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PROPOSED SOP DESIGN FOR THE IMPLEMENTATION OF OHS TO FULFILL THE REQUIREMENTS OF ISO 45001:2018 CLAUSE 6.1 IN THE PRODUCTION DIVISION AT PT XYZ

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Abstract

PT XYZ is a metal casting industry company, where in the production process there are several potential hazards. The efforts made by the company to overcome these potential hazards are to provide PPE facilities to workers. However, the workers lack of self-awareness of OHS makes them not comply with the use of PPE. Therefore, work accidents still occur in the company. The methods used in the design proposal stage are FMEA and FTA. FMEA and FTA are failure analysis methods, FMEA can also be used to assess failures that occur. The stages of the two methods are integrated to then create a process of hazard identification, risk assessment, and control. The proposed design is in the form of a Risk Control SOP. The purpose of the Risk Control SOP is to identify what hazards occur in the production process and assess the level of risk, so that the company can provide appropriate controls for existing hazards. The SOP was made to fulfill the requirements contained in Clause 6.1 of ISO 45001: 2018 and PP No. 50 of 2012 concerning OHSMS. With the Risk Control SOP, it is hoped that it can assist the company in improving the company's OHSMS and the company can achieve zero accidents.

Keywords: OHSMS, Zero accident, ISO 45001:2018, FMEA, FTA.

Introduction

A company in running its business must have OHS elements, namely occupational health, security, and safety. The presence of these three elements can make the company work optimally without experiencing work accidents (PPID DISNAKERTRANS, 2020). Occupational safety and health are something that we cannot predict, but we can prevent.

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Basically, every work environment has potential hazards, so companies must prevent and control hazards to reduce the risk of work accidents.

Recorded in the 2023 BPJS Employment, the number of work accidents has increased significantly from 2016-2022 (Syaharani, 2023). The following is a graph of the increase in the number of work accidents in 2016-2022:

Figure 1. Number of Occupational Accidets in Indonesia 2015-2022 (Source: BPJS Employment 2023)

According to Ahmad et. Al (2016) the increasing number of work accidents in Indonesia can be caused by several factors which are divided into five, namely human factors, tools/machines, materials, methods, and the environment (Wicaksono, 2020). According to Heinrich in his research, 88% of work accidents are the result of unsafe human behavior (unsafe action), 10% are the result of an unsafe work environment (unsafe condition), and the other 2% are the result of God's will (Larasatie, Fauziah, Dihartawan, Herdiansyah, & Ernyasih, 2022). In addition, 8.33% of work accidents occurred outside the workplace, 65.89% of work accidents occurred in the workplace, and the remaining 25.77% occurred because of traffic accidents (Gunawan, 2021). Based on Disnakertrans (2021), many accidents that occur are caused by human error factors which can cause material and moral losses for companies and their workers (Larasatie, Fauziah, Dihartawan, Herdiansyah, & Ernyasih, 2022).

PT XYZ is a metal casting and machining industry where the products produced are bollards, manhole covers, water catchment grills, plant grills, lamp posts, etc. There are several processes in making these products, starting from the raw material selection process, molding process, pressing process, casting process, lifting process, finishing process, quality control process, and shipping process. In these processes, there are several potential hazards

that occur in the company, resulting in work accidents. The following is a recapitulation of work accident data at PT XYZ in 2019- 2022:

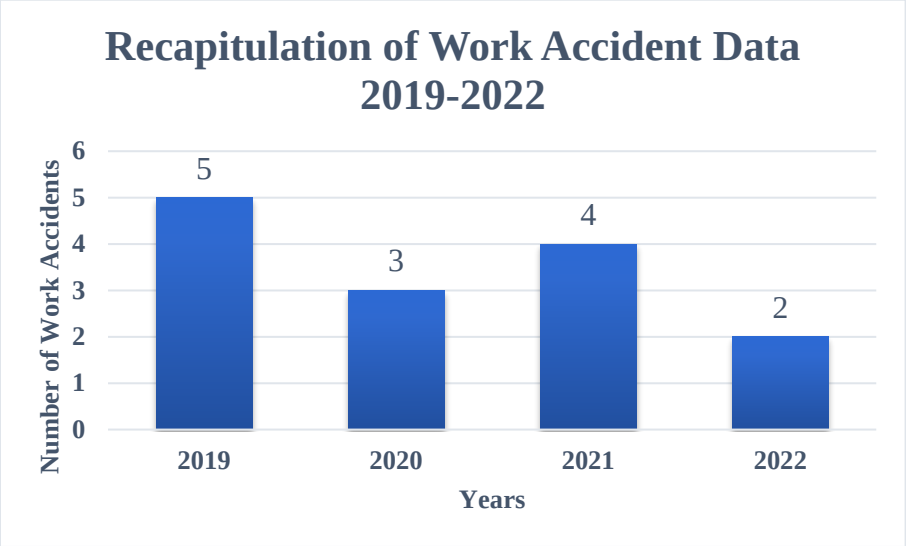

Figure 2. Total Work Accident Data 2019-2022 at PT XYZ (Source: PT XYZ)

