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Application of Inspection Programs for Risk Assessment by Factory Control Laws

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***Abstract*—Presently, there is still a high risk of non-compliance with the law in many factories, including cases where factories have risk control measures and have high accident statistics or complaints that come from impacts on communities and the environment at a high rate. The study aims to design and develop a factory inspection program and apply it to analyze and assess compliance risks with factory control laws. Data was collected from 50 factories to collect the risk assessment for compliance with the laws. The program's components consist of inspection to ensure compliance with factory control laws and risk assessment. The study found that the inspection processes and risk assessment compliance with the laws can be improved by using the Lean Work Improvement Principle with the Eliminate, Combine, Rearrange, and Simplify (ECRS) technique, resulting in increased efficiency at an average of 50% and for the conformity verification process by the factory control laws. Applying the factory inspection program according to the factory control laws reduced the audit time by an average of 9.17 hours (Productivity Up to 79%) from using the sample groups. This study has demonstrated the potential and benefits of using a risk assessment program in in-depth analysis for factory control. It can be used as an essential reference for future program development research. The satisfaction assessment results of the sample groups were very high. Besides, experts' comments strongly agreed to implement an inspection program after their usage, instilling confidence in its validity.**

***Keywords*—Factory risk assessment; self-declaration inspection program; factory inspection.**

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I. INTRODUCTION

Thailand's economy and society have changed from an agricultural society to an industrial society with technological advancement. It increases the rate of factory expansion. Thailand has also expanded into areas where people live. Therefore, the control of compliance with factory control laws must be practical and keep up with current conditions. According to statistics, complaints from non-compliance with factory control laws have an average of 3,973 complaints per year and an average of 1.07 complaints per factory [1] and are not likely to decrease significantly. In addition, there is the risk of not complying with the law to the extent that it affects the environment and the community [2]. The study found that there are still high safety risks. However, the factory has prepared a risk analysis report [3]. There are still more accidents in the factory. According to the International Labor Organization (ILO), inadequate workplace safety and health procedures have resulted in an estimated 2.78 million deaths and 374 million non-fatal injuries [4]. Besides, the establishment needs to consider occupational health risks and safety more [5], [6].

Risk assessment is critical to controlling compliance and operational risk, entailing risk discovery and determining risk control methods [5]. Some difficulties arise in factory inspection, in addition to research, problems, and obstacles. Two main factors caused the survey to concern the issues and obstacles in factory inspection. (43%). More personnel are needed to meet the workload and knowledge of relevant laws. The other factor is the inspection methods for each factory type [7]. For example, an accurate and comprehensive check sheet is needed (35%) [8].

From such problems and research data collection, both types of risk management are systematically achieved. The

researcher held a brainstorming meeting with experts to identify risks, risk factors, and losses that may occur together with experts and experts with experience in factory inspection for risk assessment in both the public and private sectors. In summary, there is a risk of non-compliance with the law (as shown in Table 1). The Lean method must be applied in the risk assessment process to find solutions using the risk assessment program [9], as shown in Table I.

TABLE I
COMPLIANCE RISK (CR)

Risks	Risk factors	Potential losses
1. Lack of knowledge in the industry to assess risks.	Lack of training and experience in the industry to inspection.	The operation does not comply with operational standards or laws.
2. Lack of knowledge of details/ or up-to-date laws.	Need to be trained in relevant or up-to-date laws.	The operation does not comply with operational standards or laws.
3. The risk assessor needs to be increased for the amount of work.	The inspection time needs to be balanced with the workload received.	The operation does not comply with operational standards or laws.
4. Inappropriateness or sufficiency of tools/equipment.	Control measurements could be more accurate and used in the inspection process.	The operation does not comply with operational standards or laws.
5. The checklist/check sheet in the inspection needs to be corrected or made more comprehensive.	Incorrect and cover operation inspection following factory control laws.	The operation does not comply with operational standards or laws.
6. The duration of the risk assessment needs to be increased or continuous.	The inspection time needs to be balanced with the workload received.	The operation does not comply with operational standards or laws.
7. The conclusion of the risk assessment must be made after a period of time and needs more credibility.	There was a data error in the inspection.	The operation does not comply with operational standards or laws.

Industrial risk control in Thailand aims to control opportunities and violence to prevent impacts or damages to the organization, such as damage to life and property, reputation, credibility, etc. [10] The risk control process must be systematic, accurate, and comprehensive. Currently, the regulation of factories according to the law can be divided into two forms [11].

