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Enhancing Disaster Mitigation Risk Assessment through Workplace Walkthrough Inspections

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Abstract

Purpose: A This study aims to enhance the effectiveness of disaster mitigation risk assessment in the context of the Serious Accidents Punishment Act, which emphasizes preventive risk management prior to accident occurrence. Despite this regulatory shift, existing risk assessment practices remain largely survey- and document-centered, limiting their ability to reflect actual workplace conditions and latent hazards. **Research design, data and methodology:** This study adopts a methodological research design rather than an empirical effectiveness verification approach. Prior literature and institutional frameworks related to Continuity of Operations Planning and Business Continuity Management Systems were reviewed, and disaster mitigation risk assessment reports commissioned by public institutions were comparatively analyzed using a baseline–reference case framework. An integrated risk assessment method incorporating workplace walkthrough inspections, a core component of risk management systems under the Occupational Safety and Health Act, is proposed. **Results:** The analysis indicates that risk assessments incorporating workplace walkthrough inspections demonstrate higher levels of hazard identification completeness, clearer identification of discrepancies between documented procedures and actual on-site operations, and stronger procedural linkage to corrective actions. **Conclusions:** These results indicate that the proposed method offers a structurally applicable framework aligned with the preventive intent of safety-related legislation, thereby strengthening preventive risk management and managerial accountability in disaster mitigation practices.

Keywords : Word#1 Disaster Mitigation Risk Assessment, Word#2 Workplace Walkthrough Inspection, Word#3 Serious Accidents Punishment Act, Word#4 Preventive Risk Management, Word#5 Business Continuity Management

JEL Classification Code: H12, H83, K32, M10, Q54

1. Introduction

1.1. Background of the Study

Recent large-scale disaster incidents have clearly revealed the structural limitations inherent in existing risk assessment approaches applied within Continuity of Operations Planning (COOP) and Business Continuity Management Systems (BCMS). The Pangyo data center fire

that occurred in 2022 represents a notable case in which formal requirements for redundancy under the Business Continuity Plan (BCP) and Disaster Recovery (DR) plan were ostensibly satisfied; however, these measures failed to function effectively during the actual disaster situation. In this case, redundancy remained confined to a logical and document-based level and did not translate into practical operational recovery capability.:

Similarly, the fire incident at the National Intelligence Service's data processing facility in 2025 demonstrated limitations arising from inspection systems that were excessively focused on access control, security management, and information protection. As a result, physical disaster risks such as fire, smoke propagation, and power loss were not systematically identified. Consequently, risks associated with facility systems, air-conditioning, smoke control, and fire protection equipment were not sufficiently evaluated from a business continuity perspective during an internal fire event.

These cases indicate that failures in business continuity do not primarily stem from the absence of formal plans, but rather from limitations in risk recognition and inspection approaches that remain centered on documentation and managerial compliance. Accordingly, enhancing the effectiveness of business continuity and disaster mitigation activity management systems requires supplementing conventional risk assessment methods based on surveys and document reviews with field-oriented assessment approaches capable of reflecting actual workplace environments.

In this context, this study differentiates itself from prior research by proposing a methodological framework that structurally integrates the concept of workplace walkthrough inspections, as stipulated under the Occupational Safety and Health Act, into disaster mitigation risk assessment. Furthermore, the proposed approach explicitly incorporates the responsibility of senior management for risk recognition and supervisory control, as emphasized by the Serious Accidents Punishment Act, directly into the assessment procedure.

1.2. Purpose of the Study

The purpose of this study is to enhance the effectiveness of disaster mitigation risk assessment in the post-enforcement context of the Serious Accidents Punishment Act by proposing a method for integrating workplace walkthrough inspections into disaster mitigation risk assessment processes. Specifically, the study focuses on applying the walkthrough inspection concept, which constitutes a core element of the risk management system under the Occupational Safety and Health Act, as a structural component of disaster mitigation risk assessment procedures.

1.3. Scope and Methodology

This study was conducted through a comprehensive review of relevant literature, an analysis of existing commissioned risk assessment reports, and an examination of risk assessment and workplace walkthrough inspection systems as defined under the Occupational Safety and Health Act. In addition, a case-based verification was performed using existing COOP and BCMS consulting reports to examine the applicability and structural effectiveness of the proposed method.

It should be noted that this research constitutes a methodological study rather than an empirical effectiveness verification. Accordingly, the analysis focuses on evaluating the structural feasibility and procedural characteristics of the proposed risk assessment framework, rather than statistically generalizing its effectiveness.