In 2023, the company has not yet recapitulated the work accidents that occurred, so the researchers only used the data on work accidents in 2019-2022 that had been provided by the company. The graph of the number of work accidents that occurred above states that work accidents that occur fluctuate and tend to be small from 2019-2022. These work accidents occurred due to the same factors every year, namely unsafe actions of workers. As a result, similar work accidents still occur. Therefore, unsafe acts committed by workers that result in work accidents that occur every year need to be taken as a preventive measure so that unsafe acts by workers do not occur in the following year. Because the same work accident factor (unsafe action) continues to recur every year, if prevention is not taken, it is feared that the following year work accidents with the same factors will occur again. In fact, if the company does not take precautions, the company also cannot predict whether an accident with the same factor will occur or not. As a result of the work accident, the company experienced a decrease in productivity due to the status of employees who were unable to work because of the accident that occurred. Another loss incurred is the company spending money on work accident insurance.

In actual conditions, the company has tried to implement OHSMS in its production process by providing personal protective equipment, such as gloves, safety clothes, safety shoes, and helmets for workers, but even though the company has provided these facilities, there are still many workers who do not comply with and support the company to optimize OHSMS on the grounds that if they wear protective equipment when working it will feel hot.

Another effort made by the company so that workers participate in implementing OHSMS is to provide rewards to workers who comply with OHS rules, in the form of using PPE when in the production area and punishment to workers who do not use PPE, but these efforts are still not successful.

Therefore, it can be said that the company's efforts have not been optimal in implementing OHSMS, so it can also be said that the company has not been able to implement zero accident. Zero accident is the government's award to the company for implementing the OHS program properly. When the OHS program is applied correctly and appropriately, the possibility of work accidents can be reduced or even completely eliminated. The zero-accident predicate must be accompanied by "without losing working time" (Erick, Program Zero Accident: Pengertian, Prinsip, Kriteria, Cara Mencapai, 2022).

In terms of occupational safety, the government established regulations related to the Occupational Safety and Health Management System (OHSMS) in Government Regulation No. 50 Year 2012. Based on point 1 of Article 5 of PP No. 50/2012, it states that every business is obliged to implement OHSMS in its company. OHSMS in PP No. 50 of 2012 is a component of an organization's overall management system that aims to reduce the risks associated with activities in the workplace and provide a productive and safe work environment where the international standard for OHSMS is known as ISO 45001: 2018. In implementing OHSMS, an OHS plan is needed which is stated in Article 9 of Government Regulation No. 50 of 2012. Then as a fulfilment of the OHS planning requirements based on Article 11 Paragraph 2 of Government Regulation No. 50 of 2012, companies must conduct risk analysis, hazard identification, and risk management. Therefore, to minimize work accidents and optimize the company's OHSMS, the company can create an OHS SOP related to hazard identification, risk assessment, and control.

ISO 45001:2018 can be used as a specific guide to OHSMS. ISO 45001:2018 is an international standard regarding Occupational Health and Safety Management System (OHSMS). In addition, ISO 45001: 2018 can also be used to manage risks and potential hazards arising from OHS, to obtain a safe and healthy work environment that allows it to improve company performance. This is in accordance with the existing problems, namely regarding the potential hazards arising from OHS in the production process at PT XYZ. In ISO 45001:2018 Clause 6.1 requires that every organization must establish, implement, and maintain procedures to identify ongoing hazards, assess risks, and establish necessary controls. Therefore, to be able to make OHSMS in accordance with what has been required in PP No. 50 of 2012 and ISO 45001: 2018 Clause 6.1 to minimize work accidents, a Risk Control SOP design is needed. With this SOP design, it is hoped that it can optimize OHS in the company, besides that it can help the company achieve zero accidents.

