Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker no.5 of 2018 at PT XYZ

Nurjihan Aqilah Murfid[1*], Sri Widaningrum[1], Yunita Nugrahaini Safrudin[1]

[1] Department of Industrial Engineering, Telkom University, Bandung, West Java, Indonesia
*Corresponding author: nurjihanaqilah16@gmail.com

ARTICLE INFO

Article history
Submission: 29th August 2024
Revised: 19th July 2025
Accepted: 22nd July 2025

Keywords:
Business Process Management
ISO 14001:2015
Maintenance
Permenaker
Physical Work Environment

http://doi.org/10.22441/oe.2025.v17.i2.143

ABSTRACT

The work environment in a company is a working condition to provide a comfortable working atmosphere and situation for employees in achieving the goals desired by a company. PT XYZ is a manufacturing company that focuses on the production of socks. Based on interviews with workers in the production area, workers complained about problems related to the physical work environment. Therefore, researchers conducted sampling on the lighting factor and noise factor and there were several work areas that did not meet the predetermined standards and criteria. So, this research aims to design a Physical Work Environment Maintenance SOP that has been adjusted to ISO 14001: 2015 Clause 9.1.1 concerning Environmental Management Systems and Permenaker No.5 of 2018. This SOP design uses the Business Process Management (BPM) method. This research produces a Physical Work Environment Maintenance SOP which includes physical work environment maintenance procedures and supporting documents consisting of physical work environment maintenance plan forms, checklist forms, list budgeting forms, findings and corrective action forms, final reports. The results of the SOP design in this design are expected to assist in providing structured and detailed guidance covering the identification of non-conformities, the repair process, to the evaluation of corrective actions.

1. Introduction

The work environment includes all elements around the workplace that can directly or indirectly affect employees (Putra et al., 2021). In a company, the work environment refers to the conditions that create a comfortable atmosphere for employees to achieve organizational goals (Pranowo, 2019). This environment encompasses both physical and non-physical aspects (Dumas et al., 2021). Physical factors include work equipment, temperature, density, noise, and workspace layout, while non-physical factors relate to interpersonal relationships within the workplace (Marnisah et al., 2021). Physical factors significantly influence employee behavior and performance. The physical work environment plays a crucial role in shaping employee performance, health, and overall job satisfaction, especially in industrial and manufacturing settings (Nurshafa, 2019). Elements such as lighting, noise levels, temperature, humidity, workspace layout, and cleanliness directly influence how employees carry out their tasks. A well-managed physical environment ensures that workers can operate safely, comfortably, and efficiently, minimizing risks of fatigue, injury, and decreased productivity. In contrast, poor environmental conditions can lead to physical strain, reduced concentration, and a decline in output quality (Firman, 2019). Therefore, maintaining and continuously improving the physical work environment is essential for supporting operational effectiveness and sustaining employee well-being

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

ISSN-p: 2085-1431
ISSN-e: 2654-5799

in the long term. Furthermore, attention to physical workspace design also reflects an organization's commitment to occupational health and safety standards, which can positively affect employee morale and retention, thus must be managed systematically (Wati & Yusuf, 2020). A good work environment supports safety, comfort, and optimal performance (Yantika et al., 2018), which is why companies must design and manage both physical and non-physical environments effectively (Darmadi, 2020).

PT XYZ is a manufacturing company that specializes in sock production. Based on interviews and environmental measurements, the production area was found to have lighting and noise levels that did not meet established standards. These issues stem from the absence of a structured and routine procedure for maintaining the physical work environment. Conditions that do not comply with standards can lower productivity and affect employee well-being. This indicates that the primary issue in PT XYZ's production area is the substandard physical work environment. Specifically, the company has not fulfilled the environmental management requirements outlined in ISO 14001:2015 Clause 9.1.1 and Permenaker No. 5 of 2018.

