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IMPLEMENTATION OF RISK MANAGEMENT IN THE TRADITIONAL SHOPPING CENTER OF JETAK VILLAGE FOR FIRE PREVENTION

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ABSTRACT

There were 17,768 cases of fires in Indonesia in 2021, with 5,274 issues of which were caused by short-circuit electricity. In early January 2022, a fire occurred in the most prominent traditional shopping center in Kudus caused by a circuit of currents. This study aims to identify risks, compile risk ratings, and control strategies to minimize fire risk—methods of retrieving data with observation and interviews using hazard identification and risk assessment checklist sheets. At the same time, the assessment method uses a risk assessment matrix. The results of observation obtained the source of danger comes from the condition of the building facilities and the process of activities carried out. At the same time, the results of the classification of risks obtained nine risks that can be the cause of fire in the traditional shopping center of Jetak Village and divided into 3 levels, namely very high-risk level, high risk, and moderate risk. Dominant risks can occur, such as the short circuit of electric current due to cable use, cable conditions, placement of electrical panels in dangerous locations, and excessive use of outlets. Mitigation measures that can be used are risk reduction by moving panel locations, using standard cables, applying the 5R rule, and providing signs of danger at the source of existing hazards. From these results, efforts are needed to prevent fire management, namely the provision of building safety facilities such as evacuation routes, gathering points, and the condition of Light Fire Extinguishers.

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Keywords: Fire, Risk Management, Traditional Shopping Mall.

INTRODUCTION

The application of safety is the primary concern and is very serious in all industrial sectors, both formal and non-formal. Every industrial sector has potential hazards or hazards arising from every production process. According to OHSAS, Hazard is a source of danger, situation, or activity that can cause injury (work accident) or work-related illness (PAK). Hazards can pose various kinds of risks (OHSAS, 2007). Fire is an unwanted event because it can result in material and moral losses. When a fire occurs, a fire occurs as a reaction to a chain process between combustible materials (fuel), oxygen, and heat (heat), often called the fire triangle. The oxidation processes continue until one of the fire-forming elements ends. To prevent a fire from occurring, one of these components must be avoided/disconnected (Ahmad, 2019). Throughout 2021, there were 17,768 cases of fires occurring in Indonesia, with 5,274 points of which were caused by electrical short circuits (Anonim, 2022). In early January 2022, a fire happened at the most significant traditional shopping center in Kudus caused by an electric short circuit (Habeeb et al., 2022). This shows that fires can potentially occur in any sector with various impacts.

Based on a preliminary survey conducted at the Jetak Village traditional shopping center, the building consists of 1

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floor that provides or sells various basic and consumer needs. Facilities have the potential for fires caused by the danger of electrical currents, wiring that is not neatly arranged, the use of LPG gas, throwing cigarette butts carelessly, and using overloaded sockets (Daniel Podgorski, 2015). In addition, there are flammable materials such as clothes, plastic, electronic goods, and goods made of wood that support the chemical process of a fire. Jetak Village's traditional shopping centers have not yet implemented Building Fire Management (MKG), such as the unavailability of evacuation routes, assembly points, and the provision of Light Fire Extinguisher (APAR) facilities which are still lacking (Degreve & Berghmans, 2012).

This condition is not following the implementation of APAR based on Permenakertrans No. Per-04/Men/1980 Concerning Requirements for Installation and Maintenance of Light Fire Extinguishers and PU Regulation No. 26 of 2008 concerning Technical Requirements for Fire Protection Systems in Buildings and the Environment. APAR conditions that need to follow the standards will affect APAR's ability, convenience, and readiness to prevent the fire from becoming large so that it can cause a large fire (Purnamasari, 2018).

Management of fire prevention and control plays an essential role in eliminating the risk of fire and controlling losses caused by fire incidents. The elements of fire safety management can be assessed from the achievement of OHSAS 18001 and the extent to which the implementation of fire safety management can run efficiently and effectively. Based on the results of research conducted by Anwar Ahmad (2013) concerning the Effect of Fire Safety Management on Building Reliability in Anticipating Fire Hazards in Flats Buildings in Makassar, namely the calculated value of implementing fire safety management is only around 15.45%, including one of them is the training system by 14.35% (Liu, Dou, & Meng, 2021).