Research Method

1. Systematics of Design

Design systematics is a series of diagrams used as problem solvers in this study where the diagram will explain how the process is from beginning to end. In the preliminary stage, the first activity carried out is to determine the formulation of problems that occur at PT XYZ. The determination of this problem formulation is based on the results of direct observation or field studies conducted by researchers at the company as well as interviews with HRD PT XYZ. The next activity carried out by researchers after determining the formulation of the problem, the objectives and benefits of the research is to determine what methods will be used in designing Risk Control SOP. Researchers conduct literature studies to find the right method for designing Risk Control SOP so that existing problems get the right solution (Hidayat & Alifah, 2022).

The next stage is the data collection stage, where the data needed in this study is collected first, before the data will be processed. In this study, the data needed was divided into three, namely:

a. Primary Data

Primary data is the main data needed in this study, where this data is obtained based on observations on the company's production floor and interviews with company owners/employees. The following is the primary data collection mechanism in this study:

Table 1
Primary Data Collection Mechanism

Data Type	Data	Tools	Mekanism	Duration
Primary Data	Actual Condition of the Company Production Process	Observation and Interview	Observation is carried out by observing the company's production area, then recording what processes and activities are carried out when the production process takes place. In addition, the interview process was carried out face-to-face directly with HRD and several	2 days

Data Type	Data	Tools	Mekanism	Duration
			company production staff. The interview process was carried out by providing several questions related to the production process that researchers did not understand.	

b. Secondary Data

Secondary data is supporting data obtained from external sources that have credibility, such as journals. In this study, the supporting data needed to support this research was obtained through the company. The following is the secondary data collection mechanism in this study:

Table 2
Secondary Data Collection Mechanism

Data Type	Data	Tools	Mekanism	Duration
Secondary Data	Company profiles Company Vision and Mission Organizational structure Work Accident Data	Literature Study	Literature study is carried out by obtaining the required documents (company profile, company vision and mission, organizational structure, and work accident data) in the company through the company's HRD.	1 Days

2. Data Processing Stage

The next stage carried out after data collection is the processing of all data that has been collected. The following are done in data processing:

a. Create a process flow map based on production process data. Process flow maps are used to clearly find out what activities are carried out during the production process. In addition, process flow maps can be used to clearly identify what things have potential hazards.

b. Integrate all clauses of ISO 45001:2018 with PP No. 50 of 2012. The requirements of all clauses of ISO 45001: 2018 and PP No. 50 of 2012 are obtained by means of literature studies. Integration is carried out by combining all ISO 45001: 2018 requirements with PP No. 50 of 2012 requirements, so that the results of OHS implementation requirements in accordance with ISO 45001: 2018 and PP No. 50 of 2012 are obtained. The results of the OHS implementation requirements in accordance with ISO 45001: 2018 and PP No. 50 of 2012 are then analyzed with the actual conditions of the company, if a gap is found, a proposal related to OHS can be made.
c. Identify the GAP between the company's actual condition and the corresponding clauses based on the results of the integration of all clauses of ISO 45001: 2018 and PP No. 50 of 2012. So that the output that will be obtained later is in the form of GAP analysis.

3. Planning Stage

The next stage after data processing is the SOP design stage for the implementation of OHS to identify hazards, risk assessment, and control. To arrive at the SOP design activity stage, the implementation of OHS will be carried out using the stages of the Failure Modes and Effects Analysis (FMEA) and Fault Tree Analysis (FTA) methods. Furthermore, this verification stage is carried out to check whether the proposed SOP design for hazard identification, risk assessment, and risk control that has been made is in accordance with the reference or reference used, namely the requirements of ISO 45001: 2018 and the requirements of PP No. 50 of 2012.

While in the validation stage, this is a description of feedback from stakeholders related to the results of the SOP design for hazard identification, risk assessment, and control. If the design results are in accordance with the needs of the company, then proceed to the analysis stage of the design results. As for this stage, an analysis of the proposed design, namely the draft Risk Control SOP for hazard identification, risk assessment, and control where this SOP design is made to meet the requirements of ISO 45001: 2018 and PP No. 50 of 2012.

This closing stage is the last step of this research, where there are conclusions from the results of the research and suggestions addressed to the company, readers, and further researchers.

Results and Discussion

A. Identify the Components in the Process

1. Purpose of the Process

   In a process, it is important to have a goal. The objective of the process is something that is to be achieved or produced from the process. The following are the objectives of the hazard identification, risk assessment, and control process:

a. Knowing the classification of hazards or risks that occur during the production process.
b. Knowing the level of risk based on the risk assessment that has been carried out.
c. Knowing what actions need to be taken to control the risks that occur based on the identification and assessment of risks.
d. Reduce the number of work accidents in the production process.
e. Achieve zero accident.