ISO 14001 is an international standard for environmental management systems that helps organizations develop policies and objectives related to environmental performance (Gaspersz, 2012). The purpose of the ISO 14001 International Standard is to help all types of organizations to protect the environment and improve the organization's environmental performance (Ningtiyas et al., 2018). The structure of ISO 14001 consists of Clause 1 Scope, Clause 2 Normative Reference, Clause 3 Terms and definitions, Clause 4 Organizational context, Clause 5 Leadership, Clause 6 Planning, Clause 6 Support, Clause 8 Operations, Clause 9 Performance evaluation, and Clause 10 Improvement (ISO 14001, 2015). The clause relevant to this study is Clause 9.1.1, which emphasizes the need for organizations to monitor, measure, analyze, and evaluate their environmental performance. It also requires transparent internal and external communication of performance results (Ningtiyas et al., 2018). Permenaker No. 5 of 2018 complements this standard by defining threshold values (NAB) for various physical factors and outlining workplace hygiene and safety requirements. However, PT XYZ currently lacks a Standard Operating Procedure (SOP) that aligns with these frameworks, indicating a gap in implementation. To ensure a safe, healthy, and compliant workplace, organizations must align their operational practices with relevant environmental and occupational health standards. ISO 14001:2015, an internationally recognized framework for environmental management systems, emphasizes the importance of monitoring, evaluating, and improving environmental performance as part of routine business processes. Specifically, Clause 9.1.1 requires organizations to identify environmental indicators, establish performance criteria, and systematically assess outcomes. Complementing this, the Indonesian regulation Permenaker No. 5 of 2018 provides detailed technical guidelines on occupational safety and health, including Threshold Limit Values (TLV) for physical factors such as lighting, noise, temperature, and vibration. These frameworks serve not only as regulatory requirements but also as strategic tools to promote continuous improvement, risk reduction, and employee well-being (Padel & Sutabri, 2023). However, in practice, many companies struggle to internalize these standards due to the absence of structured procedures or integration into daily operations, highlighting the need for practical implementation tools such as well-designed SOP.

To address the identified problems, this study proposes the design and implementation of a structured SOP for physical work environment maintenance, based on ISO 14001:2015 Clause 9.1.1 and Permenaker No. 5 of 2018. The SOP aims to ensure continuous, standardized monitoring and corrective action in the production area. A Business Process Management (BPM) approach is employed in this design to ensure that related processes are systematic, efficient, and capable of supporting sustainable environmental improvements (Azharuddin, 2019). With a structured SOP, it is expected that PT XYZ can effectively maintain and monitor the physical work environment, thus creating safe and comfortable working conditions for employees. The implementation of this SOP is expected to enhance employee safety, comfort, and productivity. This study aims to develop a comprehensive SOP that enables PT XYZ to maintain its physical work environment in compliance with applicable standards. The objective is to improve workplace safety, comfort, and employee productivity through a structured and sustainable process.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

2. Methods

Research Object

The research was conducted at PT XYZ, a manufacturing company specializing in sock production. The main object of this study is the maintenance process of the physical work environment within the company's production area. This includes various elements involved in the production process that directly relate to the state and control of the work environment. These elements are categorized based on (Man) referring to the production employees, (Machine) referring to the production equipment and machinery used, (Material) referring to the socks produced. By analyzing these components, the study aims to identify gaps between the actual conditions and standard requirements, which will serve as the foundation for designing a structured and compliant SOP. The detailed categorization of the research object based on the 3M framework is presented in Table 1.

Table 1 Research object

	Man	***Machine***	***Material***	***Information***
Object	Production employee of PT XYZ	Production equipment/machinery	Socks	Actual condition of the physical working environment of the production area
Actual condition of the physical working environment of the production area	SOP for Maintenance of Physical Work Environment in the production area at PT XYZ in accordance with the requirements of ISO 14001: 2015 clause 9.1.1 and Permenaker No.5 of 2018.			

Data Collection Stage

In the data collection stage, using the first and second stages of the BPM lifecycle method, namely BPM process identification and BPM process Discovery. BPM process identification is the stage of identifying processes at PT XYZ and the actual conditions that are happening. Process discovery is the stage of finding the existing process that will be analyzed, namely related to the process of maintaining the physical work environment (Surijadi & Idris, 2020).

Data Processing Stage

At this stage using the third stage of the BPM lifecycle method, namely BPM process analysis. In this process analysis, the information needed in making the SOP for maintaining the physical work environment at PT XYZ is in accordance with the requirements of ISO 14001: 2015. Requirement ISO 14001: 2015 is integrated with Permenaker No.5 of 2018 which is a guideline in environmental maintenance. After integrating the requirements of ISO 14001: 2015 with Permenaker No.5 of 2018, then an integration gap analysis of requirements and actual conditions at PT XYZ is carried out to see any differences that exist in order to take the right steps. The gap results will be used as input in making the SOP for maintaining the physical work environment at PT XYZ.