2. Theoretical Background

2.1. Differences between COOP and BCMS

Continuity of Operations Planning (COOP) primarily focuses on operational planning to ensure the continuity of legally mandated and essential public functions during disasters. In contrast, the Business Continuity Management System (BCMS) aims to minimize the interruption of critical organizational functions and facilitate early recovery during disasters, based on systematic risk assessment and business impact analysis.

While COOP emphasizes execution-oriented plans designed to prevent organizational paralysis, BCMS adopts a management system–oriented approach that continuously manages and improves organizational continuity. As a result, BCMS generally applies more structured and comprehensive risk assessment methodologies, integrating both qualitative and quantitative elements, whereas COOP tends to rely on relatively simplified and qualitative assessments.

Table 1: Comparison of COOP and BCMS

Category	COOP (Continuity of Operations Plan)1	BCMS (Business Continuity Management System)
Core conceptl	Functional continuity to maintain national and public services	Management system to ensure continuity of core organizational functions
Scope of application	Central government, local governments, public institutions	Public institutions and private enterprises
Risk assessment	Relatively simple, qualitative	Systematic combination

		of quantitative and qualitative methods
Management level	Plan-oriented	Management system–oriented
Key distinction	Execution-focused plans to prevent organizational stoppage	Management framework for continuous monitoring and improvement of continuity

2.2. Characteristics of Risk Management Requirements under the Serious Accidents Punishment Act

The Serious Accidents Punishment Act is often perceived as a law centered on post-incident punishment. However, in practice, it places primary emphasis on whether an appropriate risk management system for accident prevention has been established and effectively implemented prior to accident occurrence. Legal assessments under this Act comprehensively consider the adequacy of hazard identification, the implementation status of corrective actions, and the overall effectiveness of the risk management system.

In this respect, the Act differs from the Occupational Safety and Health Act in that it explicitly strengthens the accountability of senior management for preventive risk recognition and supervisory control, rather than focusing solely on compliance with procedural requirements.

2.3. Limitations of Conventional Disaster Mitigation Risk Assessment

Conventional disaster mitigation risk assessments often exhibit structural limitations, including an overreliance on survey-based qualitative evaluations, the omission of latent hazards due to insufficient reflection of on-site conditions, discrepancies between assessment actors and those responsible for risk management, and limited executability of assessment outcomes. These limitations frequently prevent risk assessment results from being translated into effective on-site risk reduction measures, thereby undermining their practical value in disaster mitigation.

2.4. Risk Management Systems and Workplace Walkthrough Inspections under the Occupational Safety and Health Act

Under the Occupational Safety and Health Act, risk assessment is defined as a cyclical process consisting of on-site verification, hazard identification, formulation of corrective measures, and confirmation of implementation. Within this process, workplace walkthrough inspections function as a core mechanism for overcoming the limitations of document-centered management and for verifying the practical application of risk management measures in actual work environments.

By enabling direct observation of operational conditions and hazard-prone areas, workplace walkthrough inspections play a critical role in ensuring that risk management systems operate as preventive mechanisms rather than formal compliance tools.

3. Comparative Analysis of Conventional Risk Assessment Approaches

3.1. Analysis of COOP and BCMS Risk Assessment Cases

An analysis of consulting cases related to COOP and BCMS conducted by public institutions and local governments indicates that workplace inspections were not implemented in the majority of cases. Instead, risk assessments were predominantly performed using survey-based approaches and document reviews. These practices reflect an assessment structure that prioritizes procedural compliance and documentation over direct observation of workplace conditions.

3.2. Structural Limitations of Conventional Assessment Approaches

Survey-centered assessment approaches offer advantages in terms of rapid implementation and standardization; however, they present a high likelihood of omitting latent hazards that are not readily captured through questionnaires. Document review–based assessments are effective for verifying institutional and regulatory conformity, yet they tend to generate discrepancies between documented procedures and actual on-site operations.

In contrast, assessment approaches that incorporate workplace walkthrough inspections demonstrate higher levels of executability and practical relevance, although they require additional time and professional expertise. As shown in the comparative analysis presented in Table 1, disaster mitigation and BCMS-related studies conducted by public institutions and research organizations have rarely included workplace walkthrough inspections, relying instead primarily on surveys and document-based evaluations.