2. Stakeholder Identification
   Stakeholder identification is the process of identifying people, groups, or organizations that have an interest or impact in a decision. The company already has a special organizational structure related to ISO, so these stakeholders are taken from the organizational structure, such as Top Management, Ka. Internal Auditor Team, ISO Secretary, and Head of Production.
3. Trigger Event
   Trigger event is a trigger that can trigger the occurrence of a process or activity (event). The trigger in the design of this hazard identification, risk assessment and control procedure are when the scheduling of the hazard identification, risk assessment and control process begins. The process of identifying hazards, assessing risks, and controlling the risks can be done every six months. The goal is to make the process more controlled.
4. Determining Inputs and Outputs
   In the process of designing procedures, inputs and outputs are required. Input is used to determine what is needed during the design process for procedures, while output is used because of input processing. Thus, it is hoped that the output that comes out is in accordance with the expectations of stakeholders. The following are the inputs and ouputs expected in the procedure design process:

Table 3
Inputs and Outputs

Input	Ouput
1. Work accident data	1. List of risks or potential hazards and their classification
2. List of activities during the production process	2. Risk rating or assessment of each risk
3. Company organizational structure	3. Control of existing risks
4. List of production support facilities	

5. List of raw materials used in the production process	
6. Work map (process flow map)	
7. Staff	

5. Determining the Process Sequence
   Determining the sequence of processes is an important part of the procedure design process because the procedure document will later become a work guide that must be carried out by several parties, so that in carrying out the stages the process must be sequenced first. In determining the sequence of activities in the SOP, it is based on a combination of methods for hazard identification, risk assessment, and control, namely the FMEA (Failure Mode and Effect Analysis) and FTA (Fault Tree Analysis) methods. The following is the sequence of processes in hazard identification, risk assessment, and control in the production process:
   a. Planning a program of hazard identification, risk assessment, and control in the production process
   b. Identifying hazards in the production process
   c. Conduct a risk assessment in the production process
   d. Review the hazard with the highest RPN rating
   e. Implement risk treatment in the production process
   f. Documenting the results of hazard identification, risk assessment, and control
   g. Performance monitoring and measurement
   h. Evaluate the performance of the hazard identification, risk assessment, and control process
   i. Implement a routine OHS socialisation program every 6 months
6. Determining Key Performance Indicator (KPI)
   Key Performance Indicator (KPI) is a measurement used to assess the quality or performance of an existing process. The indicator in this KPI measurement is the decrease in the number of work accidents in the following year. The following is the KPI calculation formula:

$$\text{KPI} = \frac{\text{Number of Work Accident}_{(n-1)} - \text{Number of Work Accident}_{n}}{\text{Number of Work Accident}_{(n-1)}}$$

7. Define PIC
   In determining the PIC needed in the process, the flowchart used is a cross functional flowchart. Cross functional flowchart can represent the interaction of actors with existing process activities.

8. Define Authority and Responsibility
   To clarify each person's duties and facilitate the making of appropriate policies based on the results of job evaluation, each PIC must define his or her responsibilities and authorities.

B. PDCA (Plan-Do-Check-Act) Identification

The sequence of activities in the Risk Control SOP is based on the PDCA cycle. The activities in the SOP are made following the PDCA cycle so that the activities made can control a problem in a coherent and structured manner. In addition, in PDCA there is Plan-Do-Check-Act, where the stages form an unbroken cycle, so that the activity/process can be improved continuously.

Discussion

1. Verification of Design Results

Based on the design results above, the next step is to verify the results of the design of hazard identification, risk assessment and control procedures. This verification process is carried out based on references and references related to the selected problem-solving method or with requirements used to solve existing problems. In addition, in the verification process, it is checked whether the design proposal that has been made is in accordance with the method/framework/model. The following is a verification of the design results that have been made:

Table 4
Verification of Design Results

Plan Results	Requirement				
	ISO 45001:2018	**PP No. 50 of 2012**	**PDCA**	**FMEA**	**FTA**
SOP for Risk Control: a. Risk Control Plan Form b. Hazard Identification Form c. Risk Assessment Form d. List Risk Treatment Form e. Fault Tree Analysis (Fault Tree) Form	Fulfilled	Fulfilled	Fulfilled	Fulfilled	Fulfilled

