تأثير إدارة المخاطر في القطع البحرية على التلوث البحري

(دراسة استطلاعية في الشركة العامة للموانئ العراقية)

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The impact of risk management in marine vessels on marine pollution

Abstract

The study aims to test the effect of marine risk management in marine vessels as an independent variable on marine pollution in marine vessels as a dependent variable in the Iraqi Ports Company. The importance of this study comes from the scarcity of studies that attempted to determine and know the nature of the relationship between the variables of the study. (Risk management in marine vessels and environmental pollution), as well as the researcher's attempt in the current study to address a realistic problem represented by the problems of environmental pollution resulting from marine vessels and the problems and damage they cause to the marine environment and living organisms. To achieve these goals, a hypothetical model was formulated. It consists of the variables that express the nature of the relationships between the variables. Two main hypotheses were due loped, with a set of sub-hypotheses devided from each hypothesis. The descriptive exploratory daisy was adopted. The study population was effectively targeted, a sample of (260) employees in maritime cadres working in the Iraqi Ports Company. Data collected using a questionnaire, and the statistical programs were used (AMOS, V.24) and

(SPSS.V.26). The study reached several results, including the existence of a significant and statistically significant influence relationship between risk management and marine pollution. Based on the results, several conclusions and recommendations have been developed and formulated, including that there must be a specialized risk management in the Iraqi Ports Company whose mission is to identify, analyze, evaluate, and control risks in order to reduce the effects of pollution resulting from marine vessels and preserve see environmental resources.

Keywords: Risk Management, Marine Vessels, Marine Pollution.

المستخلص

تهدف الدراسة إلى اختبار تأثير إدارة المخاطر في القطع البحرية كمتغير مستقل على التلوث البحري كمتغير معتمد في شركة الموانئ العراقية، وتأتى اهمية هذه الدراسة من ندرة الدراسات التي حاولت تحديد ومعرفة طبيعة العلاقة بين متغيرات الدراسة (إدارة المخاطر في القطع البحرية و التلوث البحري)، وكذلك محاولة الباحث في الدراسة الحالية معالجة مشكلة واقعية تتمثل بمشاكل التلوث البحري الناجم من القطع البحرية وما تسببه من مشاكل وأضرار بالبيئة البحرية والكائنات الحية، ومن أجل تحقيق هذه الأهداف تمت صياغة نموذج فرضي يتكون من متغيرين يعبر عن طبيعة العلاقات بين المتغيرات. ولقد تم استنباط فرضيتين رئيسيتين، تتفرع من كل فرضية مجموعة من الفرضيات الفرعية، ولقد تم اعتماد المنهج الوصفي الإستطلاعي، فقد تم استهدف مجتمع الدراسة بشكل فعلي عينة مكونة من (260) موظفاً من الكوادر البحرية العاملة في شركة الموانئ العراقية، وتم جمع البيانات باستخدام إستمارة استبانة، واستخدام البرامج الاحصائية (AMOS,V.24) و (SPSS.V.26). وقد توصلت الدراسة إلى جملة من النتائج منها وجود علاقة تأثير معنوية وذات دلالة إحصائية بين إدارة الخطر والتلوث البحري. واستنادا إلى النتائج فقد تم وضع وصياغة جملة من التوصيات ومنها لابد من وجود إدارة خطر متخصصة في شركة الموانئ العراقية مهمتها تحديد وتحليل وتقييم المخاطر والرقابة عليها من أجل التقليل من آثار التلوث الناجم من القطع البحرية والمحافظة على الموارد البيئية البحرية.

الكلمات المفتاحية: إدارة المخاطر، القطع البحرية، التلوث البحري.

Introduction:

This research is concerned with risk management in marine

vessels and their impact on marine pollution because it is one of the most important topics in the contemporary time, as safety and environmental protection are considered among the main priorities for maritime transport organizations, because ports and maritime transport operations have an impact on the marine environment and protect it from all manifestations of pollution and combat it,There is a need to establish rules for managing the marine environment and to ensure its protection and improvement and not to harm its resources. The research variables seek to know the impact of risk management for marine vessels on marine pollution, as the General Company for Iraqi Ports was chosen as a field of application due to its importance in the field of maritime transport, as it includes (58)A marine plot distributed among the most important sea ports (Basra Port - Al-Maqal, Umm Al-Qasr Port, Abu Flus Port, Al-Zubair Port) and the units affiliated with these ports (the marine shipyard, the guides station, the miscellaneous, the marine drilling department). The research is divided into five axes, including: The first topic is the research methodology, the second topic deals with some of the previous studies related to the topic of the current research, and the third topic deals with the theoretical section, while the fourth topic deals with the practical framework, and finally the conclusions and recommendations in the fifth topic.

