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Evaluating Risk Management Concepts and Their Applications in the Context of Construction Projects

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Abstract:
Risk management plays a critical role in ensuring the success of construction projects by identifying, analyzing, and mitigating potential risks throughout various project stages. It involves systematic planning, assessment of environmental and organizational factors, and the development of strategies to reduce or avoid negative impacts. Effective risk management enables informed decision-making, safeguards project resources, and enhances overall project outcomes.
Keywords: *Risk Management, Construction Projects, Environmental Elements*

INTRODUCTION:

One of the most crucial issues that affects a project's effectiveness is risk management, which is why it is important to understand it scientifically. Any project that has more risk runs the risk of becoming problematic, but these risks can be mitigated by better understanding the different kinds of risks and recognizing them.

The importance of risk management lies in the fact that some risks are likely to occur during the various stages of the project. Risk management also includes preventing the occurrence of potential problems, correcting and reducing actual problems if they occur, and developing an action plan to avoid or reduce the impact of those risks. Risk management is a tool or means that can be used to avoid losses as much as possible, due to the possibility of continuing work. It was found within building and construction projects to address the results of the remaining risks within the project.

Every project needs risk management because it creates preliminary, executive, and follow-up studies for the management of project funds, positions all anticipated possibilities in accordance with data and data, and understands the particular scope of the project and its products in general.

Planning for risk management, risk definition, qualitative and quantitative risk analyses, risk response planning, risk monitoring, and risk control are all included in risk management.

The investigation of environmental elements, the organization's operational assets, the scope statement, the project management plan, and the project charter are the inputs required for the risk management planning process. A risk management strategy is created through planning and analysis sessions.

The project's operating assets, project documents, risk management plan, activity cost estimates, activity duration estimates, scope base plan, cost management plan, schedule management plan, and quality management plan are all inputs for the risk identification process. The risk register is created using documentation reviews, information-gathering techniques, checklist analysis, assumption analysis, charting techniques, analysis of strengths, weaknesses, opportunities, and threats, and expert opinion.

First: The project's concept and characteristics

A project is characterized as a series of linked, sequential actions or procedures that are intended to yield a distinct good or service. Projects are transient in nature, have definite beginnings and ends, and are executed progressively (PMI, 2000).

In organizations, projects can be created and carried out at various management levels, and a team can consist of one person or several working group members. Three primary qualities may be inferred from this definition: (Iyer, 1996; Keller, 2006).

1) The projects are temporary:

That is to say, it has a set duration with a beginning and an end, and its goal is to accomplish the objectives for which it was implemented. Naturally, the duration of a project varies depending on its nature and the type of project it is, with some being short-term and others being long-term and requiring several years. It should be mentioned that once the project is completed, the team that was assembled to oversee it dissolves.

2) **A single item (good or service) or one particular outcome:**
Every project has its own conditions, activities, and method of implementation; for instance, thousands of buildings are being built, but each has a different owner, different design, different contractor, and different location. As a result, each project is unique in its characteristics and has never been implemented with the same specifications exactly.
3) **Implementation sequencing with gradualism:**
Projects are carried out gradually and in increments where the value of the job accomplished increases; in other words, the work must be done meticulously and precisely at every level. This necessitates a precise and comprehensive project definition, as well as a detailed project scope definition. We discover that breaking down the work contained in the project Work Breakdown Structure (or "WBS") is one of the most crucial steps in defining the project.
In addition to these three primary attributes, other features of projects include having a large number of activities and a set budget, utilizing human and financial resources, and requiring effort and time, depending on the nature of the project and the anticipated time of completion.
When defining the concept of a project, it is also important to define a term that is sometimes used interchangeably with the project: program. This term refers to an extended, long-term plan that can include a large package of related projects that fall under the purview of a particular specialization. One example of such a project is the curriculum development project, which is a long-term project that consists of a number of related projects, such as the curriculum development projects for social science and mathematics.
Typical instances are United Nations development programs, which comprise an extensive array of industrial, agricultural, anti-poverty, or disease control initiatives. These may include food projects or initiatives aimed at raising awareness and educating people about the condition.
Lastly, it should be mentioned that there are numerous project examples available, such as:
1. A residential building construction project.
2. Constructing a bridge.
3. Building an expressway.
4. Constructing a power plant, hospital, or institution.
5. Composing a master's or doctorate thesis.
6. Completing research projects as a bachelor's degree candidate.
7. A new electrical appliance production project.
8. The endeavor to produce a certain medication.
9. Intricate surgery.
10. Creating an original computer software.
11. Creating an integrated information system for the university's registration department.
12. Project to develop a website.
13. The endeavor of setting up a global trade show.
14. A spaceship, ship, or aircraft production project.
15. A project to be prepared for a university graduation or marriage celebration.