Plan Results	Requirement				
	ISO 45001:2018	**PP No. 50 of 2012**	**PDCA**	**FMEA**	**FTA**
f. Criteria Severity, Occurrence, and Detectability					

2. Validation of Design Results

The next stage after the verification process is the process of validating the results of the draft procedure for hazard identification, risk assessment and control. At this validation stage is a description of the feedback from stakeholder related to the results of the design that has been made. The following is a validation of the design results:

Table 5
Validation of Design Results

Validation Category	Validation Targets	Fulfillment
Performance Targets	The results of the design can be understood by users.	The design results are made using language that is easy for users to understand and has clear steps.
	The results of the design can be used to determine the hazards or risks that occur in the production process.	The design results have activities to identify hazards or risks that occur in the production process.
	The results of the design can be used to determine the level of risk based on the risk assessment that has been carried out in the production process.	The design results have a rating scale severity, occurrence, and detectability to assess the risks that occur and determine the level of each risk.
	The results of the design can be used to find out what actions need to be taken to control risks in the production process.	The design result has a list risk treatment that can be used to control risks in the production process.
	The results of the design can reduce the risk of work accidents in the production process.	The design results have structured activities to identify, assess, and control the risks that occur in the production process.

Validation Category	Validation Targets	Fulfillment
Stakeholder Requirement	The design results can help companies to achieve zero accident.	The results of the design have implementation activities risk treatment.

3. Analysis of Design Results

The next stage after verifying and validating is to analyze the results of the design that has been made. At this stage, the researchers analyzed the results of the draft SOP for Hazard Identification, Risk Assessment and Control based on the company's existing conditions and analyzed the strengths and weaknesses of the SOP for Hazard Identification, Risk Assessment and Control.

a. Analysis SOP for Hazard Identification, Risk Assessment and Control

SOPs for Hazard Identification, Risk Assessment and Control are made based on the company's existing conditions, where in the implementation of OHS in the company there is no process to identify hazards, assess risks, and control risks. The following are the differences between the company's existing conditions and the proposals that have been made:

Table 6
SOP Risk Control Analysis

No.	SOP name	Difference	
		Existing	Proposal
1.	Risk Control SOP	The company does not yet have an SOP for hazard identification, risk assessment and control in the production process	The company has SOPs for identifying hazards, assessing risks, and controlling them in the production process

Before the company had procedures for identifying hazards, risk assessment and controlling the production process, the company made efforts to improve and control OHS by facilitating its workers with PPE in the production process. Even so, workers still do not comply with the rules for using PPE on the grounds that when using PPE their body temperature will increase. This made the company make another policy related to OHS, namely providing reward for workers using PPE and punishment in the form of fines for workers who do not use PPE. However, with its reward and punishment still makes workers disobey the rules for using PPE in the production process. Thus, in the production process there are still work accident rates.

This SOP draft proposal was made to comply with ISO 45001:2018 Clause 6.1 and PP No. 50 of 2012 which states that companies must develop an OSH plan to

reduce work accidents through hazard identification, risk assessment, and control. Thus, the existence of SOPs for Hazard Identification, Risk Assessment and Control can assist companies in identifying hazards that occur in the production process, assessing existing risks, and making controls over these risks.

After further analysis based on the data processing stage up to the verification stage of the design results, the SOP for Hazard Identification, Risk Assessment and Control is in addition to fulfilling the requirements in ISO 45001:2018 Clause 6.1 and PP No. 50 of 2012, the SOP has also been verified as complying with several other clauses as a support for clause 6.1.

1) ISO 45001:2018 Clause 2 with Article 5 PP No. 50 of 2012
   From the second integration requirements Based on these results, the results obtained stated that companies are required to implement OHSMS. Based on this, clause 2 with Article 5 can be stated as requirements additional in the Risk Control SOP because the existence of the SOP can fulfill requirement from clause 2 of ISO 45001:2018 with PP No. 50 of 2012 Article 5.
2) ISO 45001:2018 Clause 3 with Article 1-2 PP No. 50 of 2012
   From the second integration requirement from this, the results obtained stated that the company must determine terms, definitions, and objectives related to OHSMS. The SOP for Hazard Identification, Risk Assessment and Control includes the definition and objectives related to OHS, so that it can be said that the SOP fulfills requirement clause 3 ISO 45001:2018 with PP No. 50 of 2012 Articles 1-2.
3) ISO 45001:2018 Clause 5 with Article 6 PP No. 50 of 2012
   The results of the integration of the two requirement it states that top management must show leadership and commitment in establishing OHS policies, one of which is the SOP for Hazard Identification, Risk Assessment and Control. With these SOPs, top management can continue to be committed related to OHS policies.
4) ISO 45001:2018 Clause 5.3 with Article 9 PP No. 50 of 2012
   The results of the integration of the two requirements states that the company must determine the roles, responsibilities, and authorities of the organization. The SOP for Hazard Identification, Risk Assessment and Control has defined responsibilities and authorities to assist in the process of hazard identification, risk assessment and control.
5) ISO 45001:2018 Clause 6.1 with Article 9, 12-13 PP No. 50 of 2012
   The results of the integration of the two requirements states that the company must make an OSH plan to reduce OSH accidents in the form of a process of identifying hazards, assessing, and controlling risks. Requirement this has been