This will be in the form of an audit to comply with the requirements of the factory law regarding compliance with the factory control law and record the details of the audit to report the inspection results to the relevant departments, such as electrical inspection reports besides safety certifications every year. Annual Factory Operation Data Reporting, Steam boiler inspection reporting, etc.. The main factor is that the risk assessor must comprehensively and accurately know relevant laws. Besides, have knowledge of the audit process, including tools to assist in the audit, such as checklists and supporting or reference information. Therefore, the audit process is an essential part of ensuring that the risk of compliance with the law is controllable and acceptable to a satisfactory level. The audit program will define various audit topics according to the Industrial Works Act 2019, which will be factory inspections according to factory inspection standards, including self-declaration reports certified by private auditors.

Auditors can use this program before the risk assessment to audit current conditions (Audit for Detect). It is also a tool to control risks to an acceptable level. In evaluating opportunities and impacts of risks, risk assessment is carried out in two dimensions: Likelihood and Impact. This research conducted a risk assessment in two aspects: safety, referring to Department of Industrial Works regulations, and legal compliance, based on COSO-ERM principles and standards [12].

In this study, there are five steps for non-compliance risk assessment.

1) Objective setting: The organization must define objectives/goals consistent with its strategic goals and acceptable risks. This research aims to assess the risks of compliance with factory laws.

2) Event identification: This study uses checklist reporting, brainstorming, and past data to identify risks and risk factors, both external and internal, that may occur and affect the objectives.

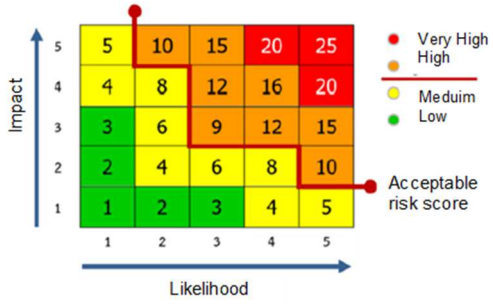

Fig. 1 The degree of risks in compliance with COSO-ERM law is shown in a table.

3) Risk Assessment: it assesses the likelihood and impact of a potential event on the objectives, how likely and severe each risk factor is, and priorities to determine countermeasures. This research uses the principles of risk assessment in compliance with the reference factory control law, COSO ERM Framework in 2017 [12]. In addition, operational risk assessments are based on factory control laws [13]. For example, following the Department of Industrial Works Regulation on Hazard Identification Criteria. Risk Assessment and Risk Management Plan Preparation B.E. 2543 in 2000 [14].

4) Risk Response: it is the management of ways to manage, reduce and control risks within the range that the organization can accept (Risk Tolerance). In this study, the factory control audit program was selected to reduce and control the risks that arise to an acceptable level.

5) Monitoring: It is subject to ensuring that risk management is quality, appropriate, and quick problem resolution. This study will be an internal audit, an audit by a

private auditor (Third party), or a report on the results of compliance with the factory's laws (Self-declaration).

D. Inspection of control values in process control

The control of various values by the laws governing the factory. By comparing the actual value with the control value required by law [15], such as the standard of sound pressure control, BOD control in wastewater treatment pond systems, etc. So as not to cause harm to employees or affect communities and the environment.

In the assessment, the principle of risk assessment is applied by analyzing hazard indications, and risk assessment analysis is essential in management to prevent, control, and mitigate occupational accidents. If the hazard is identified as inaccurate and incomplete, it may cause a more vital hazard [16]. In this study, we used a Check Sheet as a risk assessment tool; it is more suitable for legal auditing, regulation, and role than any other tool [17], [18]. In addition, using the principle of analysis, JSA (Job Safety Analysis) is a tool that assists in analyzing or assessing hazards by using both tools to determine hazard risks in various jobs. To find measures to control and prevent hazards or accidents in that activity [19]. Assessment of the danger and the determination of measures to prevent or control the hazard from occurring [20]. The principle of JSA (Job Safety Analysis) risk analysis has guidelines for practice, as shown in Fig 2

