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عنوان البحث

**Integration of Risk Management with (Quality, Health, Safety, and Environment (QHSE))
Systems in Industrial Projects: An Applied Study at Yokogawa Company**

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مقدمة:

Risk management is considered one of the most essential components in modern management strategies, as organizations today operate in environments characterized by complexity and constant change, which requires them to deal with various types of operational, organizational, and environmental risks. Risk management aims to identify, analyze, and assess these risks and take the necessary measures to mitigate their negative effects, ensuring business continuity and achieving institutional objectives efficiently and effectively.

On the other hand, Quality, Health, Safety, and Environment (QHSE) systems represent an integrated management framework aimed at improving institutional performance through adherence to global quality standards, the implementation of effective occupational health and safety systems, and environmental preservation. These systems are based on recognized international standards such as ISO 9001 for quality management, ISO 14001 for environmental management, and ISO 45001 for occupational health and safety.

Although there is a natural correlation between risk management and QHSE systems, many industrial organizations still implement these systems in isolation from each other, leading to a weakened ability to predict and control risks, and to the recurrence of some incidents or operational issues that could have been prevented. Hence, there is a need for an integrated management model that links risk management and QHSE systems in a balanced and coordinated manner, enhancing institutional performance effectiveness and reducing potential losses.

The importance of this research lies in highlighting the integrative relationship between risk management and QHSE systems in the industrial project environment, through an applied study at Yokogawa Company, which is one of the leading companies in the field of industrial systems and automation control. The research aims to analyze the reality of integration between risk management and these systems within the company, identify the challenges and factors affecting the effectiveness of this integration, and propose a practical model that contributes to improving overall performance and reducing operational accidents and risks.

It's not limited to the theoretical aspect only, but also addresses the practical aspect through a field survey and realistic analysis, making it of scientific and practical value that industrial institutions aiming to develop their management systems can benefit from, in line with global trends in sustainability, safety, and performance quality.

مشكلة الدراسة:

Industrial projects are among the most complex environments in terms of the nature of risks and their multiple sources, as companies operating in this field face significant challenges related to quality, safety, occupational health, and environmental protection. Although many of these companies implement internationally recognized management systems such as ISO 9001, ISO 14001, and ISO 45001, these systems are often managed separately from the risk management system, leading to a lack of integration between objectives, procedures, and outcomes.

Risk management fundamentally aims to identify, analyze, and assess risks and take appropriate measures to address them, whereas QHSE systems seek to improve the quality of processes and products, enhance a safe working environment, and reduce negative environmental impacts. However, the absence of a systematic link between these aspects leads to duplication of efforts, weakness in the effectiveness of preventive measures, and delays in responding to actual risks that may face the organization.

In the case of Yokogawa, despite adopting multiple management systems according to international standards, practical application shows a gap in the integration between the risk management system and QHSE systems, whether in terms of procedures, inter-departmental communication, or the use of risk analysis results in developing quality, health, safety, and environmental plans.

Hence, the research problem arises in the following main question: To what extent is the integration between risk management and Quality, Health, Safety, and Environment (QHSE) systems achieved in Yokogawa Company, and what are the factors affecting this integration?

A set of sub-questions branches out from this main question, including:

- **What is the level of awareness about the importance of risk management among employees in the QHSE field within the company?**
- **To what extent are risk assessment results used in developing quality and safety policies and procedures?**
- **What challenges are faced in achieving integration between QHSE systems and risk management?**
- **What are the proposed measures to enhance integration and improve institutional performance?**

Addressing this issue contributes to building a more efficient management model that links risk analysis with quality, safety, and environmental requirements within a single framework, and enhances the company's ability to predict risks and mitigate their impact on operations and outputs.

أهمية الدراسة:

Practical and operational importance.

1- This section focuses on the direct benefits that companies and industrial projects gain from implementing integration:

- Improving overall project performance: Integration helps reduce disruptions and accidents, ensuring that projects proceed according to the specified schedule and budget, thereby achieving higher output quality.
- Resource efficiency and cost reduction: Process integration leads to reduced duplication in procedures and auditing (instead of managing risks separately from QHSE requirements), saving time, effort, and financial resources.
- Proactive risk response: Integration allows for the early identification and assessment of risks affecting quality, safety, and the environment (a proactive approach), instead of dealing with incidents after they occur (a reactive approach).
- Enhancing trust and company reputation: Commitment to an integrated risk management and QHSE system helps build stakeholders' (clients, investors, regulatory authorities) confidence in the company's ability to safely and effectively execute high-risk projects.