Table 2: Comparison of Hazard Identification Methods in Disaster Mitigation and BCMS Studies

Organization	COOP	BCMS	Lead Researcher Qualification	Workplace Walkthrough Inspection	Survey
"G" District Office	O	—	Ph.D. (Engineering)	X	O
"D" City Government	O	—	Ph.D.	X	O
"B" City Government	O	—	Ph.D.	X	O
"G" Safety Institute	O	—	Ph.D.	X	O
"G" Institute	—	O	Bachelor's degree, Certified Disaster Management Professional	X	O
"O" Institute	—	O	Master's degree, Certified Disaster Management Professional	X	O
"B" Hospital	—	O	Bachelor's degree, Certified Disaster Management Professional	X	O
"H" Public Corporation	—	O	Ph.D., Certified Disaster Management Professional	O	O

4. Proposal of an Integrated Risk Assessment Method Based on Workplace Walkthrough Inspections

4.1. Overview of the Integrated Risk Assessment Method

This study constitutes a methodological study rather than an empirical effectiveness verification and aims to redesign the structural framework of disaster mitigation risk assessment. The primary objective of the proposed method is to enhance the preventive function of risk assessment by systematically incorporating on-site information into the assessment process, rather than evaluating outcomes after accident occurrence.

Accordingly, the proposed integrated risk assessment method focuses on restructuring assessment procedures to improve hazard identification, strengthen linkage to corrective actions, and ensure managerial involvement in preventive risk management.

4.2. Integrated Risk Assessment Procedure

The proposed integrated risk assessment procedure consists of four sequential stages designed to reflect both documentary information and actual workplace conditions.

Stage 1: Preliminary Data Analysis (Surveys and Documents)
This stage involves reviewing existing surveys, internal regulations, manuals, and risk-related documents to identify formally recognized hazards and management measures.

Stage 2: Workplace Walkthrough Inspection and Field Verification
On-site walkthrough inspections are conducted to verify actual operational conditions, identify latent and non-documented hazards, and examine discrepancies between documented procedures and real practices.

Stage 3: Integrated Hazard Analysis and Priority Setting
Hazards identified through document review and walkthrough inspections are integrated and analyzed to determine risk priorities based on their potential impact and likelihood.

Stage 4: Formulation of Corrective Actions and Implementation Monitoring
Corrective measures are established with clearly assigned responsibilities, implementation timelines, and follow-up procedures to ensure that risk reduction actions are effectively executed and monitored.

4.3. Composition of Assessment Participants

The integrated risk assessment is designed to be conducted through the joint participation of senior management or their designated representatives, safety, health, and disaster mitigation experts, as well as on-site supervisors and workers. This participatory structure is intended to ensure that managerial responsibility for preventive risk management is explicitly reflected in the assessment process while simultaneously incorporating practical operational knowledge from the workplace.

5. Verification Based on Existing Consulting Reports

5.1. Overview of the Verification Method

This study does not aim at statistical generalization. Instead, it seeks to examine the structural validity and practical applicability of the proposed risk assessment method by utilizing actual consulting reports. To this end, a

baseline–reference case verification approach was adopted, rather than a statistical group comparison design.

Specifically, multiple existing consulting cases that did not include workplace walkthrough inspections were designated as baseline cases, while a single case incorporating walkthrough inspections was selected as a reference case. The analysis focused on identifying structural differences in risk assessment outputs and procedural configurations between these two groups, rather than on comparing quantitative performance indicators.

5.2. Analysis Targets and Baseline Case Selection

The baseline cases consisted of seven COOP- and BCMS-related consulting reports conducted within the past three to five years for public institutions, local governments, and local public enterprises, all of which did not implement workplace walkthrough inspections. These cases were not selected for the purpose of directly comparing assessment outcomes, but rather to identify the typical hazard identification structures and procedural characteristics commonly applied in survey- and document-centered COOP and BCMS risk assessments.

The single case that incorporated workplace walkthrough inspections was not intended for statistical comparison with the baseline cases. Instead, it was defined as an explanatory reference case designed to illustrate how the risk assessment framework proposed in this study may be structured and operated within an actual consulting environment. Accordingly, the analysis emphasized the structural configuration of risk assessment procedures, the integration of on-site information, and the procedural linkage between hazard identification and corrective actions, rather than quantitative effectiveness verification.

5.3. Verification Indicators and Analytical Perspective

The verification was conducted with a focus on the qualitative composition and executability of risk assessment outputs, rather than on outcome-based indicators such as accident occurrence. To this end, four analytical indicators were established to examine the structural characteristics of hazard identification and assessment procedures.

First, the completeness of hazard identification was assessed by examining whether physical disaster risks, including facility systems, air-conditioning, smoke control, and fire protection–related hazards, as well as latent and non-typical hazards, were reflected in the assessment results.

Second, the level of document–site discrepancy identification was evaluated by reviewing whether differences between formal management regulations and actual on-site operations were explicitly identified and described during the assessment process.