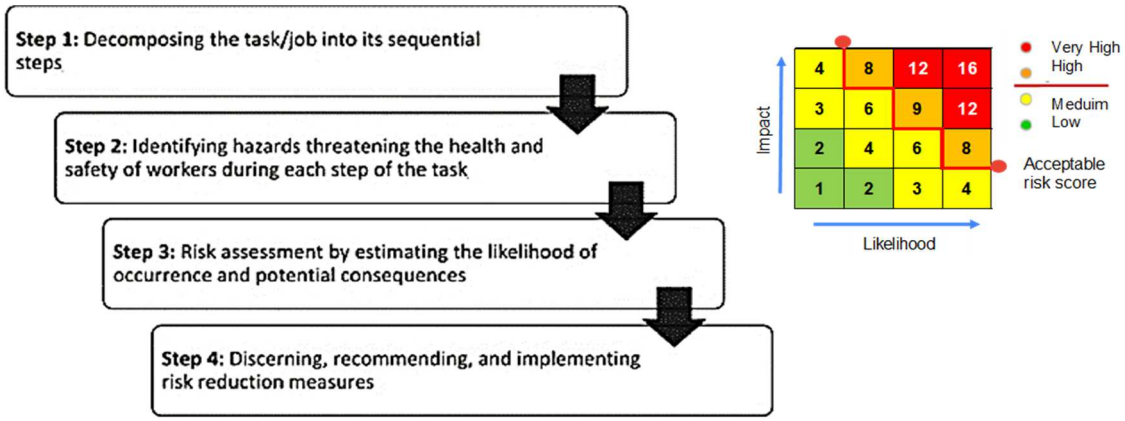

Fig.2 The procedure and implementation of JSA hazard point analysis.

The researcher has developed a conceptual framework as a guideline for conducting the research. Define tools/machines, methods, raw materials, and the environment as independent variables, whereas non-compliance risks or occupational safety risks are dependent variables, as shown in Fig. 3.

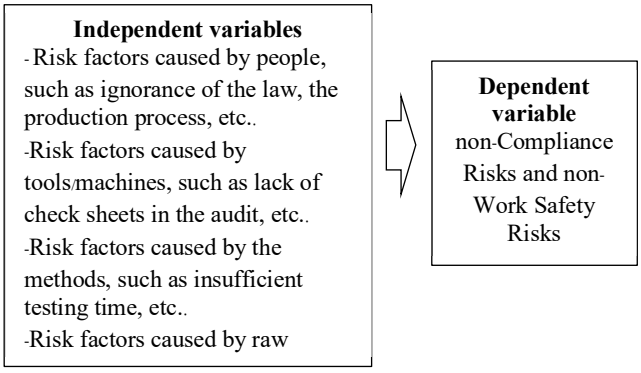

Fig. 3 Conceptual framework of the study

Therefore, this study aims to design and develop programs to inspect industrial plants to be efficient and comply with the requirements of relevant factory control laws. Also, this study analyzes and assesses the risks of checking compliance with factory control laws.

II. Materials and Method

A. Research Setting

The study used a sample of 102 factories and 80 private auditors to collect satisfaction assessment data on the use of the factory risk assessment program. The researchers collected data from 50 factories to collect the risk assessment results on compliance with the law before and after the program's implementation.

1) Factory inspection program: The researcher applied for the factory inspection program in the risk assessment management process, such as finding danger points, searching for non-compliance laws, or preparing a report on the Department of Industrial Works regulations on hazard identification Criteria, Risk Assessment and Risk Management Plan B.E. 2543 in 2000 [14]. The researchers improved the risk assessment process with the Lean principle, which can be designed as a risk management process by developing a simple and flexible risk assessment program [21].

