events that have been detected:

a. Plane accident during take off/landing

Some of the causes of the risk of airplane accidents during take off/landing are: foreign object debris (FOD), runway incursion, bird strikes, kites and standing water. Some efforts to prevent the risk of accidents are: regular supervision, coordination of related units and facility maintenance SOPs. Based on these causes, control is carried out by making chronological reports, coordinating related units, and improving facilities.

b. Plane Crash in the Apron Area

Some of the causes of aircraft accidents in the apron area are: inadequate competence of ground handling officers, officers lacking order in arranging work facilities after use, miscommunication regarding the movement of aircraft and vehicles in the apron area, limited number of AMC officers, unclear markings and signs, ground vehicle facilities inadequate handling, and limited apron area. Several efforts to prevent aircraft

accidents in the apron area are: training and education for officers in the apron area, increasing inspections, increasing the number of personnel, socializing markings and signs with officers, repainting markings and signs, replacing vehicles with adequate ones, maintaining vehicles, expanding apron area, and layout settings. Meanwhile, the controls are: accident investigation, coordination with related units, coordination with public relations and making a chronological report

c. Passage of dangerous goods into the aircraft

Some of the causes that cause dangerous goods to escape into aircraft are: X-ray technology cannot detect dangerous goods (DG), there are other doors that are not guarded, the number of DG-certified AVSEC (aviation security) human resources is limited, officer training and education. Some efforts to prevent the passage of dangerous goods into aircraft are: X-ray calibration, manual inspection by officers, purchasing the latest X-ray models, placing personnel, coordinating goods through X-ray, increasing overtime working hours, and checking X-rays one by one. Meanwhile, the controls are: coordinating with public relations, securing dangerous goods, making chronological reports, and coordinating with related units.

d. There is a fuel spill on the apron/taxiway

Several causes that cause fuel spills on the apron/taxiway are: a leak in the fuel loading device to the aircraft, incorrect estimation of the amount of refueling. Several efforts to prevent fuel spills on aprons/taxiways are: manual inspection by officers, placing personnel, coordinating filling personnel. Meanwhile, the control is: securing the affected area, making a chronological report, and coordinating with related units.

e. Minimal building maintenance

Some of the causes of minimal building maintenance are: lack of inspection of the building, maintenance only focuses on a small part of the building. Some efforts to prevent minimal building maintenance are: manual inspection by officers, providing employees with an understanding of how to always look after the building, such as keeping it clean. Meanwhile, the controls are: coordinating with section heads, making chronological reports, and coordinating with related units, immediately carrying out maintenance, especially on vital airport buildings.

f. The security inspection process is less than optimal

Some of the causes that make the security inspection process less than optimal are: the presence of other doors that are not guarded, the number of DG-certified AVSEC (aviation security) human resources is limited, training and education of officers. Some preventative measures for the security inspection process are less than optimal, namely: manual inspection by officers, placing personnel always on standby. Meanwhile, the controls are: training and education of officers, making daily reports, and coordinating with related units.

Control only reaches the planning stage and is not continued into the implementation stage so its durability cannot be tested but is good enough for current risk control. Each control has a strength value against risk. This research does not involve an assessment of the control system, but ends with the registration of the control system, because this assessment can be carried out if the control system has been implemented for a long time. Further research needs to be developed to the implementation stage so that an assessment of the control system can be carried out. The results of this study are also in accordance with the initial hypothesis that risk management is important to be applied in the context of Andi Djemma Airport because it has potential risks.

4. CONCLUSIONS

1. Based on mapping and risk assessment using the FAA risk matrix and statistical calculations of the probability of occurrence and impact of events, the mode value obtained from respondents' answers to 12 lists of events was obtained, then it was found that there were 6 risk events that were in the red category (high risk level) , while 3 is for the yellow category (medium risk level), and 3 is for the green category (low risk level).
2. After obtaining 6 risk events that are included in the list of potential risks, namely, 1) Plane accident during take off/landing, 2) Plane accident in the apron area, 3) The escape of dangerous goods on board the plane, 4) There is a fuel spill on Apron/Taxiway, 5) Minimal building maintenance, 6) The security inspection process is less than optimal. Major events that fall into the dangerous category and require special treatment

have been provided with a control and prevention system. The design of the risk control system has been well made, because it has been subjectively validated by the relevant fields.