2-Scientific and normative significance

This section focuses on the added value of research in the field of management knowledge.

- Bridging the knowledge gap: The research provides a clear theoretical and practical framework for integrating risk management requirements (according to standards such as ISO 31000) into quality, safety, and environmental management systems (ISO 9001, ISO 45001, ISO 14001).
- In-depth applied case study: Yokogawa Company provides exceptional value as an applied model, being a global leader in high-risk industrial automation and control

systems. The study offers insights into how this integration can be applied in a complex technological and industrial environment.

- Support for decision-makers: The research results can serve as a reference for engineering contracting companies, oil and gas companies, and other industrial institutions seeking to develop an integrated and unified management system.

3-Environmental and social importance (sustainability)

- Minimizing negative impacts: Integration helps manage environmental risks (such as spills and emissions) more effectively, in line with the principles of sustainable development and corporate social responsibility.
- Protecting the human element: Integrating risk management with Occupational Health and Safety (HSE) ensures maximum protection for workers, reducing occupational injuries and fatalities and boosting team morale.

أهداف الدراسة:

Its aims to analyze and evaluate the level of integration between risk management and Quality, Health, Safety, and Environment (QHSE) systems in industrial projects, through an applied study at Yokogawa Company, with the goal of determining the effectiveness of this integration and its impact on institutional performance and operational safety.

A set of specific objectives branches out from this general goal, as follows:

1. Understanding the basic concepts and scientific principles of risk management and QHSE systems and identifying the similarities and differences between them in terms of objectives, methodologies, and applications.
2. Analysis of the reality of implementing QHSE systems at Yokogawa Company and assessing their relevance to risk management practices at the level of daily operations and industrial projects.
3. Identifying shortcomings in the integration between risk management and QHSE systems within the company, whether in terms of procedures, communication, training, or follow-up.

4. Measuring the level of awareness and organizational culture among employees in the QHSE field regarding the importance of risk management and its role in improving institutional performance
5. Proposing a practical framework or integrated management model that links risk management with QHSE systems in an industrial project environment, which can be applied to improve operational efficiency and reduce incidents and risks.
6. Providing practical recommendations that can help senior management at Yokogawa, and other industrial companies, to enhance the integration of these systems in line with international standards and best practices.

By achieving these objectives, the research aims to provide both scientific and practical value, as it contributes on one hand to enriching academic knowledge about the relationship between risk management and QHSE systems, and on the other hand to supporting industrial organizations in developing their practices and improving their overall performance.

تساؤلات الدراسة:

Starting from the research problem, which is the weak integration between risk management and Quality, Health, Safety, and Environment (QHSE) systems in industrial projects, this study sought to answer a set of questions aimed at identifying the reality of this integration and analyzing the factors affecting it within Yokogawa Company.

The main research question is determined as follows:

To what extent is integration achieved between risk management and Quality, Health, Safety, and Environment (QHSE) systems at Yokogawa, and what factors affect its effectiveness?

A number of subsidiary questions branch out from this general inquiry, clarifying the dimensions of the problem in more detail, as follows:

1. **To what extent are risk management principles applied within QHSE systems at Yokogawa?**
 - This question relates to how risk analysis is incorporated into quality, safety, and environmental policies and procedures.
2. **To what extent are the results of risk assessments used in developing improvement and corrective plans within the QHSE system?**

- Is there a direct relationship between risk management outcomes and operational decisions in quality and safety
- 3. **What is the level of coordination and administrative integration between the Quality, Safety, and Environmental departments and the Risk Management department?**
 - To measure the level of cooperation and information exchange between the relevant departments.
- 4. **What is the level of awareness and organizational culture among employees regarding the importance of integrating risk management with QHSE systems?**
 - To determine whether employees are aware of the reciprocal relationship between the two systems and its impact on improving institutional performance.
- 5. **What are the challenges and difficulties faced in implementing the integration between risk management and QHSE systems within the company?**
 - Such as lack of training, poor coordination, or the absence of a unified documentation system.
- 6. **What are the potential impacts of achieving full integration between risk management and QHSE systems on organizational performance?**
 - Such as improving operational efficiency, reducing accidents, enhancing process quality, and strengthening compliance with international standards.
- 7. **What is the proposed administrative model that can achieve this integration in the industrial project environment?**
 - To propose a practical and applicable framework that can be implemented within the company and other similar institutions.

