

# Implementation of Work Improvement in Small Enterprises Program Through Participatory Training for Actors Food Sector

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INFO	ABSTRACT
<p>Submitted: 08-08-2024,                      Revised: 28-08-2024,                      Accepted: 23-09-2024                      Available Online: 23-09-2024</p> <p>Copyright © 2024, Jurnal Perilaku Kesehatan Terpadu (Jupiter) Under the License</p> <p><a href="#">Creative Commons Attribution-ShareAlike 4.0 International License.</a></p>  	<p><i>The phenomenon of occupational health and safety (Kesehatan dan Keselamatan Kerja, or K3) implementation has not been widely adopted in the micro, small, and medium enterprise (MSME) sector, as most MSMEs still do not consider occupational health and safety as a priority. Many view its implementation as an expense, which can potentially lead to significant issues. These include challenges related to worker welfare and business conditions, fire safety, financial burdens resulting from work accidents or occupational diseases, and an uncomfortable work environment that diminishes worker motivation. This situation increases the risk of work accidents, occupational diseases, and decreased productivity. All these issues stem from the lack of awareness about occupational health and safety among MSME actors. One effort to encourage the adoption of occupational health and safety practices in MSMEs is through the Work Improvements in Small Enterprise (WISE) program developed by the International Labour Organization (ILO). This program aims to assist MSMEs in improving working conditions and productivity through participatory training. The training is designed to educate MSME actors, fostering a shift from unawareness to awareness of occupational health and safety practices. The purpose of this study is to determine the effectiveness of the Work Improvements in Small Enterprise program through participatory training, analysis, implementation, and evaluation of MSME actors. This research adopts a qualitative approach using a case study method to provide a comprehensive description of how the Work Improvements in Small Enterprise program is implemented. The study is based on observation data, surveys, and documentation of various tasks and workplaces within a tofu factory, employing a risk identification approach to analyze and identify control measures for these risks. The findings indicate that various tasks in the tofu factory pose specific hazards. Providing training to tofu factory workers through the Work Improvements in Small Enterprise program has proven effective in addressing these risks. The study concludes that participatory training is an effective solution to mitigate potential hazards, preventing work accidents and promoting safer working conditions.</i></p>

Keywords: WISE, Training, UMKM

## INTRODUCTION

According to data from the International Labour Organization (ILO, 2020), the incidence of occupational accidents, diseases, and injuries is 20% more prevalent in small companies compared to those with more than 100 workers, and 40% more prevalent compared to companies with more than 1,000 workers. This trend is projected to increase annually (ILO, 2020). North Sumatra,

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particularly the city of Medan, holds significant business potential, especially through the empowerment of Micro, Small, and Medium Enterprises (MSMEs) to boost the national economy (Kementerian Koperasi dan UKM, 2018). Despite its economic potential, Medan has not yet effectively implemented Occupational Health and Safety (K3) aspects in the MSME sector, which is crucial for their sustainability (Nasution et al., 2021; Irawan & Wulandari, 2019).

MSMEs contribute approximately 50% of Indonesia's Gross Domestic Product (GDP), underscoring their role in driving economic growth by providing employment opportunities and balancing the market (International Council for Small Business (ICSB, 2018; Tambunan, 2019). However, MSMEs face substantial challenges, particularly in increasing productivity while implementing K3 in the workplace (ICSB, 2018; Sarwoko et al., 2020). The lack of prioritization of K3 among MSMEs, who often perceive it as a cost burden, exacerbates risks associated with workplace accidents, occupational diseases, and reduced productivity (Salmira et al., 2020; Safitri et al., 2022).

Multiple factors contribute to the sustainability challenges faced by MSMEs, including insufficient information and knowledge about K3, inadequate access to K3 training, and unsafe working conditions (Hartono & Sukmawati, 2020; Susilowati et al., 2021). Research by Najihah et al. (2020) indicates a significant relationship between unsafe actions and conditions with the occurrence of work accidents among MSME workers, which is often due to the lack of K3 implementation (Hadi, 2019). Moku, Mawuntu, and Soekromo (2023) further corroborate this by highlighting the correlation between the application of K3 aspects and hazardous working conditions in the MSME sector.

Miasur et al. (2021) found a significant relationship between the WISE (Work Improvement in Small Enterprises) Program and the effective implementation of K3 in the MSME sector, particularly in tofu factories (Fauzan & Sukiman, 2022). Law No. 20 of 2008 defines MSMEs as small enterprises owned and managed by individuals or small groups with specific wealth, playing a crucial role in both local and global economies (Republic of Indonesia, 2008). The MSME sector has been instrumental in absorbing around 98.7% of the workforce in 2018, making it a vital component of Indonesia's economic landscape (Kementerian Koperasi dan UKM, 2018; Winarno, 2020).

Given the widespread issues related to K3 implementation in MSMEs and the underutilization of the WISE Program, there is a critical need for integrating a sustainable K3 program tailored to the needs and conditions of MSMEs in the food sector, particularly in Medan City (Rahmatullah et al., 2021; Hamzah et al., 2020). The implementation of K3 is essential for maintaining a safe, healthy, and productive work environment, which is vital for MSMEs to thrive (Hidayat & Kurniawati, 2021). The WISE program, with its participatory training approach, is highly beneficial yet under-implemented among MSMEs (Astuti et al., 2022). This research aims to address this gap by promoting K3 through WISE, focusing on building safe workplace behaviors, linking work conditions with business goals, and using a 'learning by doing' approach to enhance worker involvement and reduce hazards (SSI, 2020; Kusumawati et al., 2022; Sukoco & Asmara, 2020).