Design Stage

At the design stage, the BPM lifecycle stage is carried out, namely BPM process redesign. This stage is carried out designing the SOP for maintaining the physical work environment, the following is an explanation of the stages of the design process.

1. Physical Work Environment Maintenance Business Process Design
   At this stage, business process design is carried out for the maintenance of the work environment by creating a process model framework to determine the value process by determining the value components of the processes along with the value of the physical work environment maintenance process.
2. Determination of Design Specifications and Standards in accordance with Requirement
   At this stage, the author determines the specifications and design standards in accordance with the requirements of ISO 14001: 2015 and Permenaker No.5 of 2018. This stage is carried out to make it easier to identify information needs and activities that exist in the process of maintaining the physical work environment.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

ISSN-p: 2085-1431
ISSN-e: 2654-5799

3. Determination of the PDCA Process Sequence (Plan-Do-Check-Action)
   This stage determines the sequence of the PDCA (Plan-Do-Check-Action) process. This is done to assist the improvement process by ensuring that each step in the process is checked and improved regularly**.**
4. Establishment of Physical Work Environment Standards
   At this stage, design specifications and design standards are made based on the requirements that have been carried out previously to identify information needs about the physical work environment at PT XYZ. Making specifications and design standards will be carried out using the references of Permenaker No.5 of 2018 and ISO 14001: 2015 clause 9.1.1.
5. Designing SOPs for Maintenance of the Physical Work Environment
   At the stage of designing the SOP for maintaining the physical work environment using the data that has been processed. The results of this design produce an SOP for maintaining the physical work environment that will be implemented at PT XYZ.

Verification Stage
At this verification stage, checking the proposed draft SOP for maintaining the physical work environment at PT XYZ is in accordance with the requirements of ISO 14001: 2015 clause 9.1.1 and Permenaker No.5 of 2018.

Validation Stage
At this validation stage is a description of feedback from company stakeholders related to the form of the draft SOP for maintaining the physical work environment in the production area at PT XYZ.

Analysis Stage
Analyzing the results of the design of the SOP for maintaining the physical work environment aims to ensure that the verification and validation stages have been carried out correctly. This analysis also serves to ensure that the design results are in accordance with the standards and requirements that have been set.

3. Results and Discussion

BPM Process Analysis

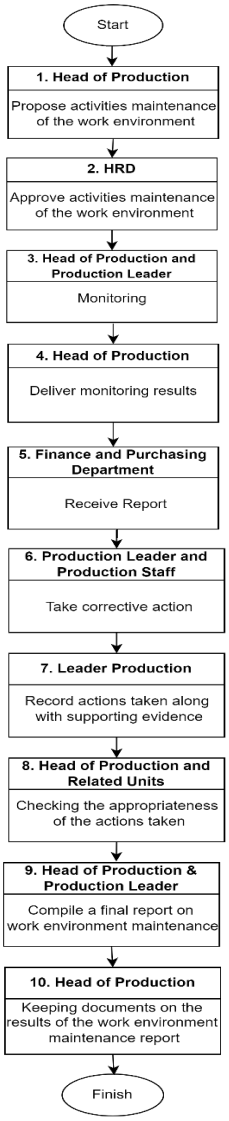
The work environment maintenance process uses the third stage of the BPM life cycle, namely the BPM Process Analysis stage. The purpose of the process analysis stage is to determine the difference between the actual condition of the maintenance of the work environment at PT XYZ and the existing requirements. During this stage, the standard requirements of ISO 14001: 2015 and Permenaker No.5 of 2018 are used as the main guide in carrying out the work environment maintenance process.

1. Requirement ISO 14001:2015
   In this study, the clause used in the ISO 14001: 2015 requirement is clause 9.1.1, which is about monitoring, measurement, analysis and evaluation. ISO 14001: 2015 clause 9.1.1 is used as a guideline in measuring, evaluating, and maintaining the work environment for PT XYZ to ensure the Environmental Management System (EMS) is effective and meets the desired objectives.
2. Requirement Permenaker No.5 Year 2018
   In this study, using the requirements of Permenaker No.5 of 2018. This regulation is used as a guideline to set standards for the physical work environment in the organization. Requirement Permenaker No.5 of 2018 is used as a supporting document to implement and establish standards and maintenance of the physical work environment at PT XYZ.