1,1: research methodology

1,1,1: the research problem

Risk management has become one of the concerns of organizations and companies in the current era, in order to enable management and employees to deal with the risks they may face and combat marine pollution. Iraqi ports suffer from weak attention to risk management, as it has been shown that

they suffer from some deficiencies in diagnosing, Evaluating, identifying and analyzing the risks that the company may be exposed to, in addition to the delay in implementing plans to combat marine pollution resulting from the operation of marine vessels, within this complex picture of risks in maritime shipping, This research attempts to address this problem through risk management, as the port company must know the nature of these risks and what their impact is on its work. and port companies need to prioritize mitigating the most important risks. This makes it important to analyze the extent to which each risk affects the performance of the port company and determine the relative importance of the risk factors. The research problem can be formulated through the following question:

1. what exist risk management in marine vessel , impact on marine pollution?

2,1,1: research importance

1. The importance of this research stems from its presentation of a proposed model that studies the relationship between risk management variables and marine pollution
2. This study highlights risk management for marine vessels and its role in reducing marine pollution.
3. The study entails special importance as a result of the increasing use of maritime transport and the intensive activities related to it, and the risks that result from it and affect the marine environment and determining who is responsible for them**.**

3,1,1: Research objectives

1. The research aims to test the direct influence impcat between the independent variable, marine vessel risk management, and the dependent variable, marine pollution.
2. Work on developing a testable statistical model between

marine vessel risk management and its impact on marine pollution.

3.Identify the reality of marine pollution caused by marine ships in Iraqi ports

4, 1,1: Research Model

was developed that shows the correlation and influence impcat between the two variables of the study, as shown in figure :(1)

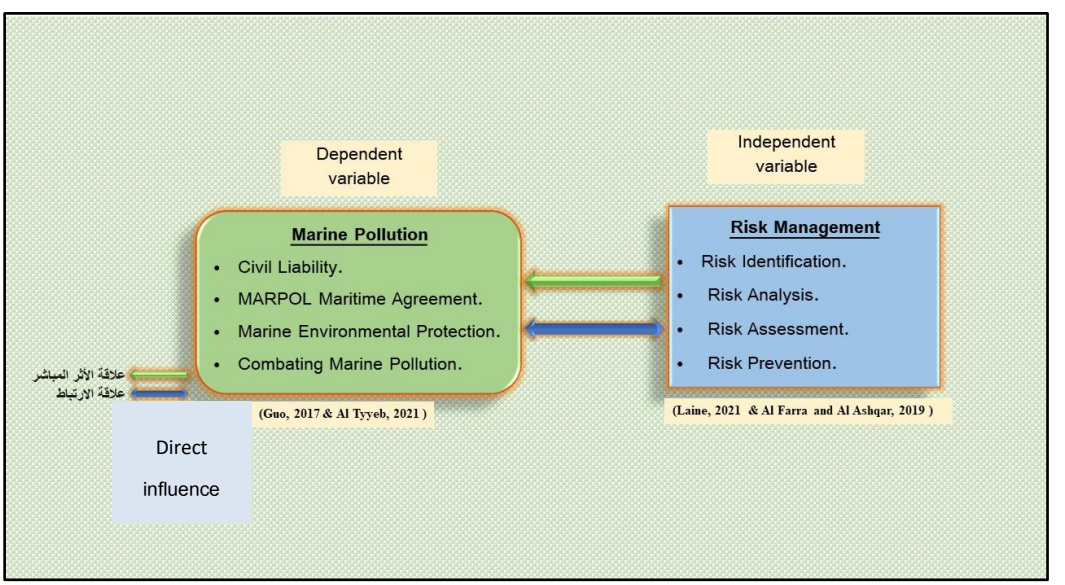

Figure (1): Research Model

5,1,1: Research hypotheses

A hypothesis was formulated to explain the relationship between the study variables, as follows:

1. **The first hypothesis:** There is a strong positive influence relationship for the dimension of risk analysis and prevention

and a moderate relationship for the dimension of identifying and evaluating risks with significant statistical significance between the dimensions of risk management in marine vessels and marine pollution.

6,1,1: Data collection tools

The current study used a questionnaire to collect data due to its suitability to the variables of the study. The research questionnaire was designed based on previous studies. The questionnaire was distributed to 260 employees working in the Iraqi General Ports Company.