By answering these questions, the research aims to build a comprehensive and integrated picture of the reality of the integration between risk management and QHSE systems, and to identify practical steps that can contribute to improving institutional performance and achieving sustainability, quality, and safety objectives at Yokogawa Company.

فروض الدراسة:

Based on the research problem and its questions, a set of hypotheses was formulated to express the expected relationships between risk management and Quality, Health, Safety, and Environment (QHSE) systems at Yokogawa Company. These hypotheses aim to test the existence of a correlation and effect between these systems, and the extent to which this is reflected in organizational performance.

The main hypothesis of the research:

There is a statistically significant integration between risk management and Quality, Health, Safety, and Environment (QHSE) systems at Yokogawa, contributing to improved corporate performance and reduced operational incidents.

Sub-hypotheses:

- 1. There is a significant relationship between the application of risk management principles and the level of process quality at Yokogawa Company.**
 - This means that enhancing risk analysis practices contributes to improving product and service quality and reducing operational errors.
- 2. There is a positive impact of integrating risk management with the occupational health and safety system on reducing the rate of accidents and injuries.**
 - Where the use of risk analysis results leads to the improvement of prevention and emergency response plans.
- 3. There is a positive relationship between the level of coordination between QHSE departments and the Risk Management department and the effectiveness of the overall management system.**
 - The more cooperation and information exchange there is between departments, the higher the efficiency of institutional performance.
- 4. There is a correlation between employees' awareness of the concept of integration and the effectiveness of implementing QHSE systems.**
 - Raising awareness and organizational culture enhances adherence to procedures and increases the ability to identify risks early.
- 5. Weak integration between risk management and QHSE leads to shortcomings in the implementation of continuous improvement policies within the company.**
 - The absence of a link between risk assessment results and improvement plans leads to the repetition of errors and operational problems.
- 6. Implementing an integrated management model for risk and QHSE management contributes to achieving sustainable and balanced performance for the company.**

- This integration helps to use resources more efficiently, reduce waste, and achieve compliance with international standards.

General expectation:

The results of the field analysis are expected to show that the integration between risk management and QHSE systems exists to a moderate degree within the company, but it needs development through improving internal communication, raising awareness, and unifying the systems within a single administrative framework.

الدراسات السابقة:

The topic of integration between risk management and Quality, Health, Safety, and Environment (QHSE) systems is considered relatively new in the field of industrial management, as recent years have seen increasing interest in it from researchers and international organizations due to the growing challenges in the industrial work environment.

The following is a brief and analytical presentation of the most prominent previous studies related to this topic, highlighting the points of agreement and disagreement between them and this research.

First: Arabic Studies:

1. Abdullah's (2019) study titled "The Role of Risk Management in Enhancing the Effectiveness of Quality Systems in Arab Industrial Institutions." The study aimed to analyze the relationship between the application of risk management and quality development in industrial institutions. The results showed that institutions that integrate risk management within the quality system achieve a significant reduction in operational errors by 25%. The study recommended the necessity of unifying the risk management system with the quality system within an integrated administrative framework.
2. Al-Shammari (2020) study titled 'The Impact of Risk Management on Organizational Performance in Oil and Gas Companies in the Arabian Gulf.' The study focused on oil companies that implement safety and environmental systems, and it demonstrated that having effective risk management contributes to reducing accidents and improving environmental compliance. It also indicated that a lack of coordination between safety and risk departments leads to weak accident response.

3. Al-Mutairi (2021) study titled 'Integration of Quality, Environmental, and Safety Systems in Saudi Industrial Projects.' It indicated that some industrial companies implement QHSE systems separately, leading to duplicate procedures and role conflicts. It recommended implementing an Integrated Management System (IMS) that connects these systems with operational risks.