Design Process
This stage contains the design of business processes for maintaining the physical work environment and determining stakeholder needs. This business process design is made based on the design specifications and sequence of activities using the PDCA cycle approach. The following is a table containing the results of the design of the physical work environment maintenance business process can be seen Table 3.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

Table 3 Proposed business process

Flow Process	Process Description	Recordings
	1. The head of production coordinates with HRD to determine the schedule for monitoring maintenance activities. Description: - Preventive activities: refers to the SOP conducted 3 times a year. • Corrective activities: refers to the corrective action work instruction. 2. HRD agrees on the schedule and methods to be used for maintenance monitoring and evaluation activities. 3a. the head of production and the production leader monitor maintenance in the aspect of physical work environment. 3b The Head of Production checks the results of the maintenance report. 4. The head of production submits the monitoring results to the MR party for follow-up. 5a. The finance department receives a report on the results of non-conformities from HRD which will then make a budgeting list regarding the follow-up process to be carried out. 5b. The purchasing department purchases the necessities needed for the maintenance process. 6. Production leaders and production staff carry out corrective actions against non-conformities in aspects of the work environment based on recommendations given by the head of production. 7. The production leader records all actions taken along with supporting evidence to show the improvements that have been made. 8. Head of production and MR conduct an evaluation to ensure that the actions taken are appropriate. 9a. Head of production receives a record of the implementation of work environment maintenance. 9b. Head of production compiles the final report of work environment maintenance 9c. Report the improvement results to top management 10. Store and maintain all work environment maintenance documents to become input for work environment maintenance planning in the next period.	• Work Environment Maintenance Plan Form • Corrective Action Work Instruction Work Environment Maintenance Plan Form Work environment maintenance checklist form Work environment maintenance checklist form Form List Budgeting Findings and corrective action form Findings and corrective action form Findings and corrective actions form Final report Work environment maintenance Work environment maintenance document

Design Results

Based on Permenaker No. 5 of 2018 concerning Occupational Safety and Health The work environment, the determination of physical work environment standards involves the assessment and management of various physical factors such as temperature, humidity, lighting, noise, vibration, and air quality. This standard aims to create safe, healthy, and comfortable working conditions for workers.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

ISSN-p: 2085-1431
ISSN-e: 2654-5799

This regulation is used as a reference for the determination of physical work environment standards for PT XYZ in order to produce good physical work environment standards.

1. Work Climate Threshold Values Wet Bulb and Ball Temperature Index (ISBB)

Work Climate is the result of a combination of temperature, humidity, airflow velocity, and radiant heat together with the level of heat expenditure from the body of the workforce due to their work which includes hot and cold pressure. The Table 4 is the working climate threshold value of the Wet Ball and Ball Temperature Index (ISBB).

Table 4 Threshold value (NAB) work climate

Working Time Setting Every Hour	ISBB (°C) Workload			
	Light	Medium	Heavy	Very Heavy
75% - 100%	31	28	-	
50% - 75%	31	29	27.5	
25% - 50%	32	30	29	28
0% - 25%	32.5	31.5	30.5	30

2. Threshold Value of Noise

Noise is any unwanted sound that comes from production process equipment and/or work equipment at a certain level that can cause hearing loss. The Table 5 is the Threshold Value of the noise factor.

Table 5 Noise standard

Exposure Time per Day		Noise Intensity in dBA
8	Hour	85
4		88
2		91
1		94
30	Minute	97
1.5		100
7.5		103
3.75		106
1.88		109
0.94		112
28.12	Second	115
14.06		118
7.03		121
3.52		124
1.76		127
0.88		130
0.44		133
0.22		136
0.11		139

3. Lighting Standards

Lighting is the entire illumination in a field of work that is needed to carry out an activity, lighting includes natural lighting and artificial lighting. The Table 6 is the standard of lighting factors.