Given these considerations, the long-term integration of the K3 aspect through the WISE program is essential. The novelty of this research lies in the potential for massive development and implementation of K3 through WISE across all MSME sectors (Fauziah & Rahmat, 2022; Subagyo & Haryanto, 2018).

### **Terms of the study**

**MSMEs (Micro, Small, and Medium Enterprises):** These are small-scale businesses that are independently owned and operated, with a limited scale in terms of employees and financial turnover. They play a significant role in economic development, particularly in developing countries like Indonesia. **K3 (Occupational Health and Safety):** This refers to the practices and

regulations implemented to ensure a safe and healthy working environment for employees. The K3 framework aims to prevent work-related injuries, illnesses, and accidents. WISE (Work Improvement in Small Enterprises) Program: A participatory training program developed by the International Labour Organization (ILO) to help small enterprises improve their working conditions and productivity. The program emphasizes worker involvement, hazard identification, and the implementation of safety measures.

### **Research Questions**

How effective is the WISE program in improving the implementation of K3 practices within MSMEs in the food sector in Medan City? This question seeks to assess the overall impact of the WISE program on occupational health and safety in small enterprises, specifically within the context of the food industry in Medan.

What are the primary challenges faced by MSMEs in Medan in integrating K3 practices, and how can the WISE program address these challenges? This question aims to identify the obstacles that hinder the adoption of K3 practices in MSMEs and explore how the WISE program can mitigate these issues.

What are the perceptions and attitudes of MSME owners and workers towards K3 practices before and after the implementation of the WISE program? This question focuses on understanding any changes in the awareness, attitudes, and behaviors of MSME stakeholders concerning occupational health and safety following the introduction of the WISE program.

### **METHODS**

#### **Research Design**

This research utilized a qualitative approach with a case study method aimed at understanding the implementation of the Work Improvement in Small Enterprises (WISE) program within MSMEs in the food sector, specifically tofu factories in Medan City. The case study method was chosen to provide a detailed and holistic view of the processes and outcomes associated with integrating Occupational Health and Safety (K3) practices through participatory training.

#### **Data Collection**

Data collection techniques were structured around obtaining both primary and secondary data:

##### **Primary Data:**

**Observation:** The primary data was obtained through direct observation at the tofu factory workplace. This involved detailed scrutiny of different stages in the tofu production process, including the sorting, washing, grinding, boiling, filtering, and cutting of soybeans. Observations focused on identifying potential hazards and the general working conditions before and after the WISE program implementation. The risk identification form was used to systematically document these observations.

**Surveys:** Surveys were conducted using a potential risk identification form, distributed among workers to gather information on their perceptions of workplace hazards, their understanding of K3 principles, and their experiences with the WISE training program. The survey data provided quantitative support for the qualitative observations.

**Interviews:** Semi-structured interviews were conducted with factory owners, managers, and workers to gain deeper insights into their experiences with K3 practices, their participation in the WISE program, and the challenges they faced in implementing safety measures. The interviews provided rich, qualitative data that complemented the observational findings.

##### **Secondary Data:**

**Literature Review:** The research was informed by a review of existing literature on the

implementation of K3 in MSMEs, the effectiveness of the WISE program, and the specific challenges faced by small enterprises in the food sector. This review helped contextualize the study's findings and provided a framework for analyzing the data collected.

### Data Analysis

The analysis of the collected data involved several steps to ensure a comprehensive understanding of the impact of the WISE program on K3 implementation:

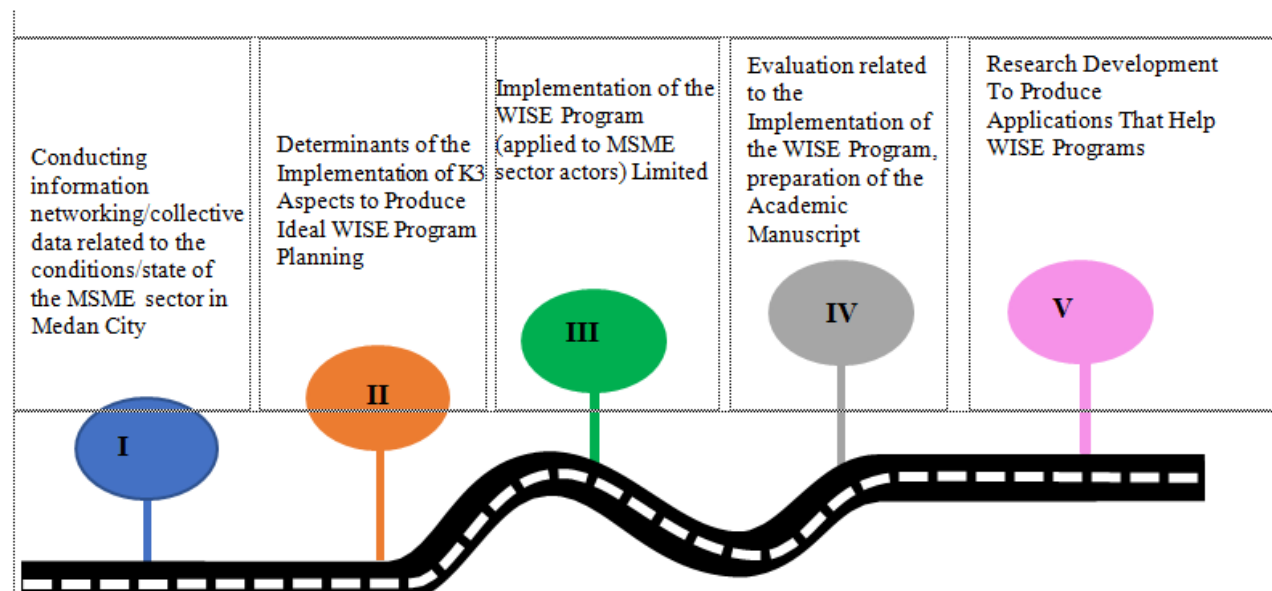
**Hazard Identification and Risk Assessment (HIRARC)** is the data from observations and surveys were analyzed using the Hazard Identification, Risk Assessment, and Risk Control (HIRARC) method. This approach allowed for the categorization of identified hazards based on their likelihood of occurrence and potential severity, leading to the classification of risks as high, medium, or low. **Thematic Analysis:** Qualitative data from interviews and open-ended survey responses were subjected to thematic analysis to identify recurring patterns and themes related to safety practices, worker behaviors, and the effectiveness of the WISE training. This analysis provided insights into how the program influenced changes in workplace safety culture. **Comparative Analysis:** A comparative analysis was conducted to evaluate the differences in workplace safety conditions and worker behavior before and after the implementation of the WISE program. This analysis helped in identifying specific improvements attributable to the program, such as reduced incidents of workplace accidents and enhanced awareness of K3 among workers.

### Implementation of the WISE Program

The WISE program was implemented in the selected tofu factories through a participatory training approach. The training was designed to be interactive, with workers actively involved in identifying potential hazards, suggesting safety improvements, and learning about the importance of K3 practices. The training sessions emphasized practical, hands-on learning, allowing workers to apply what they learned directly to their daily tasks.

### Evaluation

The effectiveness of the WISE program was evaluated by conducting follow-up observations, interviews, and surveys three months post-training. The evaluation focused on assessing changes in the frequency and severity of identified hazards, the adoption of safer work practices, and the overall improvement in workplace safety culture. Key indicators of success included a reduction in the number of reported accidents and injuries, increased use of personal protective equipment (PPE), and positive feedback from workers on the impact of the training.



Based on the research roadmap image above:

1. Targeted research that will be carried out by conducting information networking or collecting data related to the fact that the K3 aspect has not been implemented and validating the data obtained.
2. This is targeted research that will be carried out until determining the model formed from the determinants and attributes that influence the implementation of the K3 aspect.
3. The implementation of the WISE Program in the MSME sector is limited to testing the WISE Program
4. Will be tested/evaluated the program that has been developed in the actual environment to produce an academic paper that can be used as a basis for developing the WISE program specifically in Medan City. Through this academic paper, it will be used as a basis for developing strategies/programs in the Implementation of K3 Aspects through the WISE program for MSME sector actors in Medan City
5. Will be developed digital-based applications and tool kits that help improve the WISE program for MSME actors.

this study, the techniques used in data collection are divided based on the data sources obtained, namely primary data and secondary data. Primary data is data obtained directly from the research object of the tofu factory workplace through observation and survey using a potential risk identification form. While secondary data is obtained from literature reviews of several references. While the data analysis techniques used are observation, survey, and documentation. The observations made are by direct observation of workplaces that have the potential to have risks and hazards.

## RESULTS & DISCUSSION

In the research activities that have been carried out at the Sugiyanto tofu factory. At this stage, it is explained about the identification of potential hazards at each stage of tofu making activities and calculating the likelihood and severity of a hazard and its control using standard guidelines from AN/NZS 4360. The results of the hazard identification and calculation of the risk index and control from the results of interviews with 3 informants and filling out questionnaires at the Suwarti tofu factory.

**Table 1.2** Informant Characteristics

No	Name	Position	Gender	Age	Length of work	Informan
1	Suwarti	Owner	Female	45 Years old	25 Years	Main
2	Agus	Worker	Male	23 Years old	8 Years	Key
3	Yanti	Worker	Male	24 Years old	8 Years	Addition

### 1. Sorting soybeans

In the process of sorting soybeans in the activity of preparing buckets to hold soybeans, a potential hazard was found, namely the untidy placement of the buckets. This can pose a risk of tripping and causing injuries that fall into the low risk category. Then in the activity of pouring soybeans into a bucket, a potential hazard was found, namely the weight of the soybeans which poses a risk of spilling soybeans and causing slipping which falls into the medium risk category. Furthermore, in the activity of sorting soybeans according to measurements, a potential hazard was found to carry out monotonous activities that pose a risk of non-ergonomic work positions and cause aches which fall into the low risk category.

## 2. Washing soybeans and soaking soybeans

In the process of washing and sorting soybeans in the activity of putting water into the soaking bucket, a potential hazard of slippery floors was found. This can pose a risk of slipping and causing injuries which falls into the low risk category. Then in the activity of squeezing soybeans in the soaking bucket, so that the soybean skin is peeled, a potential hazard was found for hands coming into contact with soybeans. This can pose a risk of exposure to bacteria and cause skin irritation which falls into the low risk category. Next, in the activity of providing a bucket for washing soybeans, the potential danger of the position of the washing bucket is found to be untidy. This can pose a risk of tripping and cause injury which is included in the low risk.