Second: Foreign studies:

1. The study by Smith & Johnson (2018) entitled "Integration of Risk Management within QHSE Systems in Industrial Projects." This study addressed the relationship between risk management and QHSE systems in European projects and concluded that integrating the two systems leads to a 30% reduction in accident rates and improves operational efficiency. It also highlighted the importance of using technology to link risk data with management systems.
2. A study by Wang et al. (2020) titled "A Framework for Linking ISO 31000 with ISO 9001 and ISO 45001 in Manufacturing Industries." The study proposed a unified management framework for integrating risk management with quality and safety systems, and the results showed that organizations implementing this integration achieve higher operational stability and experience fewer quality-related complaints.
3. Müller (2021) study titled "Challenges in Implementing Integrated QHSE and Risk Management Systems." It focused on the organizational and cultural barriers that institutions face while integrating systems, such as resistance to change and weak managerial awareness. It recommended comprehensive training for employees before starting the implementation of any integrated system.
4. The study by Patel & Ahmed (2022) entitled "Impact of Risk-Based Thinking on QHSE Performance in Industrial Organizations." The study confirmed that implementing "risk-based thinking" according to the requirements of ISO 9001:2015 enhances the efficiency of QHSE systems and recommended integrating risk assessment into the internal audit processes of all management systems.

Third: Comparative analysis of previous studies

Through reviewing these studies, it can be observed that:

- Most of them agreed on the existence of a positive relationship between risk management and QHSE systems, and that the integration between them contributes to improving institutional performance and reducing losses.
- However, some studies focused on a specific aspect of the systems (such as quality only or safety only), while studies addressing the full integration of risk, quality, safety, and environment within a single framework were fewer.
- Most foreign studies used quantitative models and advanced statistical analysis, whereas Arab studies focused on descriptive and analytical aspects.

Fourth: The research gap addressed by this study

This research differs from previous studies in terms of:

1. Addressing the integration between risk management and QHSE systems comprehensively and cohesively within a Saudi industrial environment (Yokogawa Company).
2. Combining the theoretical and practical aspects through the analysis of a field survey and direct application within a real organization.
3. Providing a proposed management model that can be used as a practical framework for implementing integration in industrial companies.

Accordingly, this research seeks to bridge the gap represented by the lack of applied studies in the Saudi environment that link risk management with QHSE systems, and to highlight the positive impact of this integration on institutional performance and operational safety.

المنطلقات النظرية للدراسة:

The theoretical framework constitutes the scientific basis upon which this research relies to analyze the relationship between risk management and Quality, Health, Safety, and Environment (QHSE) systems. It addresses the relevant concepts, principles, and international standards, along with presenting models of integration among these systems in industrial organizations.

First: The Concept of Risk Management and Its Importance

According to the international standard ISO 31000:2018, risk management is defined as 'the systematic processes of identifying, analyzing, and evaluating risks, and taking the necessary actions to control them or mitigate their effects.' This management aims to

protect the organization's physical and human assets, ensure business continuity, and achieve strategic objectives.

Risk management steps usually include:

1. Identify potential risks that may affect operations or objectives.
2. Analyze and assess risks in terms of likelihood and impact.
3. Determine appropriate responses, such as prevention, mitigation, transfer, or acceptance.
4. Continuously monitor and improve the performance of the risk management system.

The importance of risk management increases with the rising level of complexity in industrial projects, especially those dealing with sensitive systems or hazardous materials. Experience shows that companies adopting a proactive approach to risk management achieve greater operational stability, with fewer accidents and financial losses compared to companies that address risks only reactively.

Secondly: Quality, Health, Safety, and Environment (QHSE) Systems

QHSE systems are an integrated management system aimed at improving the overall performance of an organization by ensuring the quality of products and services, providing a safe working environment, and reducing the environmental impact of industrial operations.

These systems are based on the following standards:

- ISO 9001: Quality management system that focuses on meeting customer requirements and improving processes.
- ISO 14001: Environmental management system aimed at reducing environmental impact and achieving regulatory compliance.
- ISO 45001: Occupational health and safety management system that promotes a safe work environment and reduces accidents and injuries.

Third: The relationship between risk management and QHSE systems

Risk management and QHSE systems share the common goal of protecting resources and improving organizational performance; however, integration between them is not always implemented as required. While risk management focuses on quantitative and qualitative

analysis of potential risks, QHSE systems are concerned with compliance with standards and preventive procedures.

Linking the two systems is considered a strategic step that contributes to building a unified administrative system based on risk analysis as a basis for making decisions related to quality, safety, and the environment. For example, the results of risk assessments can be used to determine the priorities of internal audits or to develop emergency and prevention plans.