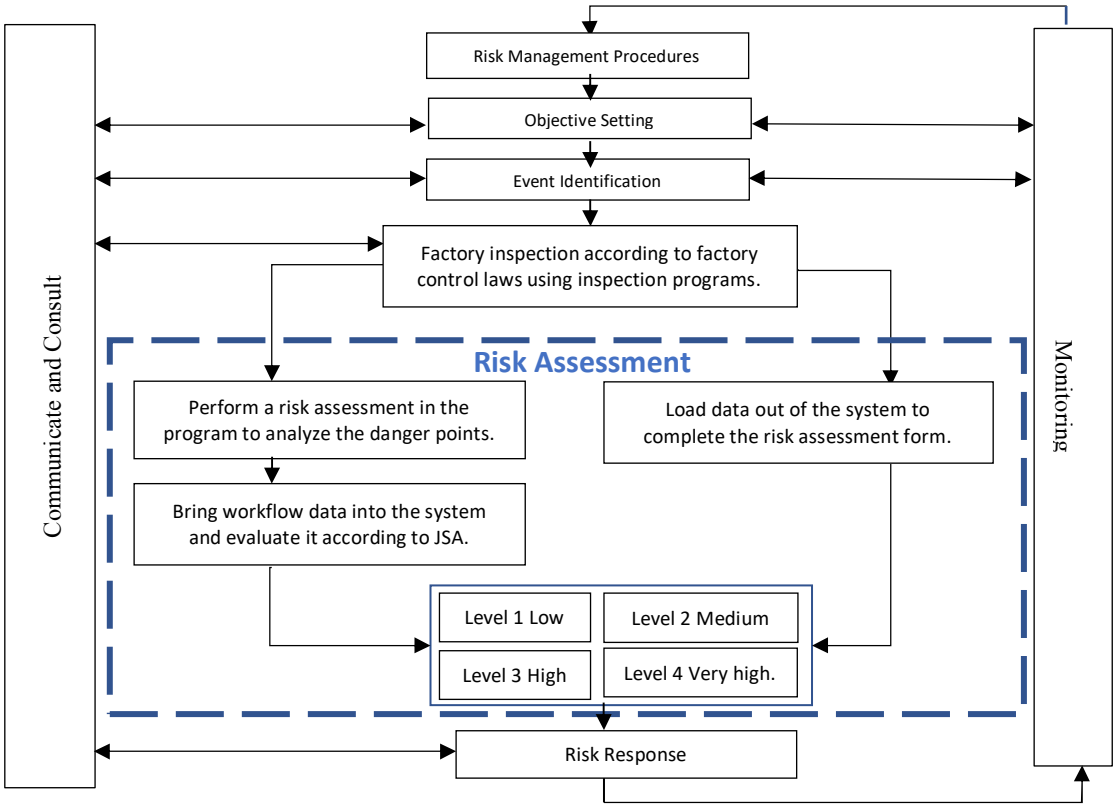

Fig. 4 The risk management process for using the program.

2) Brainstorm with experts: The researcher brainstormed with experts to create criteria for assessing the likelihood of risks and criteria to evaluate the impact that would be risky (Impact) suitable for the risk assessment in compliance with the law (Compliance Risk) and following the COSO-ERM. The principles of the factory are shown in Table II and Table III, respectively.

TABLE II
RISK ASSESSMENT CRITERIA

Level	1	2	3	4	5
Chance	very little.	little	moderate	high	very high
1. Lack of knowledge in the industry to audit.	Knowledgeable of all relevant industries to audit.	There is knowledge of the relevant industry to audit.	There is moderate knowledge.	There is a little knowledge.	There is no knowledge of the relevant industry to audit.
2. Lack of knowledge of legal details/up to date.	Knowledgeable of all relevant laws.	There is knowledge of the relevant laws.	There is moderate knowledge.	There is a little knowledge.	There is no knowledge and not keeping up with the new laws.
3. The workload with auditors is insufficient.	The number of auditors is promptly/sufficient for all workloads.	The number of auditors is sufficient for the workload.	The number of auditors is moderate.	The number of auditors is small.	There is a shortage of auditors.
4. Inappropriateness or insufficient of tools/equipment.	The number of examination instruments is readily available/sufficient.	The number of examination instruments is sufficient for the workload.	The number of examination instruments is moderate.	The number of examination instruments is small.	The number of examination instruments is in short supply..
5. The checklist/Check Sheet in the audit is not accurate or comprehensive.	The check sheet in the audit is accurate/comprehensive and up to date.	The check sheet in the audit is accurate and covers some issues.	The check sheet in the audit is not accurate and covers some issues.	The check sheet in the audit is not accurate or comprehensive.	There is no Checklist/Check Sheet in the audit.
6. The duration of the audit is not sufficient or continuous.	The duration of all the audits is sufficient and continuous.	The duration of the audits is sufficient and continuous.	The duration of the audits is sufficient, but some are intermittent.	The duration of the audits is not sufficient but continuous.	The duration of the audits is insufficient and intermittent.
7. Conclusions cannot be made immediately, and lack of credibility.	Conclusions can be made immediately and with accuracy and completeness.	Conclusions can be made immediately and accurately.	Conclusions cannot be made immediately but accurately.	Conclusions cannot be made immediately, and some validity needs to be improved.	Conclusions cannot be made immediately and are inaccurate.

TABLE III
CRITERIA FOR ASSESSING THE IMPACT OF RISK (IMPACT: I)

Level	1	2	3	4	5
Impact	**very little.**	**little**	**moderate**	**high**	**very high**
1. Lack of knowledge in the industry to audit.	Comply with relevant laws correctly.	Comply with relevant laws.	Comply with certain laws	Avoid complying with the law.	Committing illegal acts
2. Lack of knowledge of legal details/up to date.	Comply with relevant laws correctly.	Comply with relevant laws.	Comply with certain laws	Avoid complying with the law.	Committing illegal acts
3. The workload with auditors is insufficient.	Comply with relevant laws correctly.	Comply with relevant laws.	Comply with certain laws	Avoid complying with the law.	Committing illegal acts
4. Inappropriateness or insufficient of tools/equipment.	Comply with relevant laws correctly.	Comply with relevant laws.	Comply with certain laws	Avoid complying with the law.	Committing illegal acts
5. The checklist/Check Sheet in the audit is not accurate or comprehensive.	Comply with relevant laws correctly.	Comply with relevant laws.	Comply with certain laws	Avoid complying with the law.	Committing illegal acts
6. The duration of the audit is not sufficient or continuous.	Comply with relevant laws correctly.	Comply with relevant laws.	Comply with certain laws	Avoid complying with the law.	Committing illegal acts
7. Conclusions cannot be made immediately, and lack of credibility.	Comply with relevant laws correctly.	Comply with relevant laws.	Comply with certain laws	Avoid complying with the law.	Committing illegal acts