While the results of research by Kerzner, (2013) a shopping center or mall has the potential for fires caused by short circuits, air conditioners, generators, televisions, stoves, water heaters, LPG gas explosions, and flammable items such as spring beds, sofas, electronic goods and items made of wood, so it is necessary to form a fire management team consisting of the person in charge of the MKG/representative, the fire fighting team, the evacuation team, the technician team, and the security team. This is following the Decree of the Minister of Manpower No. Kep.186/MEN/1999 states that fire fighting teams are determined for workplaces with a risk level of only mild and moderate fires I, which employs a workforce of 300 people or more, or each workplace with moderate II, medium III, and severe fire risk levels (Habeeb et al., 2022).

Meanwhile, the management staff for the Jetak Village traditional shopping center still needs to identify and develop a strategy to manage risks, especially fires. One of the factors is the need for more understanding of the benefits of risk management. Thus, the limitations for implementing fire safety management revolve around building reliability, identifying rank risks, and strategies to prevent fires at the Jetak Market.

LITERATURE REVIEW

Risk management applies general management related to various activities that can cause risk. Kucuk Yilmaz, A. (2019) describe that risk management must also manage the overall risks of the organization. *Risk management* is identifying, measuring, and ensuring risks in developing strategies to manage these risks (Kerzner, 2013). In this case, risk management will involve processes, methods, and techniques that help determine the probability and consequences of a hazard (Robert et al. 2014).

In implementing risk management, several steps need to be carried out. This is intended so that the risk management process can run properly and accordingly. The steps that need to be carried out in implementing risk management are determining the context, conducting risk identification, risk assessment, risk analysis, and risk mitigation (Hakim, 2017). The risk management process chart according to AS/NZS 4360: 2004 can be seen in **Figure 1**.

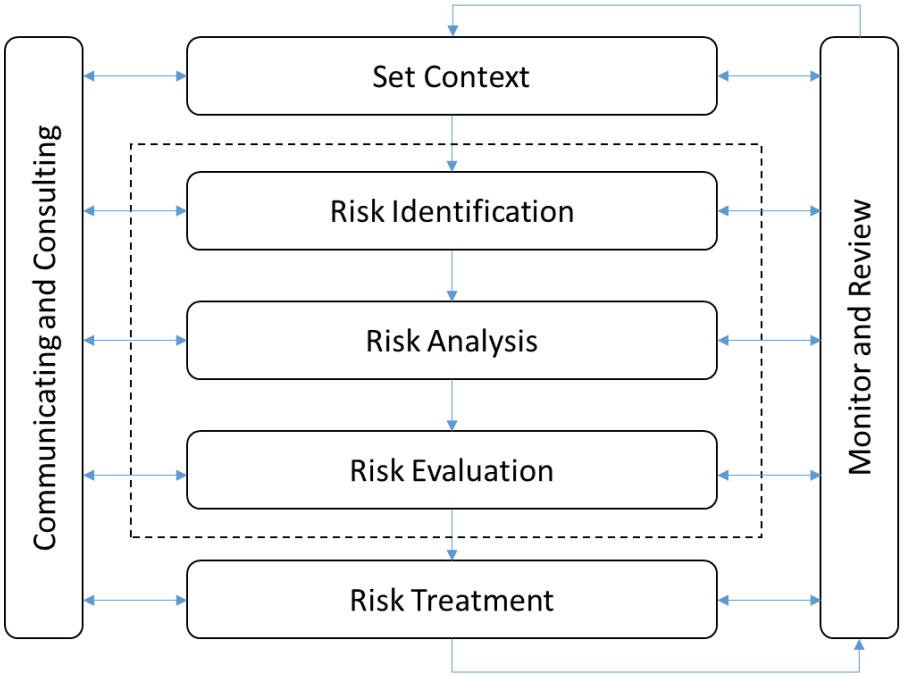

Figure 1. Stages of the risk management process according to AS/NZS 4360:2004

Process stages are indicated by downward arrows, while back-and-forth arrows indicate two-way involvement at each stage. To determine the level of likelihood, severity, and risk level scale based on AS/NZS 4360:2004 can be used in **Table 1**, **Table 2**, and **Table 3** (Australia, 2004).

Table 1. Likelihood level values

Likelihood	Rating	Description
Improbable	1	Very rarely
Unlikely	2	Seldom
Occasional	3	Possible
Probable	4	Often
Frequent	5	Very often

Table 2. Severity rating

Severity	Rating	Description
Negligible	1	Does not interfere with the work process, no injuries/injuries, small financial losses, medical expenses < 100 thousand.
Minor	2	Handling first aid, does not really need outside help, moderate financial costs, medical expenses < 1 million
Moderate/Serious	3	Requires medical treatment, impaired
Major	4	job, financial loss is quite large, need outside help, medical expenses < 10 million.
Catastrophic	5	Lost working days, permanent/partial disability, moderate environmental damage, large financial loss, medical expenses < 50 million

Table 3. Risk level scale

Risk rank	Description
17 – 25	Extreme high risk
10 – 16	High risk
5 – 9	Medium risk
1 – 4	Low risk

Then carry out a risk assessment and analysis to determine the magnitude of the current risk level. Risk analysis is carried out to determine the magnitude of a risk by considering the level of severity and the possibilities that might occur by creating a risk matrix (Australia, 2004). Evaluation of the level of risk is depicted in **Figure 2**.