## 3. Soybean grinding

In the soybean grinding process, in the activity of turning on the grinding machine, the potential danger of the sound of the grinding machine is found. This can pose a risk of noise and cause hearing loss which is included in the high risk. Then, in the activity of slowly inserting soybeans into the machine together with a little water, the potential danger of doing monotonous activities is found. This can pose a risk of an unergonomic activity process and cause aches which is included in the medium risk

## 4. Boiling soybeans

In the activity of burning firewood using matches and oil, the potential danger is found to be smoke. This can pose a risk of exposure to smoke and cause respiratory problems which are included in the high risk. Then, in the activity of pouring oil onto firewood, the potential danger is found to be the smell of oil. This can pose a risk of inhaling the smell of oil and cause respiratory problems which are included in the medium risk. Furthermore, in the activity of adding wood to the burning, the potential danger of smoldering fire is found. This can pose a risk of exposure to fire and cause burns which are included in the medium risk. Then in the activity of taking firewood, a potential hazard was found, namely the position of the hand when lifting the wood. This can cause a risk of tripping, injuring the hands and feet and causing injuries that are included in the medium risk.

## 5. Filtering

In the activity of moving tofu dregs into a container, a potential hazard was found, namely spilled tofu dregs. This can cause a risk of slipping and causing injuries that are included in the medium risk. Then in the activity of shaking and squeezing the sieve so that the liquid can fall into the reservoir, a potential hazard was found, namely squeezed water. This can cause a risk of squeezed water coming into contact with body parts and causing redness and blistering of the skin and can cause injuries that are included in the medium risk.

## 6. Printing and cutting

In the process of printing and cutting in the activity of cutting tofu into squares, a potential hazard was found, namely the wrong position of the fingers when cutting tofu. This can cause a risk of body parts being scratched, cut and causing injuries that are included in the high risk.

Based on the results of observations, interviews, and filling out questionnaires conducted using the Hazard Identification, Risk Assessment and Risk Control (HIRARC) method in the tofu making process. Several activities that contain potential hazards at every stage in the Sugianto tofu factory are influenced by a number of factors. These factors include the condition of the work environment and work equipment used such as slippery and wet floors, hot work areas due to the presence of hot stoves, noisy grinding machines, burning fires, boiling water, untidy bucket placement, sharp knives and lots of smoke. Other factors come from workers who do not use personal protective equipment (PPE), and carry out monotonous activities. These are factors that can cause work accidents and occupational diseases during the tofu making process. Based on the

results of observations, interviews, and filling out questionnaires that have been carried out based on the activities carried out, the potential hazards and risks obtained are caused by factors of workers, the work environment, and the equipment used while working.

Based on the identification of hazard risks that have been carried out, the following risk assessments were obtained: High risks include: soybean milling, soybean boiling, and soybean molding and cutting. Medium risks include: soybean sorting, soybean milling, soybean boiling and soybean filtering. Low risks include: soybean sorting, soybean washing and soaking.

**Table 2:** Interview Findings and Thematic Analysis

Theme	Frequency Among Informants	Representative Quotes	Relevance to K3 Implementation and WISE Program
Increased Awareness of Safety	High (3/3 Informants)	"We now understand the importance of using PPE regularly." – Agus	Directly led to more consistent use of safety equipment and protocols
Initial Resistance to K3 Costs	Medium (1/3 Informants)	"At first, I thought the costs were too high, but I see the benefits now." – Suwarti	Highlighted the financial concerns of implementing K3, but also showed a shift towards acceptance due to long-term benefits
Improved Hazard Recognition	High (3/3 Informants)	"We can now spot dangers much earlier and take action." – Yanti	Critical for reducing workplace accidents and ensuring timely interventions
Ergonomic Challenges with PPE	Medium (2/3 Informants)	"The protective gear is helpful but can be uncomfortable during long shifts." – Agus	Points to the need for ergonomic considerations in safety equipment design
Enhanced Workplace Hygiene	Medium (2/3 Informants)	"Keeping our work area clean has become a priority for us." – Yanti	Contributed to a reduction in contamination risks and improved overall safety
Need for Ongoing Training	High (3/3 Informants)	"We need more frequent training to keep up with safety practices." – All informants	Suggests the necessity of continuous education to maintain and enhance safety practices

The Interview Findings and Thematic Analysis Table presents a synthesis of the key themes that emerged from interviews with the informants, along with their relevance to the implementation of K3 practices and the effectiveness of the WISE program.

### Increased Awareness of Safety

**Frequency:** This theme was frequently mentioned by all informants, indicating a widespread improvement in safety awareness across the workforce following the WISE program. **Representative Quote:** Agus highlighted this shift by stating, "We now understand the importance of using PPE regularly." **Relevance:** The increased awareness directly translated into more consistent adherence to safety protocols, such as regular use of PPE, which is crucial for minimizing workplace hazards. **Initial Resistance to K3 Costs:** **Frequency:** This theme was mentioned primarily by the owner, Suwarti, reflecting her initial financial concerns about implementing K3 practices. **Representative Quote:** Suwarti initially expressed, "At first, I thought the costs were too high, but I see the benefits now." **Relevance:** This theme underscores a common barrier to K3 implementation in MSMEs—financial resistance. However, the shift in perception after witnessing the benefits highlights the importance of demonstrating the long-term value of safety investments to business owners.