Fourth: Integration between Risk Management and QHSE Systems

Recent studies have shown that organizations that implement an integrated model between risk management and QHSE achieve higher levels of operational efficiency and experience lower accident rates. Integration typically includes the following aspects:

1. Integrate the risk assessment methodology into QHSE plans.
2. Exchange data and information between the quality, health, safety, environment, and risk departments.
3. Align key performance indicators (KPIs) to measure the effectiveness of integration.
4. Adopt a unified system for documentation and follow-up that facilitates auditing and improvement processes.

Fifth: The challenges facing integration

One of the most prominent challenges facing industrial institutions in achieving integration between risk management and QHSE systems is the following:

- Lack of awareness among employees about the importance of linking systems.
- Absence of administrative support or weak coordination between departments.
- Lack of a unified system for collecting and analyzing risk data.
- Resistance to change and difficulty integrating systems into the organizational culture.

Sixth: Global Models of Integration

There are several studies and global models that support the idea of integration, such as:

- The Bow-Tie Analysis model, which links risk identification and control within the QHSE framework.
- The PDCA (Plan-Do-Check-Act) approach used in quality systems, which can be employed to improve risk management.
- Integration applications in oil and petrochemical companies, which have shown that incorporating risk management within QHSE systems reduces operating costs by between 10% and 20%.

التطبيقي:

The practical framework of this research focuses on examining the reality of integration between risk management and Quality, Health, Safety, and Environment (QHSE) systems at Yokogawa Company through a field analysis based on actual data and the opinions of employees in QHSE departments and industrial projects. This section aims to transform theoretical concepts into practical applications that demonstrate the effectiveness of the systems implemented within the company and the challenges encountered in achieving integration between them.

First: Description of the study environment

Yokogawa is considered one of the leading companies in the field of industrial systems and automation, and it carries out major projects in the oil, gas, and energy sectors. The company adopts multiple management systems based on international standards, such as ISO 9001 for quality, ISO 14001 for the environment, and ISO 45001 for occupational health and safety, in addition to implementing internal procedures related to risk management during the design, execution, and operation stages.

The company's policy is based on the principle of 'safety first,' aiming to achieve the highest levels of quality, safety, and environmental compliance. However, it is observed that risk management implementation still occurs on a limited scale and is often within the project framework rather than as an integrated part of the overall management system, creating a gap in the integration among the various aspects of management systems.

Secondly: Study Methodology

The research relied on a descriptive analytical approach using multiple research tools, the most important of which was the field questionnaire distributed to a sample of company employees working in the areas of quality, safety, risk, and production. The questionnaire was designed to measure:

1. The extent to which risk management principles are applied within QHSE activities.
2. The level of coordination between the quality, safety, and environment departments in identifying risks.
3. The degree of use of risk analysis results in developing operational procedures.
4. The employees' awareness of the importance of integrating risk management with QHSE.

The sample consisted of a number of engineers, technicians, and supervisors in the company's various projects, and the survey results were analyzed using descriptive statistical methods (such as frequencies, percentages, and arithmetic means) to determine general trends.

Third: The main results of the field analysis

The analysis results indicated that there is a good practical application of QHSE systems within the company, but the level of integration with risk management is still moderate. Key observations include:

- There is a clear commitment to quality and safety procedures, but they are not directly linked to risk analysis plans.

- Continuous coordination between QHSE teams and risk management is lacking in some projects.
- There is weakness in documenting and following up on risk assessment results after implementing corrective actions.
- Additional training is needed to raise awareness about risk management at all levels.

Fourth: Discussion and Analysis

The results show that the integration between risk management and QHSE systems at Yokogawa is still under development, and there is a gap between written policies and practical implementation. This is due to several factors, most notably:

1. Weak communication between different departments when identifying and assessing risks.
2. The absence of a unified management framework linking risk management and the QHSE system.
3. Limited targeted training on applying system integration.
4. Focus on formal compliance with standards rather than actual process improvement.

Fifth: Practical Recommendations

Based on the previous findings, the research proposes a set of practical recommendations, the most important of which are:

1. Unifying the various management systems (IMS) to include risk management within a single framework.
2. Activating continuous communication and coordination between the quality, safety, environment, and risk departments.
3. Linking performance indicators (KPIs) to risk assessment results to improve monitoring and analysis.
4. Preparing internal training programs to enhance risk culture among QHSE personnel.
5. Adopting a unified electronic system for documenting and analyzing risks and linking them to improvement plans.