These are just a few examples we provide to help the reader visualize the idea; there are many examples of their abundance. It's also possible that each person carries out a number of small tasks on a daily basis, like making coffee or cooking dinner, which are examples of small tasks that satisfy the project's requirements.
Second: Project Management and Manager:
As was previously mentioned, any project that is to be successful needs to be managed by a team of people who are highly efficient and knowledgeable about project management mechanisms, which are described as "a set of management skills, knowledge, and tools that require their application to project activities in order to meet the requirements of completing the entire project, starting from the primary stage through the planning stage, the implementation stage, the control stage, and ending with the finishing stage and closing the project" (Phillips,\ 2005).
As a result, project managers need to be precise and careful while handling the project's schedule, budget, quality of work, risk avoidance, and understanding of the needs of the project's beneficiaries. It is not an easy task, and in order to achieve satisfactory results, it requires a variety of skills and efficient work methods. This is especially true given the dynamic and quickly changing nature of today's business environment, as well as the fact that every project has unique characteristics that set it apart from the

others. These factors all contribute to the presence of risk, which can be particularly high for innovative projects that have never been completed before.

Aside from the extended duration needed to finish a project, numerous actors are also involved in or intervene in its implementation. Because of this, project management is a challenging and complex undertaking. A project manager specializes in the independent field of "project management" that emerged in management science as a result of these and other factors. However, the emphasis now is on awarding higher degrees (PhD and Master's) in this field, which is taught in the majority of universities and institutes worldwide. In this context, project management has evolved from being merely an art form gained through practice and experience to a science with established theories, rules, and prominent researchers. Numerous books and specialized scientific journals have been published in this field, the most well-known of which are the "International Journal of Project Management" publications published by the American Institute of Project Management.

The American Project Management Institute, which was previously cited as an authority in this field, has precisely defined the knowledge and skills that a project manager must possess as follows (PMI, 2000). The project manager's role is critical and essential to the project's success or failure.

1- Project Integration Management.
2- Project Scope Management.
3- Project Time Management.
4- Project Cost Management.
5- Project Quality Management.
6- Project Human Resources Management.
7- Project Communication Management.
8- Project Risk Management.
9- Project Procurement Management.

The project manager in this instance plays multiple roles: he is the project's leader and head as well as a link between the project and the elements of its external environment, whether governmental or project owners and owners. The degree to which a manager masters these knowledge and skills is an indicator of the success or failure of the project.

One of the most significant responsibilities is making decisions. In this capacity, he will organize and manage unforeseen issues and bottlenecks, distribute financial and human resources to project activities, and oversee the analytical and informational role of reports. He will also handle deviations and serve as the organization's official spokesperson. The stages of the product life cycle are a valuable resource for project managers, since they dictate the specific abilities needed for both the manager and the team they oversee. This is crucial information to remember before the paragraph ends.

Third: The project's conception of risk

Any uncertain incident or circumstance that could have a positive or negative impact on the project's goal is considered a risk in any project (PMBOK, 2002).

For instance, the cause could be the project's lack of qualified personnel or the force's insufficiency for the tasks assigned to it. In either case, the outcome or consequence will be evident in the extra expense or inaccuracy in the work schedule, the length of the implementation period, or the quality of the implementation.

The most significant project conditions that can result in hazards are inadequate management, inefficiency, or reliance on outside project partners whose performance cannot be managed or monitored. While some risks are unmanageable, project managers can deal with them by implementing general contingency plans based on prior experience gained through the implementation of previous projects. Known hazards are those that have been diagnosed, analyzed, and can be planned.

Fourth: Creating a strategy for risk management

Because it lays out the next measures that will be taken to identify the kind, level, and visibility of project risk and how best to handle it, this planning process is crucial (Wideman, 2004).