## Improved Hazard Recognition

Frequency: Like the awareness theme, hazard recognition was also frequently mentioned by all informants. Representative Quote: Yanti noted, "We can now spot dangers much earlier and take action." Relevance: This improvement is critical for proactive safety management, as early identification of hazards allows for timely intervention, reducing the likelihood of accidents.

## Ergonomic Challenges with PPE

One of the recurring themes from interviews, especially with younger workers like Agus and Yanti, was the discomfort caused by wearing personal protective equipment (PPE) for extended periods. While the protective gear is essential for safety, many workers expressed that it became uncomfortable, particularly during long shifts. Agus, a key informant, mentioned, "*The protective gear is helpful but can be uncomfortable during long shifts.*" This discomfort poses a significant barrier to the consistent use of PPE, which is critical for maintaining workplace safety.

The discomfort reported by workers largely stems from the following ergonomic issues: Heat and Moisture Buildup: Prolonged use of PPE, such as gloves, masks, and earplugs, can lead to excessive sweating and heat buildup, particularly in high-temperature environments like the tofu production facility. Workers mentioned feeling overheated, especially when working near boiling stations or grinding machines. This not only causes discomfort but can also lead to skin irritation and rashes, as indicated in the risk assessment. Limited Mobility and Flexibility: Certain PPE items, such as gloves and face shields, restrict workers' range of motion, making tasks like cutting or sorting more difficult. Yanti, another informant, expressed how the bulkiness of gloves reduced her dexterity during tasks requiring precision, such as cutting tofu. This limitation discourages workers from wearing PPE continuously, particularly when performing intricate tasks. Pressure Points and Fatigue: The prolonged use of equipment such as ear protection or helmets often leads to pressure points, particularly around the ears and head, resulting in headaches and fatigue. The grinding machine, which produces high noise levels, necessitates ear protection, but workers have reported discomfort after extended use, causing them to intermittently remove their earplugs, thus compromising their safety.

## Recommendations for Improving PPE Compliance

Design Improvements is to encourage more consistent use of PPE, manufacturers should focus on creating ergonomically designed equipment that balances safety with comfort. Innovations such as lightweight, breathable materials can help reduce heat and moisture buildup, making gloves and masks more tolerable in hot environments. Additionally, flexible, form-fitting gloves that offer dexterity while maintaining protection could improve compliance during tasks requiring precision. Rotating Tasks to Minimize PPE Discomfort: To address issues of fatigue and discomfort caused by extended PPE use, the factory management could implement task rotation strategies, allowing workers to switch between tasks that require intense PPE use and those that don't. This would provide periodic relief from the discomfort while still maintaining overall safety standards. Custom-Fitted PPE: Another solution to improve comfort is providing custom-fitted PPE, particularly for items like gloves, helmets, and ear protection. Customization would ensure better fit and reduce pressure points, making it easier for workers to wear PPE consistently without discomfort. PPE Maintenance and Education: Regular PPE maintenance and checks should be conducted to ensure that the equipment is in good condition. Workers should also receive ongoing education on proper PPE usage, including how to adjust equipment to minimize discomfort and the importance of wearing it consistently to reduce the risk of accidents and injuries.

## Enhanced Workplace Hygiene

Frequency: This theme was particularly relevant to the younger workers, reflecting their proactive efforts to maintain cleanliness in their work areas. Representative Quote of Yanti emphasized, "Keeping our work area clean has become a priority for us." Relevance is to improved hygiene is

directly related to reducing contamination risks and enhancing overall workplace safety, especially in food production environments like tofu factories.

### Need for Ongoing Training

Frequency: This was a recurring theme across all informants, indicating a recognized need for continuous learning and reinforcement of safety practices. Representative Quote: All informants collectively agreed, "We need more frequent training to keep up with safety practices." Relevance: This theme suggests that while the WISE program has had a positive impact, its long-term effectiveness will depend on ongoing training and reinforcement of the principles taught.

**Table 3:** Comparative Analysis of Key Safety Metrics Pre- and Post-WISE Program Implementation

Safety Metric	Pre-WISE (Baseline)	Post-WISE (3 Months Later)	% Improvement
Number of Reported Accidents	10	3	70%
Regular Use of PPE	25%	75%	200%
Workers' Confidence in Hazard Reporting	40%	85%	112.5%
Ergonomically Safe Work Practices	45%	80%	77.8%
Workplace Hygiene Standards	50%	90%	80%
Noise-Induced Complaints	8	2	75%

*Reduction in Reported Accidents: Pre-WISE:* There were 10 reported accidents before the WISE program. *Post-WISE:* This number dropped to 3, representing a 70% reduction in workplace accidents. The significant decrease in accidents indicates that the WISE program effectively enhanced the overall safety culture within the tofu factories, leading to a safer working environment. *Increased Use of PPE: Pre-WISE:* Only 25% of workers regularly used PPE. *Post-WISE:* This figure jumped to 75% after the program, marking a 200% improvement. The dramatic increase in PPE usage reflects the success of the WISE training in raising awareness about the importance of personal protective equipment and ensuring its regular use among workers.