3) The criteria for opportunity and impact assessment to assess risks: The inspection method by check sheet shall be based on the Department of Industrial Works regulations on hazard identification criteria, Risk Assessment and Risk Management Plan Preparation B.E. 2543 (A.C) in 2000) [14].

4) Satisfaction assessment of the use of the risk assessment program: This assessment of user satisfaction involves defining the evaluation topics into five aspects: meeting users' needs, meeting the guidelines prescribed by law, functional aspects according to the system's work functions, and data security and ease of use. It is chosen as a rating scale. The criteria for responding to their opinions are five levels.

TABLE IV
SCORE RANGE AND INTERPRETATION

Score Range	Level	Opinion level	Score Range	level	Opinion/ Satisfaction Level
4.51 – 5.00	5	Very high	1.51 – 2.50	2	Low
3.51 – 4.50	4	High	1.00 – 1.50	1	Very low
2.51 – 3.50	3	Moderate			

B. The Procedure for Risk Assessment Program

1) Use of Compliance Risk Assessment Program: The risk monitoring and assessment program is a computer program written in Python that Runs on a server (Cloud Computing) [22] (Fig. 5). It has three functions: factory inspection according to regulatory laws, reporting, and risk assessment (Fig. 6).

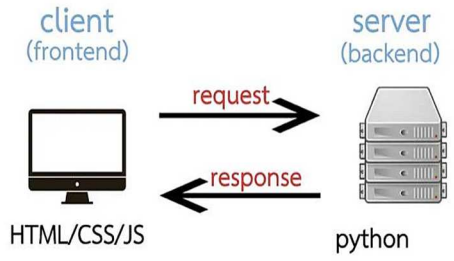

Fig. 5 Shows the data transmission on the cloud system.

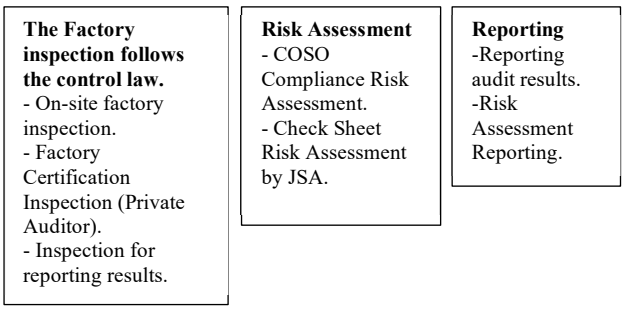

Fig. 6 Scope of work of RU Program for Industrial Inspection.

The program's components consist of two parts: the inspection part to ensure compliance with the factory control law and the risk assessment part. The flow chart shows the operation process, as shown in Fig. 7.