The first step in creating a risk management plan is scheduling meetings that will help the plan mature. Those who typically attend are the project manager, leaders of the project teams, the project's primary beneficiaries, anyone who is needed, and anyone with the authority to address certain risk aspects of the project.

The proposed plan will include risk diagnosis, risk analysis (qualitative and quantitative), risk response strategies, the implementation process, and the kind of control that will be used along the project life cycle. The following is a summary of the plan's components: Kappelman (2006) (Phillips, 2005).

METHODOLOGY

It refers to the entry, instruments, and data sources utilized in the project for risk management. Depending on the project's stage, the volume of information at hand, and the degree of flexibility in handling the risk, there are several kinds of them here.

✓ **Roles and responsibilities**

Depending on their roles within the teams, diagnose the people or groups that will oversee, direct, or assist with different risk management initiatives. Analysis and evaluation may be conducted by offices or organizations unrelated to the project; this has the benefit of objectivity and autonomy.

✓ **Setting a budget**

Establish a rough budget for handling risks based on their anticipated impact and magnitude.

✓ **Timing and scheduling**

Determining the frequency and timing of risks that arise during the project life cycle is the definition of this aspect. The timing of these hazards must be assessed on a regular basis and in accordance with the project's implementation progress.

✓ **Assessment**

Prior to beginning either a quantitative or qualitative analysis, metrics must be prepared, and their stability over time and via various hazards must be understood, as well as their mechanism of action.

- **Categories of risk**

By using the same technique of task fragmentation used in the project (WBS), but used here (RBS), risks can be categorized into multiple groups based on the nature of the job and the type of project. Throughout the course of the project, these categories should be evaluated and revised as needed. Figure (1) shows an example of this kind of classification.

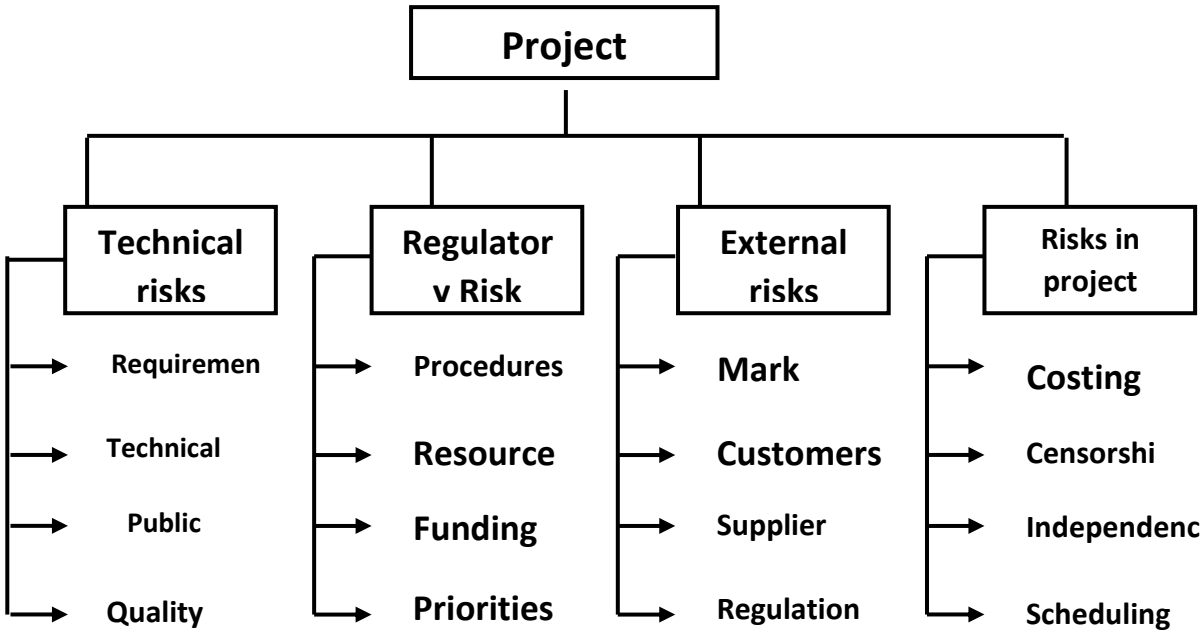

Figure (1) Segmentation of the risk structure in the project

• **Reports and forms for documentation:**

These pre-made forms and documents outline the nature of the risk and how it should be addressed. They are instruments that can assist the manager in managing the risk, outlining its details, recording it, and examining its different facets when they are distributed via the authorized communication channel, such as to project teams, sponsors, internal and external beneficiaries, and others.