Table 6 Lighting standard

No	Information	Intensity (LUX)
1	Emergency lighting	5
2	Courtyards and roads	20
3	Work that distinguishes coarse items such as working with coarse materials, working with charcoal or ash, setting aside large items, working with earth or stone materials	50

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

No	Information	Intensity (LUX)
4	Work that distinguishes small items in passing such as ironwork, rough fitting, rice milling, stripping and setting aside cotton material, engine and steam rooms	100
5	Work that discriminates between small items rather thoroughly such as medium goldsmithing of tools, rough machine and lathe work, rough inspection or testing of items, sewing textiles or light colored leather, wrapping meat	200
6	Careful discriminating work of small and delicate items such as careful machine work, careful inspection, careful and delicate experiments, flour making, leather finishing and determination of light-colored cotton or wool materials, changing office work, writing and reading, archival work and mail selection	300
7	Fine discriminating work with moderate contrast and over a long period of time such as fine fitting, fine machine work, fine checking, fine polishing and cutting of glassware, fine woodwork (carving carving), sewing of dark colored woolen materials, Accountant, bookkeeper, shorthand work, typing or long office work	500-1000
8	Work distinguishing very fine articles with very little contrast for a long time such as extra fine mounting (watches, etc.), extra fine inspection (medicine ampoules), trial of extra fine tools, gold and diamond smithing, grading and setting aside of tobacco products, typesetting and copy checking in printing, inspection and sewing of old colored clothing materials	1000

4. Vibration Threshold Values for Whole Body Exposure

Vibration is the regular movement of objects or media in an alternating direction from an equilibrium position. The table below is the threshold value of the vibration factor.

Table 7 Vibration NAB

Total exposure time per working day (hours)	Threshold Value (m/sec^2)
0.5	3.4644
1	2.4497
2	1.7322
4	1.2249
8	0.8661

5. Threshold Values for Radio Frequency and Microwave Radiation

Radio wave or microwave radiation is electromagnetic radiation with a frequency of 30 (thirty) kilohertz to 300 (three hundred) gigahertz. The Table 8 shows the threshold values of radio frequency radiation and microwaves.

Table 8 Micro waves

Frequency	Power Density (mW/cm2)	Electric field strength (V/m)	Field strength (A/m)	Exposure Time (minutes)
30 kHz – 100 kHz		1842	163	6
100 kHz – 1 MHz		1842	16.3/f	6
1 MHz – 30 MHz		1842/f	16.3/f	6
30 MHz – 100 MHz		61.4	16.3/f	6
100 MHz – 300 MHz	10			6
300 MHz – 3 GHz	f/30			6
3 GHz – 30 GHz	100			$34000/f^{1.079}$
30 GHz – 300 GHz	100			$68/f^{0.476}$

6. Allowable Ultra Purple Light Radiation Exposure Time

Ultraviolet light is part of the electromagnetic waves of solar radiation energy. The UV index is a unitless number to describe the level of exposure to ultraviolet radiation related to human health BMKG, 2024. Table 9 is the threshold value of radio frequency radiation and microwaves.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

Table 9 Ultra purple light threshold value

Exposure Period per day	Effective Irradiance (Ieff) mW/centimeter^2
8 Hour	0.0001
4 Hour	0.0002
2 Hour	0.0004
1 Hour	0.0008
30 Minute	0.0017
15 Minute	0.0033
10 Minute	0.005
5 Minute	0.01
1 Minute	0.05
30 Second	0.1
10 Second	0.3
1 Second	3
0.5 Second	6
0.1 Second	30

7. Allowable Static Magnetic Field Exposure Threshold Value

Static Magnetic Field is a field or area generated by the movement of electric current. The Table 10 shows the threshold values of radiofrequency and microwave radiation.

Table 10 Static magnetic field threshold value

Body Parts	Highest level allowed (ceiling)
Whole Body (general workplace)	2 T
Whole Body (specialized workers and controlled work environments)	8 T
Limbs	20 T
Use of electronic meditating equipment	0,5 T

Description: mT (milli Tesla)

Design Result Analysis

This analysis aims to evaluate the difference between the actual conditions at PT XYZ, which do not have a structured procedure for maintaining the physical work environment, and the proposed new SOP. Analysis of the results of the Physical Work Environment Maintenance SOP design can be seen in the Table 11.

Table 11 Design result analysis

Actual Condition	Design Results	
	Improvement	Analysis
The existing business process in maintaining the physical work environment at PT XYZ there are 5 stages where the business process has not run consistently	After the design process, the proposed business process has preventive activities and corrective activities.	The proposed business process design includes the addition of preventive and corrective activities in the business process. Preventive activities are designed to reduce the likelihood of disruptions in the process, while corrective activities aim to ensure that any problems that arise are addressed immediately and do not recur.
PT XYZ does not yet have a structured procedure for maintaining the physical work environment, especially in the production area, so that maintenance is not carried out consistently and causes worker discomfort.	Physical Work Environment Maintenance SOP	With the Physical Work Environment Maintenance SOP that refers to ISO 14001: 2015, the physical work environment maintenance process is structured and consistent. This SOP contains steps starting from the identification of nonconformities, the corrective action process, to the evaluation of corrective actions. The implementation of this SOP aims to manage non-conformities to the physical work environment, besides that this SOP aims to support companies in continuous improvement in accordance with ISO 14001: 2015.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

Analysis of Strengths and Weaknesses of the Design

The following is an analysis of the advantages and disadvantages of the SOP for maintaining the physical work environment contained in the table below.