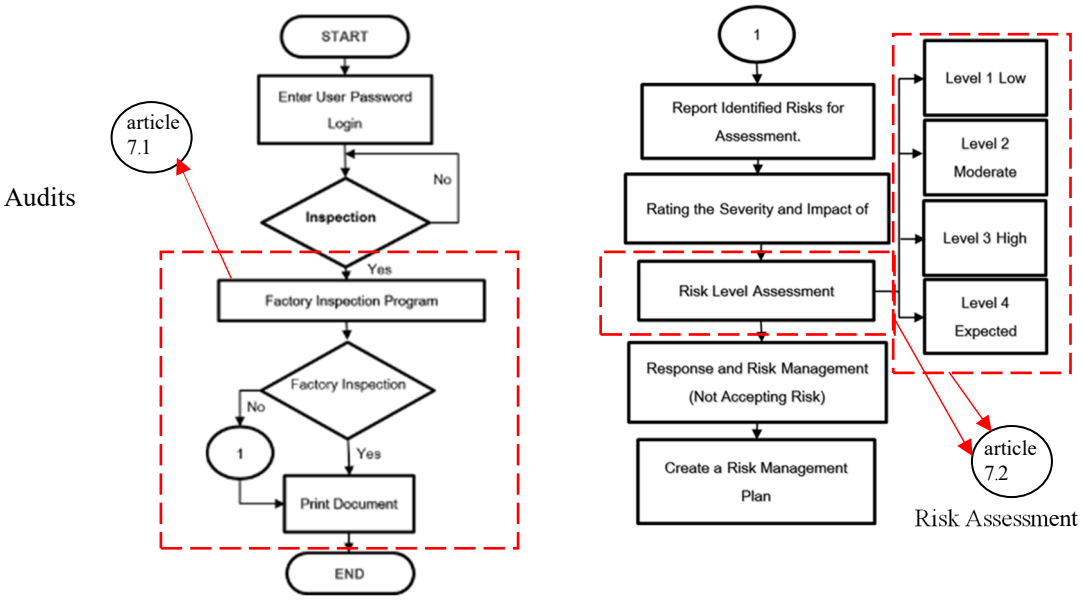

Fig. 7 The risk assessment process for compliance with factory control laws.

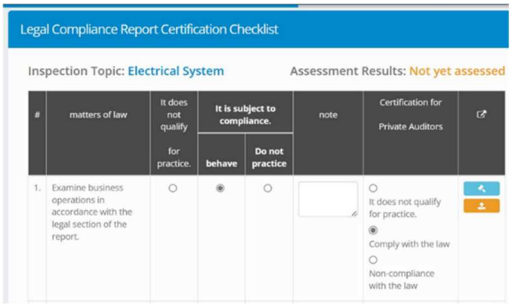

Fig. 8 Auditing compliance with relevant laws.

When auditing operations, the auditor must check whether the actual operation complies with legal requirements or is related to the law, as shown in Fig. 8. Upon completion of the inspection process, it can be printed as a report, or the data from all topics inspected can be exported in paper form or ready-made programs for analysis and risk assessment. The data can be used for analysis and risk assessment to prepare a report (Table V).

TABLE V
REPORT ON RISK ANALYSIS/ASSESSMENT OF COMPLIANCE WITH FACTORY CONTROL LAWS

Causes	**Risks**	**Chance**	**Impacts**	**Assessment Level**	**Critical Controls Already in Place**	**Further actions to be taken to minimize risk further**
1) Practitioners need to gain knowledge and understanding of relevant laws/insufficient knowledge.	Risk of non-compliance with the Factory Act Concerning Annual Electrical System Certification.	2	5	10	Organize training to educate on relevant laws.	Hire legal counsel to advise on the Factory Acts.
2) The internal control process only investigates non-compliance with the law once complaints or related illegal operations arise.		3	5	15	1) Establish procedures for consolidation. 2) Make an annual audit plan.	1) Assign the outsource to perform a system audit, the Annual Factory Electrical Certification Inspection. 2) The Internal Audit Department formulates an inspection plan regarding factory laws.

2) Implementing the Operational Risks: The assessment program can be carried out as follows.

a. The auditor can analyze and assess the risk of the Check Sheet to check for non-compliance with requirements or laws. Prioritizing corrections, such as not detecting annual electrical certifications and the number of fire extinguishers not following the law, is unacceptable. Immediate control and improvement must be made before starting work, etc., as shown in Fig. 9.

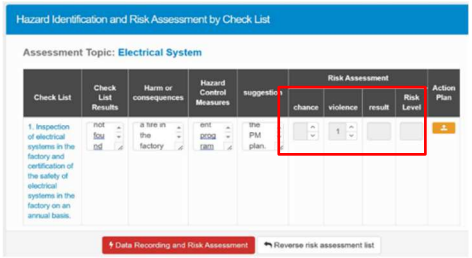

Fig. 9 Filling out a risk assessment in the program.

b. Auditors can conduct an in-depth occupational hazard point identification analysis using the Check Sheet tool with JSA (Job Safety Analysis) [23]. The work process includes finding hazards from boiler inspection procedures and comprises three parts. Assessment Procedures refer to the procedure to analyze dangerous points, such as JSA (Job Safety Analysis), by entering the Checklist field in the program, as point (1) is shown in Table VI. Harm or consequence refers to the consequences of the operation by entering the data in the Harm or Consequence field in the program, as point (2). Hazard control measures refer to the guidelines for preventing hazards from occurring by entering the Hazzard Control Measure field in the program, as point (3).

TABLE VI
THE JSA ANALYSIS OF THE WELDING WORK TO FIX THE STEAM BOILER REPAIR.