The questionnaire was subjected to a set of preliminary tests to ensure its validity, reliability, and the possibility of adopting it to measure the study variables, as follows:

1. **Content Validity**: To ensure the validity of the content of the scale, a number of experienced and specialized arbitrators were used. The questionnaire items were presented to the arbitrators. The arbitrators agreed on the validity of the majority of the questionnaire items and requested that some paragraphs be amended by deletion or addition.

2. **Scale Reliability**: The reliability and stability of the sample's responses to the dimensions of the questionnaire were measured using Cronbach's alpha coefficient. Based on the scale, the value of Cronbach's alpha is good if the value of the coefficient is higher than (0.70). Based on the scale, the Cronbach's alpha value was higher than (0.70), which indicates good stability of the scale.

3. **Final validity test**: Reliability refers to the extent of the stability of the answers to the sample. It also measures the extent of the internal consistency of the questionnaire, or it is the extent of the stability of the answers to the questionnaire if it is conducted at different times, provided that all other factors and conditions remain constant. To measure the validity of the questionnaire statements, the Spearman

Correlation Coefficient is used, and based on the scale, The paragraphs are retained if the correlation rate is higher than (0.40), while the paragraphs that obtain a correlation less than (0.40) are eliminated. The results showed that the correlation was strong and acceptable between each statement in the questionnaire, and that all items had a correlation coefficient greater than (0.40).

7,1,1: Limits of research

1. **Limits of the variables**: The research included the risk management variable as an independent variable, which is represented by the dimensions (risk identification, risk analysis, risk assessment, risk prevention), and marine pollution as a dependent variable, which is represented by the dimensions (civil liability, MARPOL maritime agreement, marine environmental protection, combating marine pollution).

2. **Human limits**: The study population is represented by workers in marine vessels belonging to (the General Iraqi Ports Company).

3. **Time limits**: It represents the period during which the study was prepared and the questionnaire form was distributed and retrieved, which extended from the date of 4/26/2023 until 11/19/2023.

8,1,1: Statistical methods

Data were analyzed using SPSS V.23 software. to calculate the normal distribution of the data and calculate percentages and arithmetic averages. The Spearman correlation coefficient were also calculated to measure the direction of the relationship among the variables and dimensions of the study. The Amos.v.24 program was also used to calculate

regression of the variables to determine the direct effects of the independent variable on the dependent variable.

2,1: Literature reviews

A study conducted by **Al-Khayyat (2019)** aimed to Identify the processes of risk management, analysis, evaluation, confrontation, and continuous monitoring, and their importance in developing business management in Kuwaiti business institutions. The results showed a weakness in management in classifying risks, lack of strategic management to confront potential risks, lack of alternatives proposed by management to avoid risks, lack of use of technology to help management identify potential risks.

A survey conducted by **Adam (2019**) to identify the challenges faced by the port and provide sustainable solutions and mitigation strategies. The results showed that customers used outdated manual systems to make payments and clear shipments at the port. The port management team was found to be ineffective, the port lacked proper risk assessment, mitigation and management methods and lack of capacity building for staff.

In addition, **Geels et al (2021)** conducted a study Provide an up-to-date look at future ship emissions and provide a comprehensive overview of atmospheric pollutants and their contribution to air quality in the Nordic (and Arctic) region. The results showed that the lack of regulation of shipping emissions, coupled with the high growth in maritime transport traffic, leads to an increase in the relative impact of shipping and the number of premature deaths. It may also lead to increased deposition of nitrogen and black carbon in the Arctic, with potential impacts on the environment and climate.

Moreover, **Sabela-Rikhotso et al. (2022)** conducted a study to propose a conceptual model for managing marine oil spills in South Africa. The results showed continued integrative

coordination with a strict focus on cohesive cooperation among multiple stakeholders in incident management. Qualitative findings stated limitations to the effective implementation of oil spill risk mitigation policies, especially in regional and local government spheres. Quantitative results demonstrated that some local municipalities have disseminated joint planning and preparedness among organizations and have budgets**.**

Additionally, **Khan et al. (2021)** conducted a study to assess the multi-factorial risks associated with handling hazardous cargo within the port. The results showed that under normal circumstances, the probability of an accident occurring with major consequences is 59.8, with humans and management found to be the most contributing factors. When providing evidence of a pollution and environmental accident, the probability that "management" was the cause is raised by 7.06%.

2. The theoretical framework of the research

1,2: Risk management

1,1,2. The concept of risk management

Individuals and organizations face many risks that threaten their lives, capital, and property (Zwikael, 2011: 12), which makes it necessary for individuals and managers in organizations to constantly search for policies and methods used to ensure the safety of the economic decisions they make (Boide, 2014: 620 & Wadhwa, 2017). Risk management considered as a systematic approach to managing forces that may negatively affect companies (Susanto and Meiryani, 2018:102).