Third, the executability of corrective action structures was examined by analyzing whether corrective measures were formulated with procedurally actionable elements, such as the designation of responsible personnel, the establishment of implementation deadlines, and the inclusion of follow-up and inspection procedures.

Fourth, management involvement was analyzed by assessing how decision-making and supervisory participation by senior management or their designated representatives were reflected in the risk assessment results and in the implementation process of corrective actions.

Each indicator was applied using a checklist-based analytical tool to systematically organize assessment procedures and hazard reflection patterns across cases. Through this approach, the structural characteristics of disaster mitigation.

5.4. Procedural Application Analysis of Baseline and Reference Case Structures

The analysis results indicate that, in the case incorporating workplace walkthrough inspections, procedural elements related to hazard identification, linkage to corrective actions, and managerial involvement were more explicitly articulated. These characteristics demonstrate how the risk assessment procedure proposed in this study can be structured and operated within an actual consulting environment. Accordingly, the reference case serves an illustrative purpose by clarifying the procedural applicability of the proposed framework rather than by providing comparative effectiveness verification.

Table 3: Structural Characteristics of Disaster Mitigation Risk Assessment Processes in Baseline and Reference Cases

Analytical Item	Baseline Cases (General Characteristics of Cases without Walkthrough Inspections)	Reference Case (Single Case with Walkthrough Inspection)	Analytical Perspective
Hazard identification method	Limited hazard identification based on surveys and document reviews	Detailed hazard identification through on-site observation and interviews	Scope and depth of hazard identification
Hazard reflection structure	Limited reflection focused on selected types of physical disaster risks	Broad reflection including facility systems, circulation routes, and spatial characteristics	Comprehensiveness of hazard consideration
Level of on-site information integration	Limited identification of document–site discrepancies focused on regulatory conformity	Identification of discrepancies between actual operations and documented procedures	Integration of field information

Assessment procedure structure	Recommendation-oriented corrective measures	Procedural linkage including assignment of responsible personnel and implementation deadlines	Executability of corrective actions
Management involvement	Formal reporting procedures	Inclusion of reporting and implementation verification procedures	Managerial supervision and oversight structure

6. Conclusions and Implications

6.1. Summary of Findings

This study identified structural limitations in conventional disaster mitigation risk assessments, which have been predominantly conducted through surveys and document reviews and have therefore failed to adequately reflect on-site risks. In response, the workplace walkthrough inspection–integrated risk assessment method proposed in this study does not aim to statistically verify effectiveness or achieve generalization. Rather, it presents an alternative assessment framework that can be practically applied within public-sector consulting environments.

The significance of the proposed method lies in its ability to concretize the structure of hazard identification, enhance the executability of corrective actions, and procedurally strengthen managerial involvement in supervision and oversight. By doing so, the proposed framework addresses key weaknesses of existing disaster mitigation risk assessments while remaining aligned with preventive risk management principles.

6.2. Policy and Practical Implications

The integrated risk assessment method proposed in this study offers meaningful policy and practical implications by compensating for the structural shortcomings of conventional disaster mitigation risk assessments. By linking the risk assessment procedures stipulated under the Occupational Safety and Health Act with disaster mitigation risk assessment, the proposed approach provides a structural foundation for integrating risk management activities that have previously been operated in a fragmented manner into a unified management system.

In particular, the incorporation of workplace walkthrough inspections—an essential component of risk assessment under the Occupational Safety and Health Act—into disaster mitigation risk assessment procedures, together with the structural inclusion of senior management responsibilities and supervisory obligations reinforced by the Serious Accidents Punishment Act, enables a responsibility-centered safety management paradigm to function effectively within actual risk assessment processes. In this respect, the proposed framework holds significant policy and institutional relevance.

6.3. Limitations and Future Research Directions

This study is subject to several limitations inherent in its design as a case-based methodological study that does not pursue systematic generalization. While the study proposes a workplace walkthrough–based risk assessment framework through theoretical review and analysis of existing cases, it does not directly verify quantitative outcomes such as reductions in disaster occurrence frequency across diverse industries and organizational scales.

Furthermore, the study does not empirically analyze potential organizational burdens or cost increases that may arise from the integrated application of disaster mitigation risk assessment and occupational safety and health risk assessment. Future research should therefore focus on developing evaluation systems capable of quantitatively analyzing changes in hazard identification scope, corrective action implementation rates, and management system maturity by applying the proposed method across industries and organizational sizes.

Moreover, extending this line of research toward an integrated risk management framework that encompasses the Serious Accidents Punishment Act, the Occupational Safety and Health Act, and disaster mitigation–related institutional systems may further enhance the practical applicability and policy relevance of the methodology proposed in this study.

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