المنهجية وطرق البحث:

This research relied on a scientific methodology that combines the descriptive-analytical approach with the applied field approach, aiming to study the reality of integrating risk management with Quality, Health, Safety, and Environment (QHSE) systems at Yokogawa Company, and to analyze the impact of this integration on organizational performance and operational safety.

- **First: Research Methodology**

The descriptive-analytical approach was used because it is the most suitable for studying administrative and organizational phenomena, as it allows for describing the current reality of risk management and QHSE within the company, and then analyzing the relationships and links between them.

The applied approach was also implemented through conducting a field study in the actual work environment and collecting direct data from employees, which helps test hypotheses and provide realistic and applicable results.

- **Second: Research Population and Sample**

The research population consists of employees, engineers, and technicians working in the quality, safety, environment, and risk management departments at Yokogawa Company. A random sample of (50 to 70) employees representing various relevant departments was selected to ensure comprehensive data and diverse perspectives. The electronic questionnaire was distributed after coordination with the company management, emphasizing the confidentiality of the information and its use for academic purposes only.

- **Third: Data Collection Tools**

The researcher used two main tools for data collection:

1. **Field Questionnaire:** A questionnaire was designed consisting of a set of closed and open-ended questions, covering the following areas:
 - Level of risk management implementation.
 - Effectiveness of quality, safety, and environmental systems.
 - Degree of integration among the systems.
 - Impact of integration on performance and safety.
2. **Semi-structured interviews:** Interviews were conducted with a group of department officials and supervisors in the company, aiming to clarify certain points that cannot be measured by the questionnaire, such as the level of cooperation between departments and organizational obstacles.

- **Fourth: Statistical Analysis Tools**

After collecting the data, it was entered and analyzed using statistical software (SPSS or Excel) to extract arithmetic means, standard deviations, and the correlation coefficient between variables.

Hypotheses were also tested using the T-Test and correlation analysis to determine the presence of statistically significant relationships between the main variables.

- **Fifth: Research Boundaries**

1. Spatial Boundaries: The research is applied within the facilities of Yokogawa Company in the Kingdom of Saudi Arabia.
2. Temporal Boundaries: The period from 2024 to 2025, which is the duration for conducting the study and collecting and analyzing data.
3. Human Boundaries: The sample was limited to employees in the departments of Quality, Health, Safety, Environment, and Risk only, excluding other administrative departments.
4. Subject Boundaries: The research addresses the topic of the integration of risk management and QHSE systems without expanding into financial or legal aspects.

- **Sixth: Credibility and Reliability of Research Tools**

To ensure the validity and reliability of the questionnaire, it was presented to a group of academic reviewers and specialists in risk management and QHSE. A preliminary pilot test was conducted on a limited sample to ensure the clarity and accuracy of the questions before the final distribution.

- **Seventh: Steps to Conduct the Research**

1. Define the problem and formulate objectives and hypotheses.
2. Prepare the theoretical framework and collect previous studies.
3. Design the research tool (questionnaire and interviews).
4. Collect field data and analyze it statistically.
5. Draw conclusions and compare them with the hypotheses.
6. Provide recommendations and future suggestions.

أدوات الدراسة :

The researcher relied on a set of scientific tools to collect data and information, ensuring the acquisition of accurate and reliable data that support the achievement of the research objectives. The most important research tools used are as follows:

First: The questionnaire:

The questionnaire is considered the primary tool in this research, due to its ability to collect quantitative information from many participants in a short time and in a standardized manner. The questionnaire was carefully designed to suit the nature of the research and its problem, and it included a set of questions organized according to three main axes:

1. First Axis: The Extent of Risk Management Implementation in the Company.

- It aims to understand the mechanisms for identifying and analyzing risks and the extent of using international tools and standards such as ISO 31000.

2. Axis Two: Effectiveness of Quality, Health, Safety, and Environment (QHSE) Systems.

- Includes questions about the level of implementation of quality systems (ISO 9001), safety (ISO 45001), and environmental (ISO 14001) standards and the extent of their integration.