Effective risk management in any organization is a vital management task that can help achieve success in ports and

maritime transport (Sampso and Ellis, 2015: 297). In addition, risk management has become a critical aspect of management activities in ports and marine vessels, and one of the main benefits is that the risk management system should facilitate systematic and objective decision-making in the organization when risks occur (Lavanya and Malarvizhi, 2008: 13). Accordingly, many companies develop risk management plans. These plans include identifying risk factors, assessing predictable consequences, and creating mitigation plans to overcome risks (Alansari and Nguyen, 2019). According to Sila (2018: 13) risk management is defined as a situation or situation that involves the possibility of harm occurring, such as injury to an individual or damage to the environment, organizations, or infrastructure due to environmental phenomena or human errors. In addition, Al-Desouki (2019: 98) defined risk management as Finding a set of modern means to control risk, reduce the frequency of accidents, and reduce the size of the losses resulting from them, with the result that achieving a degree of uncertainty by successfully anticipating the occurrence of natural and general phenomena in advance, then adopting a set of policies to confront the losses expected from them. While Jaber (2020: 19) defined risk management as all processes including risk identification, assessment and evaluation, property identification and risk mitigation measures or forecasting and monitoring and confirming progress. Accordingly, risk management is defined as the process of identifying all expected events that cause losses within the organization, and the size of these losses, and then determining the means and methods to be taken in the event that these losses occur.

2,1,2. Risk management objectives:

Writers and thinkers have explained many of the goals that risk management seeks to achieve in the organization, and the

two main goals of risk management are to mitigate this risk first and reduce the losses resulting from it second (Susanto and Meiryani, 2018: 104). Risk management objectives include the following (Al-Husseini, 2008: 10) (Masood, 2019: 26)

A. Determine a framework aimed at controlling the implementation of activities.

B. Make the most effective decisions and set priorities, taking into account the probability of the risk occurring.

C. Ensuring the best use of resources in the organization.

D Protecting human and material resources within the organization.

H. Develop a database of risks and losses that can be relied upon in making future decisions.

3,1,2. Risk management processes:

Risk management processes consist of a set of stages, which can be identified as follows:

The first stage: identifying and describing potential risks

It is the first basic step of the risk management process, which is identifying all forms of exposure to risks (Meyer and Reniers, 2016: 25). The risk management manager studies the stages of project design with the aim of identifying the risks that accompany each stage and determining the causes of these risks, so that Risk management is able to prepare a guide to the risks to which the organization is exposed (Prapawadee, 2009: 9), and sometimes the risk guide is prepared based on the experience of similar organizations working in the same field that have been operating for a period of time and have practical experience about losses, their types, causes, and methods. Confronting them (National Consumer Commission, 2018, 22-27). The risk management manager can collect

information about risks within the organization from many sources, including (Susanto and Meiryani, 2018: 106):

1.Risk description analysis questionnaire.

2. Personal inspection.

3.Work and production audit maps.

4. Financial statements, such as sales statements and income statements.

5. Historical data kept about past hazards.

6. Environmental analysis.

7. Organizational charts and structures within institutions.

The second stage: risk analysis:

The goal of risk analysis is to understand each specific case of risk and how it affects the organization's activities and strategic goals (AL Dalaeen, 2023:753). The techniques used at this stage are classified into qualitative and quantitative techniques (Pernille, 2013:17), as follows**:**

1. Qualitative techniques for risk analysis:

It means knowing the size and degree of breadth of the expected risks. The risks are arranged according to the degree of their impact on the organization's objectives. It highlights the importance of qualitative techniques in determining the importance of risks and identifying the risks that have priority for treatment before others (Campbell, 2005:44)

2. **Quantitative techniques**:It is intended to give a quantitative description of risks based on the probability of occurrence and the resulting consequences in an estimated manner or any other value (Faihan and Shaker, 2015: 48).