✓ **Tracking:**
For the benefit of the project's implementers and beneficiaries, it is the process of recording all risk-related information, outlining future requirements in light of implementation procedures and the lessons gained from them, as well as the effectiveness of risk audits.

✓ **Risk diagnosis:**
In this stage, the risks that could have an influence on the project are precisely identified, together with the possible impact's extent, and their characteristics are documented (PMBOK, 2002). Involved in the risk diagnosis are the project team, the risk management team, specialized specialists from various financial and technical elements from many project departments, some clients, project beneficiaries, other project managers, project stakeholders, and external experts. The diagnostic process is a procedural process that can go through three stages: the project team and the risk management team perform the first stage, the project team as a whole and the primary project beneficiaries perform the second stage, and everyone who wasn't involved in the first two stages participates in the third stage. To make the diagnostic procedure precise and sufficient, a number of instruments are required; the following are maybe the most crucial of these tools: (Well-Stam, 2005; Phillips, 2005)

- **Examine the project-related documents:**

Here, the project contract, its blueprints, and preliminary proposals are carefully studied.

- **Techniques for collecting data**

The most popular techniques for gathering data include interviewing, brainstorming, the Delphi approach, and SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats).

- **Checklists:**

These lists are created using historical data that is currently accessible, knowledge that has been gained by the execution of prior initiatives, and data from additional sources.

- **Analyze assumptions**

Every project starts with a set of initial hypotheses and potential outcomes; this analysis of assumptions aims to investigate the viability of these hypotheses in terms of instability, incompleteness, correctness, and completeness.

- **The charts**

These contain several different types that are well-known in building projects and administrative literature, like flowcharts, impact diagrams, and cause and effect diagrams.
In addition to identifying the risks that would impact the project, the risk diagnosis process is crucial for identifying "risk triggers," which are other times known as warning signs of a certain danger (Kappelman, 2006).
The incapacity to complete some essential project components on schedule poses a risk to the ability to complete the project on schedule overall.

Fifth: Qualitative and quantitative risk analysis:
Qualitative risk analysis refers to the extent and size of a potential risk, meaning that the risks are ranked based on how much they could affect the project's goals. The goal of quantitative analysis is to give a numerical depiction of risk based on the likelihood that the risk will materialize and the ways in which it could have financial or other value-producing effects.

✓ **Qualitative evaluation:**
Using a variety of mathematical and visual aids, qualitative assessment is a crucial process for evaluating the significance of potential risks and identifying which ones should be handled first. These tools, which are constructed by estimating the following, include the consequence order matrix and the probability matrix.

- **Probability of risk:** This is evaluated qualitatively using characteristics like extremely low, extremely high, or other attributes. Probabilities between 0.05 and 1 are used to balance these qualitative characteristics, and the standard evaluation is:

0.1 Moderate, 0.3 Low, 0.7 High, 0.9 Very High, and 0.1 Very Low.

- **Consequences (risk consequences):** These are qualitatively assessed as well, classified as low, moderate, or high. They are typically weighted with relative importance to account for this effect; 0.05 is typically allocated for very low impact consequences, 0.10 for low, 0.20 for moderate, 0.40 for high, and 0.80 for very high.

The risk coefficient matrix, which is the product of (probability * consequence) for each of the project objectives, can be calculated after these two indicators are determined. Table (1) shows an example of the probability and consequence matrix of risk, and Figure (4) shows the risk coefficient matrix, which includes an assessment of the hazards. Here, (0.05 * 0.9) was multiplied to get 0.045, which was then rounded to 0.05. It was then multiplied by 0.10 * 0.9 to get 0.09, and it was multiplied by (0.20 * 0.9) to get 0.18. Understanding the meaning of the three colors in the matrix is crucial because green denotes a risk that is not very relevant, yellow denotes a risk that is important, and red denotes a risk that will significantly affect the project's goals