Figure 2. Risk matrix according to AS/NZS 4360:2004

Figure 2 is a risk matrix depicting the level of risk starting from green for low risk, yellow for medium risk, orange for high risk, and red for very high risk. The purpose of implementing risk management is to mitigate or track dangerous sources. Risk management is applied in the workplace and in public places, one of which is in traditional shopping centers. A *traditional shopping center* is a building consisting of outlets for various basic daily needs. The building is equipped with electrical installations. This can be one of the causes of fires (Degreve & Berghmans, 2012).

METHOD

The type of research conducted is descriptive qualitative research. The nature of the descriptive research is to describe in depth the method or process studied by identifying, interviewing, observing, and reviewing documents to determine how risk management is implemented in the Jetak Village traditional shopping center. Observations were made directly on traders at the Jetak Village traditional shopping center using the Hazard Identification and Risk Assessment (HIRA) sheet. At this stage, the interviews were conducted with several related parties, namely traders who sell at the Jetak Village traditional shopping center. The results of observations and interviews will then be analyzed through several stages by identifying, analyzing, assessing, and monitoring risks (De Merich et al., 2022).

RESULTS AND DISCUSSION

Hazard Identification

The initial process of implementing risk management is to identify risks. This is the first stage to determine the sources of hazards and risks in the Jetak Village traditional shopping center using the Hazard Identification and Risk Assessment (HIRA) sheet. The sources of hazards found are part of the process of daily activities and the condition of available building facilities (Smith et al., 2015). The sources of danger come from the condition of building facilities, such as loose cables, potholes, messy cable arrangement, sockets close to water pipes, and non-standard cables (Goyal et al., 2020). Meanwhile, the process of activities such as lifting heavy items manually, placing merchandise that covers the road, coconut grinding machines, excessive use of sockets using LPG gas, and throwing cigarette butts carelessly (Rikhotso et al. 2022). The results of hazard and risk identification can be seen in **Table 4**.

Table 4. Results of Hazard and Risk Identification

Num	Source of Danger	Risk
1.	Lifting heavy objects manually	Musculoskeletal, Low Back Pain
2.	Potholes	Sprain, Broken leg
3.	Placement of merchandise that covers the street	Stumble
4.	Water splattered on the floor	slipped

5.	Socket adjacent to the water pipe	Electrical short circuit
6.	Garbage clogged drains	Flood
7.	Coconut grinding machine	Pinched and Scratched
8.	Chipped cable	Kestrum and Short Circuit
9.	Excessive use of sockets	Explode
10.	Use of non-standard cables	Short Circuit, and Electrocuted
11.	Untidy cable arrangement	short circuit
12.	The use of LPG gas as a source of fire in the cooking process	Explode
13.	Throw away any cigarette butts	Immortality

Risk Analysis

Risk is a combination of the likelihood (probability) of occurrence and the severity of the impact (Kucuk Yilmaz, A. 2019). The analysis results of the severity level obtained the risk of fire and explosion with a catastrophic level, namely death, permanent/serious disability, to severe environmental damage (Mathavan & Hynes, 2012). The results of the analysis of the severity rating can be seen in **Table 5**.

Table 5. Results of the Analysis of the Severity Rating

Num	Source of Danger	Risk	Severity (S)				
			1	2	3	4	5
1.	Lifting heavy objects manually	Musculoskeletal, Low Back Pain		2			
2.	Potholes	Sprain		2			
		Broken leg			3		
3.	Placement of merchandise that covers the street	Stumble		2			
4.	Water splattered on the floor	slipped		2			
5.	Socket adjacent to the water pipe	Electrical short circuit			3		
6.	Garbage clogged drains	Flood			3		
7.	Coconut grinding machine	Pinched		2			
		scratched		2			
8.	Chipped cable	Kestrum			3		
		short circuit,			3		
9.	Excessive use of sockets	Explode				4	
10.	Use of non-standard cables	short circuit,			3		
		electrocuted			3		
11.	Untidy cable arrangement	short circuit			3		
12.	The use of LPG gas as a source of fire in the cooking process	Explode					5
13.	Throw away any cigarette butts	Immortality				4	

Table 6 shows the results of the assessment of the likelihood of a hazard occurring within a particular time. Risks that need to be considered are risks with a substantial probability of a work accident occurring. Throwing cigarette butts carelessly and placing merchandise covering road vendors can occur every month. This must get attention so these risks can be mitigated appropriately (Albrechtsen, et al., 2019).