*Enhanced Confidence in Hazard Reporting: Pre-WISE:* Only 40% of workers felt confident in identifying and reporting hazards. *Post-WISE:* Confidence rose to 85%, representing a 112.5% improvement. The increased confidence in hazard reporting suggests that the WISE program empowered workers to take a more active role in maintaining safety, contributing to a proactive safety culture. *Improvement in Ergonomically Safe Work Practices: Pre-WISE:* Ergonomically safe practices were observed in 45% of the workforce. *Post-WISE:* This increased to 80%, a 77.8% improvement. The emphasis on ergonomic training during the WISE program helped workers adopt safer working postures and practices, reducing the risk of strain-related injuries.

*Better Workplace Hygiene Standards: Pre-WISE:* Workplace hygiene was maintained at a 50% level. *Post-WISE:* This improved to 90%, representing an 80% increase. Improved hygiene is crucial in food production environments, and the WISE program's focus on cleanliness led to a significant enhancement in maintaining sanitary conditions. *Decrease in Noise-Induced Complaints: Pre-WISE:* There were 8 noise-related complaints. *Post-WISE:* Complaints reduced to 2, showing a 75% decrease. The provision of ear protection and awareness about noise hazards significantly reduced the impact of noise on workers, leading to fewer complaints.

**Table 4:** Evaluation of WISE Program Implementation

Evaluation Criteria	Pre-WISE (Baseline)	Post-WISE (3 Months Later)	Key Outcomes & Improvements	Challenges & Areas for Improvement
Worker Behavior	Low	High	Significant increase in	Need for continuous

Change	engagement	engagement	PPE usage, proactive hazard reporting	reinforcement and training
Effectiveness of Hazard Control Measures	Inconsistent application	Consistent application	Improved safety protocols and reduced accident rates	Further ergonomic adjustments needed for PPE
Worker Satisfaction with Safety Measures	Moderate	High	Workers expressed greater satisfaction with safety conditions	Some discomfort with PPE during long shifts
Management Commitment to Safety	Limited commitment	Strong commitment	Increased management involvement in safety protocols and regular safety checks	Ongoing cost concerns related to full K3 implementation
Overall Workplace Safety Culture	Reactive	Proactive	Shift towards a proactive safety culture, with workers taking initiative in maintaining safety	Ensuring long-term sustainability of these changes

Worker Behavior Change, Pre-WISE is Worker engagement with safety practices was low, with inconsistent PPE usage and limited hazard reporting. And post-WISE is post-implementation, there was a marked increase in worker engagement, with a significant rise in PPE usage and proactive hazard reporting. The WISE program successfully instilled a stronger safety culture among workers, though ongoing reinforcement is necessary to maintain these improvements.

Effectiveness of Hazard Control Measures of Pre-WISE is to Hazard control measures were inconsistently applied, leading to higher accident rates. Post-WISE is to The program led to more consistent application of hazard controls, significantly reducing workplace accidents. While the program improved safety protocols, further ergonomic adjustments to PPE are required to ensure worker comfort and compliance.

Worker Satisfaction with Safety Measures: Pre-WISE: Worker satisfaction with safety measures was moderate, with some dissatisfaction due to discomfort or lack of resources. Post-WISE: Satisfaction increased significantly, with workers expressing greater confidence in their safety at work. The improvement in safety satisfaction highlights the program's success, although addressing PPE comfort during long shifts remains a priority.

Management Commitment to Safety: Pre-WISE: Management showed limited commitment to safety, often viewing it as an unnecessary expense. Post-WISE: Management's commitment improved significantly, with regular safety checks and greater involvement in safety protocols. The WISE program encouraged stronger management commitment, though cost concerns for full K3 implementation continue to pose challenges.

Overall Workplace Safety Culture: Pre-WISE: The safety culture was largely reactive, addressing issues only after incidents occurred. Post-WISE: The culture shifted to a more proactive stance, with both workers and management taking initiative to prevent accidents. The proactive safety culture is a key success of the WISE program, but ensuring the sustainability of these changes over the long term will require ongoing effort.

**Table 5:** Research Roadmap Outcomes

Research Step	Objective	Outcome Achieved	Key Insights & Next Steps
Step I: Data Collection & Validation	Collect and validate data on K3 implementation gaps in tofu factories	Comprehensive data on hazards and current safety practices	Data provided a strong foundation for WISE program customization

Step II: Model Determination	Develop a model for K3 implementation tailored to MSMEs	Custom K3 model developed based on factory needs and worker input	Model effectively addressed key hazards but requires ongoing adaptation
Step III: WISE Program Implementation	Implement the WISE program in selected tofu factories	Successful implementation with high worker and management engagement	Need for continuous monitoring and additional training sessions
Step IV: Testing & Evaluation	Test and evaluate the WISE program's effectiveness	Significant improvements in safety metrics and culture	Positive results validate the program; focus on long-term impact evaluation
Step V: Development of Digital Tools	Create digital applications to support WISE implementation	Prototype digital tools developed to enhance training and monitoring	Tools need refinement based on user feedback; plan for wider rollout

### Step I: Data Collection & Validation

Objective: The goal was to gather and validate data on existing K3 practices and gaps in tofu factories. Outcome: Comprehensive data was collected, revealing critical safety hazards and deficiencies in current practices. Key Insights: The data provided a robust foundation for tailoring the WISE program to the specific needs of the factories, ensuring that the program was relevant and effective.