Risk assessment% Project Objectives	**Very low 0.05**	**Low 0.1**	**Medium 0.2**	**High 0.4**	**Very high 0.8**
Cost	Insignificant cost increase	Cost increase Less than 5%	Cost increase between 5% - 10%	Cost increase between 10% - 20%	Cost increase greater than 20%
Project scheduling	A slight scheduling glitch	Less than 5% scheduling defect	The total scheduling defect rate ranges between 5% - 10%	Total scheduling defect rate 10% - 20%	The percentage of defects in the total scheduling of the project is more than 20%
Project Scope	A change that hardly feels the scope of the project	Some aspects of the range are slightly affected	The main parts of the range will be affected	Changes in the scope of the project are not acceptable to the beneficiary	The final output of the project cannot be benefited from
Quality	Barely felt quality drop	Scheduling some aspects of the project scope with substandard quality	Key aspects of the project scope that do not conform to specifications	Unacceptable quality level by the customer	The final output of the project cannot be benefited from

Table 1 Probability Matrix – Consequence of Risk
Source: PMI, 2000.

Sixth: The importance of risk management in construction projects.

The following are just a few reasons why project management is crucial, along with the significance of risk management in construction projects for safeguarding their objectives and advancing their sustainability and prosperity in the face of rival projects (Al-Nsour and Al-Khararia, 2020):

- Create the framework for the building project by assisting with the methodical execution of tasks.
- Fulfilling its goals.
- Creating strategies for planning and making decisions in unstable project environments.
- Contribute to the allocation of available resources to achieve the optimal use of resources in construction projects.
- Preserves building projects' continuity, promotes development, and boosts productivity.
- Help to strengthen the working and senior management teams' capacities and skills so they can better handle the commercial risks the project may entail.
- Used to calculate the amount of uncertainty that a building project can tolerate while still achieving its strategic goals.
- Helps achieve the best possible strategic balance between the project's financial inflows and the risks attached to them.
- Permit the project to use its resources wisely in order to accomplish its goals.

Seventh: Construction project risk environments:

The nature of the risks associated with construction projects is determined by the surrounding environments, which are

The set of factors that surround it, affect it, and are affected by it include Sarsar and Ben Hamida (2015)); (Emblemsvg, 2020).

- The external environment of construction projects: This is the collection of factors influencing the environment surrounding the construction project, such as opportunities, threats, social, economic, environmental, legal, and political aspects.
- Individuals, entities, and bodies that affect and are involved with construction projects, such as stakeholders, funders, clients, and suppliers, comprise the construction project environment.
- The internal environment of construction projects: It is the collection of variables influencing the internal environment of a construction project, such as organizational structure, organizational resources, such as human resources, financial resources, information systems, and data in the project.

Eighth: Risk Management Dimensions in Construction Projects:

Risk management in building projects is divided into several dimensions (Al-Masry and Nema, 2019):

✓ **Recognize risks in construction projects**

This stage, which is the most challenging in the process of identifying risks because the goal is to provide a list of these events that will affect the project, is thought to be crucial for risk management in construction projects. It involves identifying potential risks that the project will face, determining their likelihood of occurring, and verifying these risks by looking at the project activities and introducing these events to them.

a. Risk analysis in construction projects

Risk analysis procedures are carried out in various ways, and the project applies what suits it according to its type of work. The risk analysis process in the project includes two types of techniques, and its goal is to identify both positive and negative effects. This helps those in charge of risk management in the project to deal with them and determine their results.

1) Quantitative techniques: Monte-Corlo assessments is one of the most significant quantitative techniques utilized in building project risk assessments.

- Sensitivity analysis for scenario analysis.
- Techniques for expected value analysis and review in program evaluation.
- Analysis of fuzzy sets.
- Analysis using decision trees.
- Probability distribution, modeling, and simulation.

Some of these methods are used less frequently than others because they call for certain data, which can be hard to find or gather.

2) The qualitative techniques: Risks relating to contractual obligations, customer disputes, and variations in the design of goods and services are among the most significant qualitative approaches utilized in the process of risk analysis in building projects. These techniques include:

- Failure tree analysis.
- Event tree analysis.
- Probability and effect matrix cause and effect analysis.
- Risk urgency assessment.
- Delphi technique. Brainstorming.
- Assumption analysis.
- Analysis of checklists.
- Expert performance.

Risk assessment in construction projects:

This is one of the most common tasks in the field, and the frequency with which it is carried out determines how decisions are made throughout the project. The risk assessment process helps project managers identify, quantify, and estimate risks—whether they be qualitative, quantitative, or a combination of both—based on the conditions and events that give rise to them. Analyzing the financial return and costs, as well as the legal, social, economic, and environmental obligations and employer concerns, is part of measuring the potential dangers.