Assessment topics in the program		
Check List	Harm or Consequence	Hazard Control Measure
JSA Assessment Topics		
Step (1)	Hazards (2)	Recommended Safe Job Procedure (3)
1.Startup at beginning of shift Inspect work center before turning on the welder.	1.Electrical shock	1.Inspect work center before turning on worker. 2.Confirm insulation on welding cables is not arranged exposing bare wire. 3.Confirm cables are tightly connected to machine and work surface. 4.Confirm welding gun or electrode holder is not damaged. 5.Verifables cable are laying in wet areas. 6.Electrical Safety training.
2.Handle appropriate fixture and mount to workbench or positioner	1.Pinch point	1.Keep hands and fingers away from pinch areas.
	2.Sprains and strains	1.Use proper lifting techniques. 2.Use material handling and lifting devices when provided at work cell.
	3.Impact injuries from dropping object on foot/toes	1.Use stings or chains that are rated for the load being lifted. 2.Employer awareness and OJT training.

c. If a risk assessment has been conducted on each topic specified by law, the program can write a risk management plan as an action plan, attach files, and print a risk assessment report.

d. The auditors may select the risk assessment report according to the audit topic category or all. The summary sheet, shown in Fig. 10, can be printed for accurate and quick submission of the inspection report to relevant departments.

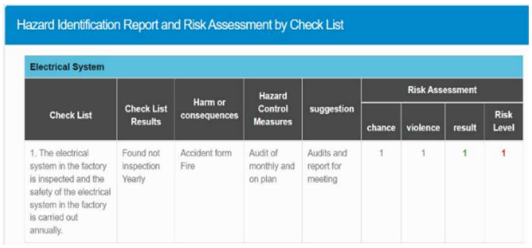

Fig. 10 The risk assessment analysis report.

III. RESULTS AND DISCUSSION

A. Risk Assessment Results

Based on the results of the trial of the risk assessment program after the audit according to the governing law topics with the sample groups of the industrial plants, it can be summarized as follows:

TABLE VII
SUMMARIZE THE RISK ASSESSMENT RESULTS BY THE RISK ASSESSMENT PROGRAM.

The risk assessment topics follow control laws.	**Number of factories selected for risk analysis.**	**Results of risk level analysis.**
Electrical system and safety certificate inspection.	10	4
Fire prevention and suppression system.	10	2
An ammonia-based cooling system as the factory refrigerant.	8	4
Industrial gases.	5	2
Forklifts use liquid petroleum gas as fuel.	5	2
Radioactive substances.	5	3
Workplace environment.	5	3
Radiators/boilers that use liquids as a heat conduction medium.	4	3
Safety regarding chemical handling in the factories.	4	3
Water pollution.	4	3
Report of Factory Hazard Risk Analysis.	1	2

The assessment results concluded that the risk assessment according to the regulation law is moderate besides low level, which means that factories at the moderate level (3-4 rating), such as electrical systems and safety certifications, fire prevention systems, Forklift systems or chemical management system, etc., need to have a supporting plan and operation rapidly. If there still needs to be a management plan, it should be determined by the following year. The low-risk levels (1-2 ratings) include refrigeration, industrial gas, Steam boilers, etc. A risk control system must be at an acceptable level, and the level of risk must be monitored at regular intervals.

The results of the user satisfaction with the assessment program, which evaluated the four aspects, were found to have an overall average of 4.67 (very high level).

TABLE VIII
THE ANALYSIS RESULTS OF THE EVALUATION OF THE USER'S SATISFACTION WITH THE FACTORY INSPECTION PROGRAM TO RISK ASSESSMENT

Satisfaction Assessment Topics	**Average Score**	**Standard deviation**	**Satisfaction**
System Analysis and Design issue	4.48	0.58	High
Accuracy in the use of the program issue	4.68	0.59	Very high
Information Security issue	4.80	0.64	Very high
Convenience and ease of use issue	4.72	0.63	Very high

B. Lean Improvement ECRS Risk Assessment Audit Procedure

In the application of a Risk Assessment Audit program, the researcher made improvements to the risk assessment methodology [24] in a new sustainable model [25] using the Lean Work Improvement Principle with the ECRS (Eliminate, Combine Rearrange, and Simplify) technique [26], which is a simple work improvement process (Kaizen) [27]. That makes it possible to reduce the audit process for risk assessment [24],[28]. The researcher compared the new procedure with the previous method using the risk assessment audit program [29]. Then, it can be summarized in Table IX as follows.