Table 6. The results of the Analysis of the Level of Likelihood

Num	source of danger	Risk	Probability (P)				
			1	2	3	4	5

1.	Lifting heavy objects manually	Musculoskeletal, Low Back Pain			4	
2.	Potholes	sprain		3		
		Broken leg		2		
3.	Placement of merchandise that covers the street	Stumble				5
4.	Water splattered on the floor	slipped		3		
5.	Socket adjacent to the water pipe	Electrical short circuit	1			
6.	Garbage clogged drains	Flood		2		
7.	Coconut grinding machine	Pinched		3		
		scratched			4	
8.	Chipped cable	Kestrum		2		
		short circuit,		2		
9.	Excessive use of sockets	Explode		3		
10.	Use of non-standard cables	short circuit,		3		
		electrocuted		3		
11.	Untidy cable arrangement	short circuit		2		
12.	The use of LPG gas as a source of fire in the cooking process	Explode		2		
13.	Throw away any cigarette butts	Immortality				5

Risk Classification

The stage of data processing based on the risk matrix is carried out to analyze each hazard source's risk level so that the risk index's results can be sorted from the highest to the smallest or commonly called the risk rating. These results determine the order from the highest rank to the lowest. These risks are grouped into high, medium, and low (Chartres et al. 2019).

Table 7 shows the results of processing the risk matrix classification data from 13 hazard sources and 17 risks found. The result is 1 risk with a very high level of risk (Very High Risk), namely the activity of throwing cigarette butts carelessly. For the high-risk level (High risk) obtained, 3 and 13 others are included in the medium-risk group (Medium Risk).

Table 7. Classification of Risks Based on the AS/NZS 4360 Risk Matrix

Source of Danger	Risk	Severity (S)					Probability (P)					Total	Matrix Risk
		1	2	3	4	5	1	2	3	4	5	S x P	
Lifting heavy objects manually	Low Back Pain		2							4		8	Medium
Potholes	Sprain		2						3			6	Medium
	Broken leg			3				2				6	Medium
Placement of merchandise that covers the street	Stumble		2								5	10	High
Water splattered on the floor	Slip		2						3			6	Medium
Socket adjacent to the water pipe	Electrical short circuit			3					3			9	Medium

Garbage clogged drains	Flood			3			2				6			Medium
Coconut grinding machine	Pinched	2					3				6			Medium
	scratched	2							4		8			Medium
Chipped cable	Kestrum			3			2				6			Medium
	short circuit,			3			2				6			Medium
Excessive use of sockets	Explode				4			3			12			High
Use of non-standard cables	short circuit,			3				3			9			Medium
	electrocuted			3				3			9			Medium
Untidy cable arrangement	short circuit			3			2				6			Medium
The use of LPG gas as a source of fire in the cooking process	Explode					5	2				10			High
Throw away any cigarette butts	Immortality				4					5	20			Very High

After classifying risks using a risk matrix, risks can be mapped. The result is that from the 13 identified hazard sources, 7 hazard sources with 9 risks can cause fires in the Jetak Village traditional shopping center. The source of this hazard is part of the daily activities and the condition of the available building facilities. The results of risk mitigation on variables and their handling can be seen in **Table 8**. The risk control plan then carries out the risk mitigation results. Risk mitigation is the handling of the risks faced. It can be done with several options Kucuk Yilmaz, A. (2019), namely holding the risk (risk retention), reducing the risk (risk reduction), transferring the risk (risk transfer), and avoiding the risk (risk avoidance) (Judge, 2020).

The dominant risks in the Jetak Village traditional shopping center are electrical short circuits due to cables, cable conditions, placement of electrical panels in dangerous locations, and excessive use of sockets. From this, the mitigation measures that can be used are risk reduction by moving panel locations, using standardized cables, applying the 5S rules (Clean, Concise, Diligent, and Caring), and giving danger signs to existing sources of danger (Wang et al. 2021).