The third stage: assessing potential risks:

After the process of defining and analyzing the risks to which each area of the organization is exposed, the risks are assessed through (Bodicha, 2015: 24) and (Lomothey, 2018: 7):

A- Determine the probability of each risk occurring
B- The size of the expected loss if it occurs.
Accordingly, risks are arranged according to their importance, with risks that result in catastrophic losses being given special importance. At this stage, a risk management matrix is prepared, where the degree of risk is classified into (high, medium, or low), and the degree of risk is determined in light of the probability of occurrence. Risk and its impact (loss) (Heniz-peter, 2010: 85; Bodicha, 2015: 25)
The risk assessment matrix can be explained as follows (2):

possibility / Impact-loss	high	Middle	Low
High	High high very	High High	Middle Middle
Middle	High high	middle Middle	Low Low
Low	middle high	Low Middle	Low very low

Figure (2): risk assessment matrix

Source: Pernille Monstad, (2013)," unveiling and enablers of risk management in interoperability efforts ", Masters thesis of economic and social sciences deportment of information system, university of Agder in Norway, p:18

It is noticeable from the figure that as the degree of risk increases towards the right, the degree of risk increases in terms of impact and probability. Distributing the probability of exposure to risks into one of the three categories requires determining the financial loss that results from the possibility

of a specific risk occurring and evaluating the organization's ability to absorb such risks. Losses.

The fourth stage: risk control:

It is choosing the appropriate methods to confront the risk after the risks have been identified, analyzed and evaluated, after which the methods and techniques that can be used to confront the risks are determined (Pernill, 2013:18 and Meyer and Reniers, 2016: 15). Organizations use many methods to control risks, such as risk avoidance, risk assumption, prevention and prevention, and risk transfer (Baccarini, 2004:286; Pernille, 2013: 54; Hobbs, 2015, p. 43).

2,2 Marine pollution

1,2,2 The concept of marine pollution

The concept of marine pollution has been defined in many international agreements and by many organizations. In the definition of the United Nations Convention on the Law of the Sea in 1970, marine pollution was defined as direct or indirect human intervention that results in the introduction of materials or energy into the marine environment, including the entry area. Rivers to the seas, which results in an organic and psychological effect that is harmful to life sources and human health, or exposure to the interaction of marine life, including fish, or increased salinity, which affects the use of seawater or any change in the conditions of marine life. It is known (Verma et al, 2020: 270) Marine pollution is the harmful effect resulting from the entry of chemicals, particles, agricultural and residential waste into the ocean, noise, or the spread of invasive organisms. Based on the above, marine pollution is defined as changing the environmental balance of the marine environment, through human introduction of substances that spoil sea water, lead to damage to biological resources, cause a negative impact on marine life and fishing, and cause harm to human health.

2,2,2 Marine pollution caused by ships:

1.Oil pollution resulting from ships: Pollution caused by ship transportation includes two categories: The first is pollution caused by normal navigation, for example: cabin bilge water, oil tanker ballast water, washing water and so on. The second category: due to shipping accidents and oil spills (& Feka, 2020: 28 Abu Madaniyah, 2012: 56-59)

2.Marine pollution resulting from the transport of harmful substances:

It includes ballast water, tank washing water, cargo pump bilge water, pollution resulting from accidents causing the spread of a large number of toxic and hazardous substances, leaking pipelines or engine oil disposed of in the sewer, and loading and unloading operations (YuZhuo, 2003: 13; Karwat, 2016: 2). It also includes transporting hazardous materials in containers on board ships, which may cause leakages and spills on open surfaces (YuZhuo, 2003: 13)

3.Pollution with sewage waste:

These are toilet drain water, medical room emptying, and building materials discharge activities (Abu Madaniyah, 2005, 45), and marine waste causes environmental pollution due to the presence of toxic or difficult-to-decompose materials, such as plastic;(Guo, 2017: 5, Al-Hadi, 2012, 34)

4.Air pollution by ships: Shipping activities lead to emissions of important air pollutants such as nitrogen oxides (NOx), sulfur dioxide (SO2), particulate matter less than 2.5 micrometers in diameter (PPM2:5) and black carbon (BC) (Geels, et al., 2021: 65). There are many negative effects

associated with these pollutants and the air compounds that subsequently form in the atmosphere; Nitrogen deposition poses a threat to ecosystems, and increased deposition is associated with loss of biodiversity (Bobbink et al., 2010: 45), and negatively impacts human health (Pope et al., 2020: 42).

5.Marine accidents:

The increase in external transport by sea by ships to all parts of the world has led to a large number of marine accidents, whether they are the result of direct or indirect human errors resulting from force majeure or fatal force or pollutants that have an impact on marine organisms. These damages may be reflected in the local economy. And the International (Al-Marzouqi, 2019: 70), and experiments have shown that human error plays a fundamental role in causing maritime accidents, as is the case in cases of marine collisions and fires, and that negligence by crew members in applying safety standards leads to maritime accidents, and thus these accidents lead to It leads to disasters such as fire and drowning, and ultimately causes marine pollution (Al-Erian, 2017: 351)

3,2,2 Marine Pollution Requirements:

A. Civil responsibility

The risk of marine pollution results in difficulties in proving its existence, attributing its responsibility to a specific person who is responsible for compensating this damage. Civil liability insurance for marine pollution damages is considered an application of the principle of substantive liability in international instruments, and to guarantee the rights of individuals affected by this pollution, because the damage resulting from Marine pollution causes a waste of the rights of individuals who have been harmed (Mubarak, 2017: 244; Al-

Hajj, 2020: 8).