Table 12 Analysis of strengths and weaknesses of the design

Strengths	Weakness
Provides structured and detailed guidance covering the identification of nonconformities, the corrective process, and the evaluation of corrective actions. So that the quality of maintenance can be improved.	Requires time to adapt to changes in the steps of the physical work environment maintenance process.
Assists the monitoring process of previous maintenance due to a well-documented process.	Increases the workload of relevant stakeholders to carry out the physical work environment maintenance process.
Ensure that all action steps are carried out in accordance with standards and reference criteria, in order to improve occupational safety and health.	May overlook risks in work areas other than production because they are not included in the focus of maintenance.

Analysis of the Effect of Design Results on Initial Problems

Based on the initial problems experienced by the company, namely the condition of the physical work environment that does not meet the standards, one of the main obstacles is that there is no written regulation regarding work environment maintenance actions. The design of the Physical Work Environment Maintenance Standard Operating Procedure (SOP) provides procedures related to the identification of physical environmental non-conformities along with actions to correct the non-conformities with the help of supporting forms that have been designed. The Physical Work Environment Maintenance SOP will provide clear and structured guidance, so that maintenance can be carried out regularly and on schedule. The Physical Work Environment Maintenance SOP can help the maintenance and repair process and is well documented. In addition, it allows the company to monitor every action that has been done before and make continuous improvements if needed.

The Standard Operating Procedures (SOPs) designed directly addressed the physical work environment deficiencies observed at PT XYZ. For example, one of the key issues identified was inadequate lighting in certain production areas, which posed risks to safety and productivity. The SOP introduced a structured monitoring mechanism supported by periodic inspections and evaluation forms aligned with ISO 14001:2015 Clause 9.1.1. This approach ensures that deviations from standardized lighting thresholds are detected early and followed by corrective action. The proposed Standard Operating Procedure (SOP) offers a novel contribution by integrating structured monitoring, evaluation, and follow-up mechanisms into the management of the physical work environment. Unlike typical SOPs that serve merely as compliance checklists, this design embeds the Plan-Do-Check-Act (PDCA) cycle to ensure continuous improvement in line with ISO 14001:2015 Clause 9.1.1. Each step of the SOP—from routine environmental inspections to corrective actions and performance reviews—is aligned with measurable indicators and standardized documentation formats. Moreover, the application of the Business Process Management (BPM) framework ensures that the SOP is not only technically sound but also operationally practical, enabling seamless integration into daily production workflows. This approach enhances organizational responsiveness, accountability, and long-term environmental performance, representing a structured and adaptive model that is rarely addressed in typical environmental SOP design efforts.

This study acknowledges several limitations. Firstly, the research scope is confined to the production area of PT XYZ, excluding other departments such as packaging, warehousing, or administrative offices, which may have different environmental management needs. Secondly, while the SOP was designed based on standard values and observed conditions, it does not incorporate full field data validation across all physical factors. Actual measurements were conducted for lighting and noise only, while other important parameters such as vibration and indoor air quality were not evaluated due to equipment limitations. Lastly, the implementation of SOPs in real operational contexts can face challenges such as limited staff availability, shifting production schedules, or resistance to procedural changes. These limitations should be considered in future research aiming to expand or validate the SOP in more dynamic and diverse industrial environments.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

ISSN-p: 2085-1431
ISSN-e: 2654-5799

4. Conclusion

The results of the design of the Physical Work Environment Maintenance SOP at PT XYZ have been carried out by focusing and approaching ISO 14001: 2015 and Permenaker No.5 of 2018. This Physical Work Environment Maintenance SOP is designed by providing a structured and systematic procedure for maintaining the physical work environment. This SOP ensures that every action has been analyzed and in accordance with predetermined standards and criteria and can be implemented consistently to prevent the emergence of non-conformity of physical work environment factor criteria. This Physical Work Environment Maintenance SOP includes structured steps for the implementation of maintenance, identification of nonconformities, and implementation of corrective actions and preventive actions to prevent recurrence of problems. This SOP is also equipped with supporting documents such as finding forms and corrective actions that can help the physical work environment maintenance process to be well documented for the continuous improvement process. The design of this SOP is expected to help improve employee productivity and the health of the PT XYZ work environment.