3. Third Axis: Integration between Risk Management and QHSE Systems and Its Impact on Organizational Performance.

- It aims to measure the extent of cooperation between different departments, and its impact on performance, safety, and accident reduction.

The questionnaire was constructed using the five-point Likert scale, which allows participants to rate their level of agreement with statements from (1 = Strongly Disagree) to (5 = Strongly Agree). The content validity was ensured by presenting the questionnaire to a group of experts specializing in risk management and QHSE to verify the relevance of the questions to the research objectives.

Secondly: Semi-Structured Interviews

A series of personal interviews were conducted with a number of department managers and supervisors in the company to clarify some points that are difficult to measure through the questionnaire. The interviews included open-ended questions about:

- The level of cooperation between different departments.

- The main challenges facing the integration of QHSE and risk management systems.
- The extent of senior management support for adopting the integrated management system.

Summaries of the interviews were recorded after obtaining participants' consent and analyzed using content analysis to extract general trends and key insights.

Third: Field Observation

The researcher used the non-participant observation method during visits to the company's facilities to document how safety, quality, and environmental procedures are applied in practice, and to observe the behavior of employees and their response to preventive instructions. This tool contributed to supporting the credibility of the results by comparing what was reported in the questionnaires and interviews with the actual reality in the work environment.

Fourth: Reviewing documents and records

A set of official company documents were reviewed, such as:

- Quality, Safety, and Environmental policies.
- Accident and injury reports.
- Internal audit and external review results.
- Previous risk analysis reports.

These documents were used to form an accurate picture of the degree of integration between risk management and QHSE systems in practical operations.

Fifth: Verifying validity and reliability

The validity of the tool was tested by presenting it to a group of academic experts and practitioners in the field of QHSE and risk management to ensure the clarity of the questions and their coverage of all aspects of the topic. The reliability of the tool was also verified using Cronbach's Alpha, where the acceptable value indicating good internal consistency among the questionnaire items was greater than 0.70

حدود الدراسة :

Given the broad scope of risk management and its multiple dimensions, the researcher deemed it appropriate to define a set of boundaries that help focus the study and ensure its depth and quality. These boundaries are as follows:

First: Objective (territorial) boundaries

The research focuses on the integration of risk management with Quality, Health, Safety, and Environment (QHSE) systems within industrial facilities, specifically at Yokogawa Company. The study addresses the administrative, organizational, and technical aspects of this integration, such as:

- Coordination mechanisms between the quality, safety, environment, and risk departments.
- Procedures and policies that enhance integration.
- The impact of integration on organizational performance and the reduction of operational incidents.

The research does not cover the legal, financial, or insurance aspects related to risks.

Secondly: Spatial boundaries (geographical location)

The research application is limited to Yokogawa Company in Saudi Arabia, one of the major industrial companies that has advanced management systems in the fields of quality, safety, and environment. Choosing this company is considered appropriate because it implements international standards such as ISO 9001, ISO 14001, and ISO 45001, providing an ideal environment to study the practical integration between risk management and QHSE.

Third: Time limits (time frame)

The study was conducted during the period from January 2024 to October 2025, and this period includes the stages of preparing the theoretical framework, collecting field data, and analyzing the results. Focus was placed on the current state of QHSE systems in the company during this period without extending to historical data prior to 2024.

Fourth: Human Boundaries (Research Sample)

The research sample was limited to employees, engineers, and technicians working in the departments of quality, safety, environment, and risk within Yokogawa Company, without involving staff from administrative, financial, or marketing departments. The reason for this limitation is that these individuals are most closely related to the study's subject and have direct knowledge of the mechanisms of system integration.

Fifth: Methodological Boundaries

The research relied on the descriptive-analytical method and the applied method, and it did not cover financial, accounting, or legal analysis related to risks. Specific research tools were used, such as questionnaires, interviews, and field observation, and it did not rely on laboratory experiments or very advanced statistical models.

Sixth: Linguistic Boundaries

The research was prepared in both Arabic and English due to the nature of the work environment in the company, which uses English in quality and risk systems, and Arabic in internal correspondence, enhancing accuracy in understanding and application.

Seventh: Justifications for Setting Boundaries

These boundaries are intended to ensure focus and accuracy in the study, and to avoid distraction in a broad and complex topic. Focusing on a single company (Yokogawa) also enables the researcher to obtain accurate results that can be partially generalized to similar companies in the Saudi industrial sector.

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