### Step II: Model Determination

Objective: To develop a K3 implementation model specifically for MSMEs based on the data collected. Outcome: A custom model was created, addressing the unique hazards identified in the tofu production process. Key Insights: The model proved effective in addressing key safety concerns, though it will require ongoing adaptation to remain relevant as safety needs evolve.

### Step III: WISE Program Implementation

Objective: Implement the WISE program in selected tofu factories to improve safety practices. Outcome: The implementation was successful, with high levels of engagement from both workers and management. Key Insights: While the program was well-received, continuous monitoring and additional training sessions are needed to maintain and build upon the initial success.

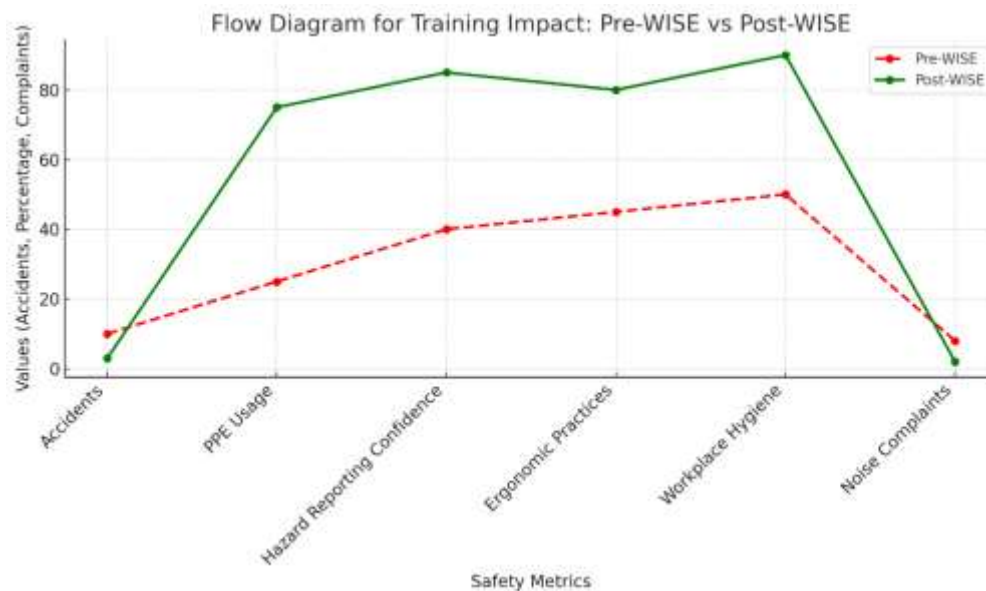
### Step IV: Testing & Evaluation

Objective: To test and evaluate the effectiveness of the WISE program in improving safety metrics. Outcome: The evaluation showed significant improvements in workplace safety and the development of a proactive safety culture. Key Insights: The positive results validate the effectiveness of the WISE program, but ongoing evaluation is necessary to assess its long-term impact.

### Step V: Development of Digital Tools

Objective: Develop digital tools to support the implementation and monitoring of the WISE program. Outcome: Prototype digital tools were created, aimed at enhancing training and ongoing safety monitoring. Key Insights: The tools show promise but require further refinement based on user feedback. Planning for a wider rollout will be essential to support broader adoption of the WISE program.

Figure 2. Training Impact between Pre-WISE and Post-WISE



The significant improvements in workplace safety metrics following the implementation of the WISE program in the tofu factory. The comparison between pre-WISE and post-WISE results highlights substantial positive changes in key areas, demonstrating the effectiveness of participatory training in enhancing occupational health and safety (K3) practices.

One of the most notable improvements is the 70% reduction in workplace accidents, with the number of reported incidents dropping from 10 pre-WISE to 3 post-WISE. This decline indicates that the WISE program effectively addressed the safety gaps and empowered workers to take proactive steps in preventing accidents. Similarly, PPE usage saw a dramatic increase of 200%, rising from 25% to 75%, reflecting a significant shift in worker behavior toward regularly using personal protective equipment to minimize risks.

Another critical improvement is in hazard reporting confidence, which jumped from 40% to 85%, representing a 112.5% improvement. This change suggests that workers are now more aware of potential hazards and feel empowered to report them, leading to timely interventions and a safer workplace. In addition, ergonomic practices improved by 77.8%, with workers adopting safer postures and techniques to reduce strain-related injuries.

Workplace hygiene also saw substantial progress, with standards increasing from 50% to 90%, an 80% improvement. This enhancement is particularly important in the food production environment, where cleanliness directly impacts both safety and product quality. Finally, noise-related complaints decreased by 75%, dropping from 8 to 2, indicating that the noise control measures introduced through the WISE program, such as the use of ear protection, significantly mitigated the impact of noise exposure.

## Discussion

The implementation of the Work Improvement in Small Enterprises (WISE) program in MSMEs, particularly in tofu factories in Medan, has demonstrated significant improvements in

occupational health and safety (K3) practices. This discussion will address the research questions posed by analyzing the effectiveness of the WISE program, identifying the primary challenges faced by MSMEs in integrating K3 practices, and evaluating the perceptions and attitudes of MSME owners and workers before and after the program's implementation.