References

Azharuddin, R. A. (2019). Kepuasan Kerja dan Dampaknya Terhadap Kinerja Karyawan (Studi pada Karyawan PT Bali Age Surabaya). *Jurnal Administrasi Bisnis (JAB)*, *72*(2), 166–174.

Darmadi, D. (2020). Pengaruh Lingkungan Kerja dan Disiplin Kerja Terhadap Kinerja Karyawan Pada Indomaret Cabang Kelapa Dua Gading Serpong Kabupaten Tangerang. *JIMF (Jurnal Ilmiah Manajemen Forkamma)*, *3*(3), 240–247.

Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2021). *Fundamental Manajemen Proses Bisnis*. Penerbit Andi.

Firman, R. (2019). Pedoman Pembuatan Standar Operasional Prosedur (SOP). *Jakarta: Badan Penjaminan Mutu, Universitas Al Azhar Indonesia*.

Gaspersz, V. (2012). Three in One ISO 9001, ISO 14001, OHSAS 18001. *Bogor: Vinchristo Publication*.

ISO 14001. (2015). *Environmental management systems - Requirements with guidance for use*. www.bsn.go.id

Marnisah, L., Farradia, Y., Erwant, E., Aisyah, N., Natan, N., & Widayanto, M. T. (2021). *Bookchapter, 2021*.

Ningtiyas, R. K., Pulansari, F., & Hayati, K. R. (2018). Penerapan Business Process Management (BPM)(Studi Kasus: Proses Bisnis Mengeksekusi dan Mengelola Rencana Penjualan di Divisi Niaga PT PJB Services). *Jurnal Teknologi*, *11*(1), 65–71.

Nurshafa, E. A. (2019). *Gap Analysis Penerapan ISO 45001 Pada Klausa Nomor 4, 5, 6 Dan 7 Di PT. Pupuk Kalimantan Timur*. UNIVERSITAS AIRLANGGA.

Padel, P. M. A., & Sutabri, T. (2023). Analisis Standard Operating Procedure (SOP) Manajemen Insiden Menggunakan Framework ITIL V3 dengan Metode Analisis Gap Layanan Pada PT Lingkaran Sistem Intelektual. *Indonesian Journal of Multidisciplinary on Social and Technology*, *1*(2), 61–68.

Pranowo, I. D. (2019). *Sistem dan Manajemen Pemeliharaan*.

Putra, D. R., Rachmadi, A., & Setiawan, N. Y. (2021). Pemodelan dan Rekomendasi Perbaikan Proses Bisnis Divisi Akademik Menggunakan Metode Business Process Improvement (BPI)(Studi Pada: Bina Avia Persada Malang). *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, *5*(1), 201–208.

Surijadi, H., & Idris, Y. (2020). Dampak Lingkungan Kerja Fisik dan Lingkungan Kerja Non Fisik Terhadap Kepuasan Kerja Karyawan. *Public Policy*, *1*(1), 14–32.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143

Wati, A. I., & Yusuf, M. (2020). Pengaruh Lingkungan Kerja Non Fisik Terhadap Kepuasan Kerja Pegawai Pada Dinas Koperasi dan UMKM Kabupaten Bima. *Journal of Business and Economics Research (JBE)*, *1*(2), 92–97.

Yantika, Y., Herlambang, T., & Rozzaid, Y. (2018). Pengaruh lingkungan kerja, etos kerja, dan disiplin kerja terhadap kinerja karyawan (Studi kasus pada pemkab Bondowoso). *Jurnal Manajemen Dan Bisnis Indonesia*, *4*(2), 174–188.

Please cite this article as: Murfid, N., Widaningrum, S., & Safrudin, Y. (2025). Designing SOP for physical work environment maintenance based on ISO 14001: 2015 and Permenaker No.5 of 2018 at PT XYZ. *Operations Excellence: Journal of Applied Industrial Engineering*, 17(2), 190-200. doi: http://doi.org/10.22441/oe.2025.v17.i2.143