Table 8. Fire Risk Mitigation

Source of Danger	Risk	Risk Matrix	Risk Mitigation	Control
Socket adjacent to the water pipe	Electrical Short Circuit	Medium	*Risk reduction*	Switching the location of the socket
Chipped cable	Electrocuted	Medium	*Risk reduction*	Replace the cable according to SNI.
	Short Circuit,	Medium	*Risk reduction*	Use of cables according to SNI.

Excessive use of sockets	Explode	high	*Risk reduction*	1. Administrative control, namely providing danger sign information boards 2. Education on the dangers of electricity
Use of non-standard cables	short circuit,	Medium	*Risk reduction*	Replace the cable according to SNI.
	electrocuted	Medium	*Risk reduction*	Replace the cable according to SNI.
Untidy cable arrangement	short circuit	Medium	*Risk reduction*	Application of the 5S rules
The use of LPG gas as a source of fire in the cooking process	Explode	high	*Risk reduction*	Placement of LPG Gas in a flat place and has good air circulation
Throw away any cigarette butts	Immortality	Very High	*Risk reduction*	1. Administrative control, namely providing danger sign information boards 2. Education on the dangers of cigarette butts

From the results of the implementation of risk management in the Jetak Village traditional shopping center, it is necessary to have fire management. The fire management application is needed in various places, one of which is a public building (Barrero et al. 2022). Fires in public places require a great deal of attention because many occupants, namely permanent and non-permanent residents, visit these places. In addition, the nature of the hazards in public places varies according to the type and use (Amaya-Gómez et al., 2019).

One of them is the effort to control fire risk in fire management. Fire risk control includes fire prevention, control, and protection measures, including fire prevention, control, and protection procedures, for example, sprinkler systems, fire detection and alarm systems, emergency procedures and planning work permit systems, and fire extinguishing equipment (Dra et al., 2021). The management of the traditional Jetak Village shopping center still needs to be completed, so it is necessary to provide adequate building safety facilities for fire prevention and control measures (Ahmad Che, & et al., 2019).

One of the fire prevention media is a Light Fire Extinguisher or what is called APAR. With APAR, it is hoped that fire incidents can be dealt with while still in their initial stages before the fire spreads and causes more significant losses (Ronda et al. 2019). Regulation of the Minister of Manpower and Transmigration No.Per.04/MEN/1980 concerning Requirements for Installing and Maintaining APARs such as (1) APARs are placed in a position that is easy to see, easy to reach, easy to pick up, (2) the distance between APARs from one APAR to another distance not exceeding 15 meters, (3) all APAR tubes should be red, (4) APARs are equipped with installation markings, (5) APARs are inspected twice a year, and (6) APARs are installed and placed according to the type and classification of fire (Nguyen et al., 2018). However, fire extinguishers' placement, use, maintenance, and supervision following established regulations are often overlooked. This certainly affects the condition and ability of the APAR when used so that it cannot be maximized in emergency conditions (Ramawati, 2018).

CONCLUSION

The application of risk management is needed in various places, one of which is a public place (public building) such as the traditional Jetak Village shopping center. The purpose of implementing risk management is to mitigate or track dangerous sources. The results of risk identification carried out at the

Jetak Village traditional shopping center using a Hazard Identification and Risk Assessment (HIRA) sheet, obtained the source of the hazard from the condition of building facilities such as loose cables, potholes, untidy cable arrangement, electrical outlets close to water pipes, and the use of cables that are not standard. While the process of activities such as lifting heavy goods manually, placing merchandise covering the road, coconut grinding machine, excessive use of electrical outlets, use of LPG gas and throwing cigarette butts carelessly.

Based on the results of risk classification using the risk matrix, 9 risks were obtained that could cause fires in the Jetak Village traditional shopping center. The risk is divided into 3 levels, namely very high risk, high risk and medium risk. Meanwhile, the source of the hazard comes from the process of daily activities and the condition of the available building facilities.

The dominant risks in the Jetak Village traditional shopping center are electrical short circuits due to the use of cables, cable conditions, placement of electrical panels in hazardous locations and excessive use of electrical outlets. Mitigation measures that can be used are risk reduction by relocating panels, using standardized cables, applying the 5R rules (Clean, Brief, Diligent and Caring), and giving signs of danger to existing sources of danger. From these results it is necessary to take measures to prevent and control fires, namely the provision of adequate building safety facilities such as evacuation routes, gathering points and provision of Light Fire Extinguishing Equipment.

Author Declarations

Author contributions and responsibilities

The authors made major contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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Availability of data and materials

All data is available from the author.

Competing interests

The authors declare no competing interests.

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