B. MARPOL Maritime Convention

The Maritime Convention MARPOL (MARPOL 73/78) is an international maritime convention established by the International Maritime Organization (IMO) in order to prevent pollution resulting from ships, which may appear as a result of accidental accidents or operational reasons (Djadjev, 2015: 45). Regulations on sources of pollution from ships are contained in Annexes I, II, II, IV, V and VI of the London Convention and are updated frequently. Annexes III, IV, V and VI relating to bulk materials, wastewater, litter and air pollution are optional, while Annexes I and II, which regulate petroleum and chemicals, are mandatory (IMO, 2010**).**

C. Marine environment protection

Based on legal agreements in the field of protecting the marine environment from pollution, countries rely on several means to implement the obligation to protect the marine environment and preserve it from pollution. These methods are as follows**:**

1. **Global international cooperation**: This is done either on a direct regional basis or through international organizations specialized in the field of marine protection from pollution by establishing international procedures and standards consistent with international agreements in the field of protecting and preserving the marine environment from pollution, taking into account the characteristics of regional countries (Article 197 of the United Nations Convention on the Law of the Sea 1982).

2. Countries inform international organizations specialized in protecting the marine environment from pollution if their marine environment or the environment of any other country is exposed to the dangers of marine pollution (Ledia and Hayat, 2015: 47)

3. Assisting developing countries to reduce the effects of marine pollution by working to develop scientific programs and techniques that eliminate pollution or reduce its size (Article 202/b of the United Nations Convention on the Law of the Sea 1982).

4. Establishing a special environmental monitoring and evaluation system to monitor marine environment pollutants, evaluate their effects, and analyze the risks of marine environment pollution (Salama, 2000: 32)

D. Combating marine pollution

There are many important preventive measures in combating marine pollution, the most important of which are (Guo, 2017: 45):

1.Strengthen legislative oversight and increase law enforcement efforts: In accordance with UNCLOS and other international laws and regulations, all countries should accelerate the formulation and implementation of special laws on marine oil pollution according to their national conditions, and ratify the International Convention on Oil Pollution Preparedness and Response. Cooperate as quickly as possible and combat pollution.

2. Combating pollution of coastal waters with industrial pollutants in the environment, through:

A- Adjusting the industrial structure and product mix,

changing the pattern of economic growth, and developing the circular economy.

B- It is to strengthen the management of major industrial pollution sources, and implement the entire clean production process.

C- Implementing a complete control system for the discharge of pollutants and a sewage drainage system.

D. Prevent, mitigate and control the contamination of marine pollutants into the marine environment, and implement the ship's sanitation seal system. Establishment of large-scale wastewater and waste oil ports and waste recycling and treatment systems.

3. Fourth: Implementing the environmental impact assessment and the “three simultaneous” system.

4. Preventing and reducing the occurrence of sudden pollution incidents. Develop emergency plans for marine oil and toxic chemical spills, develop emergency plans for environmental pollution incidents in the port, and establish an emergency response system.

3.Practical framework for research

1,3 Hypothesis testing

1.1.3 Risk management

1. The risk management variable was measured through four dimantions: (risk identification, risk assessment, risk analysis, and risk prevention),Table (1) shows the measurement of

these dimensions through paragraphs (1-16), and the arithmetic mean values of the sample members' answers were shown. On the items of the questionnaire form, the sample members agree with the items of the questionnaire form, and this is clear, as all the arithmetic means of the items are greater than the hypothesized arithmetic mean. The small value of the standard deviations also shows the presence of agreement and homogeneity among the sample members in their choices, and the relatively large response intensity values also indicate clarity in Drafting paragraphs of the questionnaire form.