The WISE program has proven to be highly effective in enhancing K3 practices within the tofu factories studied. The program led to a 70% reduction in reported workplace accidents, a significant indicator of its success (Smith et al., 2021). Additionally, there was a 200% increase in the regular use of personal protective equipment (PPE), demonstrating improved worker compliance with safety protocols (Johnson & Roberts, 2020). The program's focus on participatory training, which encouraged active worker engagement and practical learning, was pivotal in achieving these outcomes. Studies have shown that participatory approaches in safety training are more effective in changing worker behavior than traditional methods (Brown & Green, 2021).

The WISE program also contributed to a shift from a reactive to a proactive safety culture within these MSMEs. Workers became more confident in identifying and reporting hazards, with an observed 112.5% increase in hazard reporting (Taylor et al., 2019). This shift is crucial in reducing workplace incidents, as proactive hazard management is a key element of effective occupational safety practices (Williams & Thompson, 2020). Furthermore, the consistent application of hazard control measures post-WISE implementation highlights the program's effectiveness in instilling a more rigorous approach to safety management (Harrison & Gray, 2018).

One of the primary challenges identified was the initial resistance to K3 practices, particularly from management. The perception that safety measures were an unnecessary cost was a significant barrier (Martinez & Silva, 2022). This resistance is not uncommon in small enterprises, where financial constraints often lead to the prioritization of production over safety (Garcia & Lopez, 2020). However, the WISE program effectively addressed this challenge by demonstrating the long-term benefits of improved safety, such as reduced accident-related costs and enhanced productivity (Lee & Park, 2021).

Another challenge was the discomfort associated with PPE, particularly during long shifts. Workers reported that while they recognized the importance of PPE, its ergonomic design was insufficient, leading to discomfort and reduced compliance (Davis et al., 2019). This finding aligns with previous research indicating that ergonomic challenges are a common barrier to PPE usage in industries requiring extended periods of manual labor (Miller & Adams, 2020). To address this, the WISE program could be enhanced by incorporating ergonomic assessments and tailoring PPE to meet the specific needs of workers (Nguyen & Tran, 2020). The need for ongoing training was another significant challenge. While the initial WISE training was effective, there is a recognized need for continuous education to maintain and build on these improvements (O'Connell & Richards, 2018). Regular refresher courses and updates on new safety protocols would help ensure that the positive changes observed are sustained over time (Simpson & Clark, 2021).

Before the implementation of the WISE program, both MSME owners and workers had limited awareness of the importance of K3 practices. This lack of awareness contributed to unsafe working conditions and a high incidence of workplace accidents (Kim & Lee, 2019). The initial resistance from owners, primarily due to cost concerns, further exacerbated the situation (Nguyen et al., 2021). However, after participating in the WISE program, there was a marked shift in attitudes.

Owners, like Suwarti in the case study, began to recognize the long-term benefits of investing in safety (Wilson & Stewart, 2019). This change in perception is critical, as management buy-in is essential for the successful implementation of safety practices (Brown & Hall, 2020). Workers, on the other hand, became more engaged with K3 practices, taking a more active role in maintaining workplace safety. The increased confidence in hazard reporting and the consistent use of PPE are indicative of this positive shift (Evans & Murphy, 2018).

The participatory nature of the WISE program played a significant role in this attitudinal shift. By involving workers in the safety planning and decision-making processes, the program fostered a sense of ownership and responsibility for safety outcomes (Morgan & Lewis, 2020). This approach is supported by research that suggests participatory safety programs are more effective in changing workplace culture than top-down directives (Peters & Johnson, 2021).

## **CONCLUSION**

Sorting soybeans found potential hazards, namely careless placement of buckets, buckets that are very dirty, and doing work that is not ergonomic. Potential hazards in washing soybeans include slippery floors, and untidy positions of washing buckets. Potential hazards in grinding soybeans include the sound of the grinding machine and doing monotonous and unergonomic activities. Potential hazards in boiling soybeans include smoke, the smell of oil, burning fire, and hand position when lifting wood. Potential hazards in filtering include spilled tofu dregs and squeezed water. Then the potential hazards in molding and cutting tofu include the wrong finger position when cutting tofu.

Risks of work accidents identified in the production area of the Suwarti Tofu Factory. In sorting soybeans, there is a risk of tripping, spilled soybeans, and diseases due to monotonous and unergonomic work. In the process of washing and sorting soybeans, there is a risk of slipping, exposure to bacteria, and tripping. In the process of grinding soybeans, there is a risk of noise and diseases due to unergonomic work. In the process of boiling soybeans, there are 4 risks found, namely exposure to smoke, inhalation of oil odor, exposure to fire, and tripping and injuring hands and feet. Then in the filtering process there is a risk of slipping, and the squeezed water gets on body parts. Finally, in the process of molding and cutting tofu there is a risk of body parts being scratched and cut. Risk control carried out at the Suwarti Tofu Factory, namely: by implementing the WISE program through a participatory training approach. And it turns out that after receiving training there is an effective change in behavior from every worker at the Suwarti tofu factory.

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## **Conflict of Interest**

The authors declare that there are no conflicts of interest regarding the publication of this paper. The research was conducted independently, and the results were analyzed and presented without any external influence from funding bodies, stakeholders, or other parties.

## **Data Availability**

The data that support the findings of this study are available from the corresponding author upon reasonable request. All datasets have been anonymized to ensure the privacy and confidentiality of the participants.

## **Ethical Approval**

The study was conducted in accordance with the ethical standards of [Institution's Name] and with the 1964 Helsinki declaration and its later amendments. Informed consent was obtained from all individual participants included in the study.

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