fulfilled by researchers by designing a proposed procedure, namely Risk Control SOP.

6) ISO 45001:2018 Clause 7.5 with Article 10 PP No. 50 of 2012
   The results of the integration of the two requirements states that in making an OSH plan, support is needed in the form of resources, competence from workers, communication between organizational functions, and document documentation. In this case, the SOP made by the researcher contains document documentation activities, where these activities can fulfill clause 7.5 regarding documented information.
7) ISO 45001:2018 Clause 8.1 with Article 11 PP No. 50 of 2012
   The results of the integration of the two requirements states that the company needs to make control measures based on the results of the process of identifying and assessing existing risks. In the SOP for Hazard Identification, Risk Assessment and Control, there are implementing activities risk treatment in the production process based on the results of hazard identification and risk assessment, in which of these activities there are sub-activities, namely making a list risk treatment and implement it.
8) ISO 45001:2018 Clause 9 and 9.1 with Article 14 PP No. 50 of 2012
   Based on the results of the integration of the two requirements it was found that companies need to monitor, measure, and evaluate OHS performance. The SOP for Hazard Identification, Risk Assessment and Control includes monitoring activities implementation of risk treatment, after that performance measurements were carried out using Key Performance Indicators (KPI), and finally there is a performance evaluation activity from the process of identifying hazards, risk assessment, and controlling whether the objectives of the SOP have been achieved.
9) ISO 45001:2018 Clauses 10 and 10.3 with Article 15 PP No. 50 of 2012
   Clause 10, 10.3 ISO 45001:2018, and Article 15 PP No. 50 of 2012 states that there is a need for continuous improvement to improve OHS performance. Therefore, the sequence of activities in the SOP that has been made is adjusted to the PDCA cycle (Plan-Do-Check-Act) so that the results of the SOP are not just activities but can continue in a cycle so that improvements can be made in its activities.

Based on the results of the activity evaluation sub-chapter and requirements implementation of OHS, in addition to the proposal in the form of procedures for identifying hazards, risk assessment, and controlling them, there are other suggestions, namely routine socialization programs related to OSH for workers and making safety sign in the production area. The two proposals were not carried out further research by researchers because the limitations in this study were design

proposals made only to fulfill requirements ISO 45001:2018 Clause 6.1 and PP No. 50 of 2012. In addition, with the procedures for identifying hazards, risk assessment and control, the two proposals can be included in one of the control efforts or risk treatment which will be determined by the company.

b. Advantages and Disadvantages of Planned Outcomes

In addition to analyzing the Risk Control SOP, researchers also need to carry out an analysis related to the strengths and weaknesses of the SOPs so that the deficiencies that have been identified can be corrected in further research.

Table 7
Advantages and Disadvantages of Planned Outcomes

Advantages	Disadvantage
1. The results of the draft SOP can be used as a guide in carrying out hazard identification and risk assessment. 2. The results of the SOP design can fulfill requirements Clause 6.1 ISO 45001:2018 and PP No. 50 of 2012. 3. The results of the SOP design can be easily implemented in the production process.	1. Some of the activities in the SOP involve method stages Failure Mode Analysis Effect (FMEA) and Fault Tree Analysis (FTA), where not all stakeholders knowing the two methods, so that it will have an impact on the results of the process of hazard identification, risk assessment, and control.

Conclusion

The proposed SOP design that is in accordance with the requirements of ISO 45001: 2018 and PP No. 50 Year 2012 is the Risk Control SOP. The SOP is designed to reduce work accidents at PT XYZ. Where in the SOP activities contain stages from the FMEA and FTA methods that can be used to identify and assess existing risks. In addition, the activities in the SOP are based on the PDCA cycle so that continuous improvement can be made in each activity or process.

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