Table (1): Descriptive statistics for risk management dimensions

Questions	mean	standard deviation	Coefficient of variation
hazard identification			
1-There are specialized risk management committees that work to reduce the risk on marine vessels	4.03	0.70	17%
2-There is awareness among working personnel of the risks surrounding marine vessels.	3.99	0.52	13%
3- Those working on marine vessels can know the risks facing their work.	3.97	0.48	12%
4- Administrative leaders in marine vessels are aware of the importance of	3.90	0.66	17%

identifying the risks to which they may be exposed.			
Risk analysis			
5- Risk management is classified according to its nature into technical, administrative and environmental.	4.13	0.55	13%
6- Risk management is classified according to the degree of its impact into very high, high, medium, and low.	4.03	0.47	12%
7- Management classifies risks according to the frequency of their occurrence into very high, high, medium, and low.	3.93	0.54	14%
8- Those working on marine vessels use methods, techniques and procedures to analyze potential risks.	3.89	0.70	18%
risk assessment			
9- Marine vessels operate according to the standards and principles of risk assessment.	3.95	0.57	14%

10-There is an established and comprehensive safety system for assessing maritime danger and dealing with maritime safety elements.	3.93	0.58	15%
11- Controls are available to control and evaluate new risks resulting from changes in marine technology.	3.77	0.74	20%
12-The Maritime Administration has procedures to manage navigational risk.	3.77	0.70	19%
Risk prevention			
13- Management takes the proposed alternatives to avoid the risks it faces.	3.80	0.62	16%
14- Management sets the decisions taken to confront risks as institutional goals that it works to achieve.	3.76	0.67	18%
15- Those working on marine vessels shall adhere to the plans drawn up to anticipate the occurrence of risks.	3.92	0.65	17%
16-The administration communicates and coordinates with the risk management team to develop the necessary	3.79	0.74	20%

solutions to confront risks before they occur.			

2,1,3: Marine pollution:

The marine pollution axis was measured through four sub-variables: (civil liability, MARPOL, marine environment protection, and marine pollution control). Table (2) shows the measurement of these dimensions through paragraphs (17-32), and the arithmetic mean values of individuals' answers were shown. The sample on the items of the questionnaire form indicates the agreement of the sample members with the items of the questionnaire form. This is clear, as all the arithmetic means of the items are greater than the hypothesized arithmetic mean. The small value of the standard deviations also shows the presence of agreement and homogeneity among the sample members in their choices. The relatively large response .

Table (2): Descriptive statistics for dimensions of marine pollution intensity values also indicate clarity. In drafting the paragraphs of the questionnaire form.

the question	**Arithmetic mean**	**standard deviation**	**Coefficient of variation**
Civil responsibility			
17-Civil liability insurance is available on marine vessels to cover damage to	3.87	0.70	18%

others.			
18-Insurance coverage is available for transported goods that cause harm to others, such as pollution resulting from petroleum products.	3.97	0.54	14%
19-Senior management is committed to providing clear, essential data upon contracting.	3.76	0.71	19%
20- Civil liability cover is available for damages caused by individuals to others on marine vessels.	3.86	0.59	15%
MARPOL Maritime Convention			
21- Marine vessels operate in accordance with the Marine Pollution Convention (MARPOL).	4.03	0.54	14%
22-The administration seeks to educate workers on the vessels about the importance of the MARPOL Maritime Convention and how to apply it.	4.02	0.54	14%
-23The port company, in the field of marine	3.90	0.71	18%

vessels, is committed to unloading standards and to the necessary procedures to prevent pollution with harmful substances and waste in accordance with the terms of the agreement.			
-24The administration in marine vessels is working to tighten control and enhance the implementation of the provisions of the agreement to prevent pollution.	4.01	0.59	15%
Marine environment protection			
25-There is a comprehensive system for protecting the marine environment approved by the senior management of the marine vessels.	3.77	0.72	19%
26-Senior management in marine vessels is committed to achieving the goal of preserving the marine	3.89	0.60	16%

environment from pollution.			
27-The necessary decisions will be issued to mitigate the effects of pollution and limit its continued occurrence in a timely manner.	3.87	0.61	16%
28-The administration applies effective strategies to confront marine pollution.	3.80	0.68	18%
Combating marine pollution			
29- Marine personnel are trained about marine pollution and its danger to the marine work environment.	4.05	0.57	14%
30-Ease of obtaining the necessary funds and personnel from other departments when needed in order to deal with the risks of marine pollution.	3.70	0.72	20%
31-The administration works to modernize and maintain devices and equipment to ensure business continuity and combat	3.84	0.63	16%

pollution.			
32-The administration provides designated places for collecting waste inside the port.	3.81	0.75	20%

2.3 Analysis of correlations between variables

1,2,3 Analyzing the correlation between the dimensions of the independent variable, marine vessel risk management, and the marine pollution variable

The Spearman correlation coefficient was calculated to estimate the correlation between the variables, and Table (3) shows the correlation between the dimensions of the main variable, marine vessel risk management, and the marine pollution variable. There are positive and statistically significant correlations between the dimensions of the risk management axis and the marine pollution axis and its dimensions.