TABLE IX
SUMMARIZE THE ECRS PROCEDURES AND TECHNIQUES FOR FACTORY RISK ASSESSMENT

Current model	Program-based model	ECRS technique	Corrective actions
1. Select the topic that you want to assess the risk.	1. Select a risk assessment topic from the system.	Simplify	1. Simplify by defining audit topics of relevant laws in the program.
2. Prepare a check sheet assessment detailing the topic to assess the risk.	2. Examination and assessment according to conditions.	Simplify	2. Simplify by defining the format of a Plate Form in accordance with the conditions of the audit according to the factory control law.
3. Check compliance with factory control laws in detail for each topic.	3. Make a risk management plan.	Combine/Simplify	3. To simplify operations, the process of searching for relevant laws and standards for auditing should be included in the program.
4. Calculate assessment of risks against benchmark standards.		Combine/Simplify	4. Inclusion shows the criteria for evaluating opportunities and risks, simplifying the assessment because it is written as a ready-made formula.
5. Make a risk management plan.			5. The risk management plan be written into a file and attached to documents in an electronic format.
6. Prepare risk assessment and risk management reports.		Simplify Eliminate	6. The risk assessment processes can be reduced because reports and risk management plans can be printed from the risk assessment program.

It was found that the audit process and risk assessment compliance with the law can be improved with the LEAN method, resulting in increased efficiency (Productivity Up) at an average of 50% and for the conformity verification process by the factory control law (Item 1.3). Applying the factory inspection program according to the factory control law reduced the audit time by an average of 9.17 hours (Productivity Up to 79%) from the usage of the sample groups.

Risk analysis is part of the internal control system, which, according to COSO (Committee of Sponsoring of the Treadway Commission) standards [30]. It can assess factory risks using ERM (Enterprise Risk Management) principles. The factory must ensure correct and complete compliance risk control [31].

The study found that the level of risk that occurred in each assessment both before and after the program's use had a markedly lower risk value, as shown in Fig. 11. In addition, the risk assessors of the sample groups also outlined corrective approaches to risk reduction and control, according to Table X [32],[33],[34].

Table X Risk factors undertaken of risk management.

Risk factors undertaken of risk management.
1.Lack of knowledge of legal details/up-to-date
2.The amount of work with inspectors is not sufficient.
3.The checklist/Check Sheet in the inspection is incorrect or not covered.
4.The duration of the inspection is not sufficient or continuous.
5.Summarizing results cannot be made immediately and is unreliable.

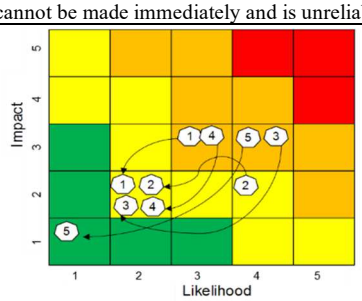

Fig. 11 The legal compliance risk score for implementing a factory inspection program (before-after).

TABLE X
THE GUIDELINES FOR MITIGATING COMPLIANCE RISKS (COMPLIANCE RISK: CR)

Order	4M-1E	Risk mitigation approaches.
1.	Method	1.1 Make an internal audit plan for the factory using the Factory Inspection and Risk Assessment Program.
	Method	1.2 Conduct safety promotion activities such as Safety Week, TPM, KYT, CCCF Activity, etc..
2.	Method	2.1 Establishing 3Z projects to increase the productivity.
	Machine/ Method	2.2 Development of automation technology in the production process.
3.	Man(Operator)/ Method	3.1 Training on factory laws. 3.2 Conduct Anti-Corruption Campaign.

Therefore, it was found that implementing the audit program for factory risk assessment following the factory control laws can reduce the risk of non-compliance with factory control laws and conduct analysis and evaluation of hazardous procedures (JSA) to correct and control risks to an acceptable level in conducting audits to assess risks. Besides, the level of satisfaction with using the program was very high.

IV. CONCLUSION

Further development regarding the results of the program for inspection of compliance with factory control laws, including the analysis of hazard points by methods other than JSA and Check List, such as HAZOP, What If, Fault Tree Analysis (FTA), Event Tree Analysis (ETA), etc. Improving the connection system with relevant agencies regarding risk reporting, such as the Department of Industrial Works and Industrial Estates, etc. In addition, preparing reports in electronic format with government agencies or Link-data as a platform for efficient management in the manner of Big Data further.

The use of the factory inspection program for risk assessment that the researcher has studied and used to meet users' needs that meet the proposed objectives is to design the program to assist in factory inspection and risk assessment wholly and accurately following the factory control laws. As well as to reduce and control risks in compliance with factory laws (Compliance Risk) and Operation Risk assessment (Operation Risk) to ensure safety by reducing work accidents. In addition, the satisfaction assessment results of the sample groups were extremely high. Besides, experts' comments after their usage strongly agreed to implement an audit program to reduce risks and increase audit efficiency by 50% from Lean, ECRS workflow, and data collection before and after using the factory audit program to assess the risks of compliance with factory laws. It found a significant decrease in risk (more than 58%) within the risk tolerance level.

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