3. ACKNOWLEDGMENTS

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4. REFERENCES

Anita A. & Taufik I., (2021).Analisis Manajemen Risiko Dengan Penerapan ISO 31000 Pada Proses Machining (Studi Kasus: Perusahaan AB)

Cahayani A. & Arif F. (2022). Evaluasi Penerapan Sistem Manajemen Keselamatan (Safety Management System) Terhadap Sumber Daya Manusia Unit Safet Management System di Bandar Udara Sultan Muhammad Kaharudin

Dayu, A. & Desiana R.,(2022). Analisis Implementasi Manajemen Risiko Operasional *Runway* Pt Angkasa Pura I Bandar Udara Internasional Juanda Surabaya Jawa Timur

Debrina P. & Amalia D., (2016). Analisis Penerapan Manajemen Risiko Berdasarkan ISO 31000 pada proyek Konstruksi Pengembangan Fasilitas Gas .

Hendarwan, D. (2022). *Penerapan ManajemenRisiko (Risk Management) DenganPendekatan ISO 31000:2018 Dalam Pelaksanaan Strategi Perusahaan. Jurnal Adminika,* 8(1), 58–73.

Herliyanto, T. (2019). Perencanaan dan Perancangan Bandar Udara. Bandung: Penerbit ITB

Heriawan, A., & Saputra, R. (2018). Evaluasi Risiko pada Manajemen Bandar Udara dengan Pendekatan *Risk matrix*. Jurnal Ilmiah Teknik Industri, 17(1), 34-41.

Izami, F. N. (2022). Implementasi Pengendalian Risiko untuk Meminimalisasi Kerugian. Jurnal Riset Mahasiswa Ekonomi (RITMIK), 4(2), 62–74.

Janna, N. M., & Herianto. (2021). Konsep Uji Validasi dan Realibilitas Dengan Menggunakan SPSS. Jurnal Darul Dakwah Wal-Irsyad (DDI), (18210047), 12.

Lanin, I. (2018). Standar Baru Manajemen Risiko ISO 31000:2018. *(Vol. 15, pp. 104–116).*

Mardi Setiawan, P. P. (2017). Implementasi Pengendalian Risiko Terhadap Kecelakaan Kerja Pada Landasan Helikopter. Journal of Chemical Information and Modeling, 53(9), 1689–1699.

Nugrahani, F., & Hum, M. (2014).Metode penelitian kualitatif. *Solo: Cakra Books*, *1*(1), 3-4.

Nurcahyani, R., & Setiawan, A. (2019). Evaluasi Risiko pada Manajemen Keamanan Bandar Udara. Jurnal Teknik Sipil, 6(2), 97-105.

Pradana, I. K., & Imbar, R. (2018). Analisis Risiko Implementasi ISO 31000:2018 pada Proyek Konstruksi Jalan Raya. Jurnal Ilmiah Teknik Industri, 17(1), 60-66.

Pramudito, A., & Nugroho, A. (2019). Analisis Risiko pada Pengembangan Infrastruktur Bandar Udara. Jurnal Rekayasa Sistem Industri, 8(1), 1-7.

Rahajaan, M., Gafi, M. G. A., Supardi, S., & Bachmid, S. (2019). Manajemen Risiko Keselamatan dan Kesehatan Kerja (K3) Pada Proyek Konstruksi Gedung (Studi Kasus: Pembangunan RSIA Ananda Kota Makassar). *Jurnal Ilmiah Mahasiswa Teknik Sipil*, *1*, 363–371

Sutopo, H. B. (2017). Metode Penelitian Kualitatif: Dasar Teori dan Terapannya dalam Penelitian. Surakarta: UNS Press.

Suroso, I. (2020). Karakteristik Brake Lining Pada Pesawat Cessna Type 208b. Teknika STTKD: Jurnal Teknik, Elektronik, Engine, 6(1), 17–24.

Sutisna, icam. (2020). Statistika penelitian. Universitas Negeri Gorontalo, 1(1), 1–15.