Table (3): Results of the analysis of the correlational relationships between the dimensions of the main variable, marine vessel risk management, and the marine pollution variable

Paragraph	hazard identification	Risk analysis Risk	assessment	Risk prevention
Correlation Coeffic	.600**	.768**	.615**	.733**
Sig. (2-tailed)	0.000	0.000	0.000	0.000

the description	Middle Strong and	Strong and Expulsion	middle Strong and Expulsion	Strong and Expulsion
the decision	Statistically significa	Statistically significant	Statistically significant relationship	Statistically significant relationship
Ranking	4	1	3	2

Source: Results of statistical analysis in AMOS V24

3,3 Testing the influence impcat between variables

1.3.3 Analysis to estimate the regression relationship between the dimensions of marine vessel risk management and marine pollution

To estimate the influence relationship between the dependent variable and the independent variables and analyze the regression relationship between the variables in this study through the regression analysis method. Table (4) shows an analysis of the effect of the dimensions of the marine vessel risk management variable on the marine pollution variable. The results show the existence of statistically significant influence relationships between the dimensions. The axis of risk management and the axis of marine pollution and its removal. This indicates the importance of risk management variables in marine pollution.

Table (4): Results of estimating the regression relationship between the dimensions of marine vessel risk management and marine pollution.

variable	Beta	t	Sig.	Adjusted R Square	F	Sig.
(Constant)	0.205	2.319	0.021	0.58	89.642	.000[b]
hazard identification	0.079	2.207	0.029			

Risk analysis	0.073	7.232	0.000			
risk assessment	0.071	2.169	0.023			
Risk prevention	0.066	2.572	0.011			

Source: Results of statistical analysis in AMOS V24

4.Conclusions and recommendations

1.4 Conclusions

Conclusions from the theoretical side:

1. There is a lack of interest by the port company in the issue of pollution in general and marine pollution in particular and its repercussions on the marine environment and its negative impact on all areas of life.

2.The management of seaports suffers from some deficiencies in diagnosing and evaluating risk analysis and prevention, in addition to the lack of a specialized department in this field within its organizational structure.33.The lack of training of individuals working on marine vessels to deal with risks and manage them through identifying, analyzing, evaluating and preventing them.

4. The Iraqi Ports Company does not have the infrastructure, advanced capabilities, and resources necessary to confront the various disasters and disasters that cause pollution, and thus this deficiency hinders the treatment of marine pollution in regional waters.

5.There is a positive and direct correlation between the dimensions of risk management and the marine pollution variable. This is a positive indicator that there is risk management in marine vessels that has an effective role in dealing with pollution.

Conclusions from the practical side

1. The results of the process showed that there is a direct and strong correlation between the analysis and prevention dimension and the marine pollution variable. This is a positive indicator that there is risk management in marine vessels that has an effective role in dealing with pollution. It was also shown that there is a direct, moderate, and positive correlation between the sub-dimensions of risk management (assessment and analysis) and marine pollution, and this is a positive indicator of the effective role that these variables play in confronting marine pollution.
2. There is a direct influence relationship of the dimensions of risk management variables on the dimensions of pollution as a dependent variable

2,4: Recommendations

1. Working on the existence of a specialized risk management department for the organizational structure of the General Company for Iraqi Ports, similar to other departments, whose tasks are to identify, analyze, and evaluate risks and prevent them, and find strategies and methods for dealing with those risks and working to reduce them.
2. Prepare effective and comprehensive emergency plans to confront potential risks, and develop practical and effective mechanisms and methods to overcome them and avoid their occurrence in the future.
3. Working on the existence of a specialized risk management department for the organizational structure of the General Company for Iraqi Ports, similar to other departments, whose tasks are to identify, analyze, and evaluate risks and prevent them, and find strategies and methods for dealing with those risks and working to reduce them.
4. Prepare effective and comprehensive emergency plans to confront potential risks, and develop practical and effective

mechanisms and methods to overcome them and avoid their occurrence in the future.

5. Training employees of the General Company for Iraqi Ports on effective methods for identifying and analyzing risks, and effective methods for evaluating them, preventing them, and confronting them in order to reduce the possible damages and to reach the least possible damages, and to avoid the occurrence of such risks in the future.

6. Equipping ports and ships operating in maritime transport with all modern devices, equipment and means, and providing specialized ships and boats as well as technical experts in order to combat marine pollution and reduce its occurrence.

7. The administration takes the necessary measures to identify the risks that cause marine pollution, evaluate them, and take effective and possible methods to prevent them.

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