Determining the uncertainty factor and estimating the severity of the damage resulting from it, or the likelihood of occurrence, are therefore the processes involved in assessing and measuring risks. Typically, the degree of risk is quantified, and a lower and higher degree is determined and classified. The probability standard has been developed to measure the degrees of risk in construction projects, which is divided into two groups:

✓ Fixed mathematical techniques form the foundation of the set of arithmetic probabilities.
✓ Based on historical measurements of different risks, temporal experiments and observations are used to construct the set of experimental probabilities.

Follow-up and control of risks in construction projects:

The process of risk management in projects is an ongoing process that aims to control the effects of risks on the project, keep them within the limits that can be dealt with, review the extent to which senior management in the project applies follow-up and control procedures, manage appropriate risks and the extent to which they are absorbed, and prepare the so-called retrospective plan. The process of monitoring and monitoring risks in construction projects includes evaluating and controlling the quality of follow-up and monitoring systems.

This is to manage any alterations that are made to the project's data, information systems, and operational procedures.

This procedure aims to preserve the defined risk pathways, track and monitor any residual risks, spot any new risks, assess and appraise the risk implementation, and track and monitor a number of corrective measures for the risks that have been addressed.

The following and monitoring process works to review the risk management process, which is closely related to previous risk management processes because it is based on information and data collected in previous operations. In other words, we follow and monitor the extent to which the treatment methods that have been identified within the risk management plan are applied on the one hand, and the development of risks on the other. The process of follow-up and control of risks in the project must be carried out in accordance with the risk management plan, including the necessary updates to the plan and the corrective actions to be followed.

Ninth: Risk management processes in construction projects.

Construction projects' risk management procedures include the following steps (Fischer and 2020, Schoder; Al Faihan and Shaker, 2015):

✓ The procedure for creating a risk management strategy for building projects: It is a process that determines how to apply risk management activities in construction projects, with the goal of risk management commensurate with the risks. Planning is an essential project management tool that necessitates the cooperation of all project participants because it supplies the tools needed to manage risks and establishes a baseline for risk assessment.

✓ The procedure for determining risks in building projects: This process aims to document the current and future risks of the project and provide enough information and data to reduce or eliminate them. It involves identifying the risks that threaten construction projects and their sources throughout the project life cycle and documenting their specifications and characteristics. Because risks may arise during the construction project's life cycle, it is regarded as an ongoing process that involves senior project management, risk management personnel, experts and specialists from outside the project, managers of other departments, and employers.

✓ The procedure for carrying out qualitative risk assessment in building projects: Through a series of steps to evaluate the possibility of risk occurrence and impact, risk management priorities are established for the construction project. The goal of this process is to give construction project managers the chance to focus on risk management and minimize uncertainty. Qualitative risk analysis is carried out by evaluating the significance of potential risks and the degree to which they could affect the project's goals. In addition to the time frame required to respond to risks and the degree of project tolerance to them, and then evaluated, which is a quick and effective way to prioritize the project's response to the risks, and the reference line (baseline) is established for the process of conducting quantitative risk analysis.

✓ The procedure for carrying out quantitative risk assessment in building projects: It is a process that involves doing a numerical analysis of how risks affect the project's objectives. Its goals are to generate data and information about potential quantitative risks, support the project's decision-making processes, and ascertain the likelihood of a risk event, which is dependent on conducting a qualitative analysis of potential risks and ranking them. This risk procedure is repeated in order to control and reduce risks, which is a costly and time-consuming process that is used for large construction projects. The construction project management plan, schedules, and budget are intended to incorporate the resources available for the project and its activities. As part of this process, a project participant is identified and assigned to oversee the risk response.

✓ How risk responses are implemented in building projects: It is a procedure that involves applying risk response plans for the construction project at every stage, reducing or minimising the threats associated with it. It also entails putting the identified risks' responses into action. Developing the procedures and mechanisms for identifying, assessing, and recording risks in the construction project's risk register calls for the labor of working individuals.

✓ Risk follow-up process in construction projects: This is a procedure that uses contemporary techniques for analysis of variance and trend analysis to monitor the implementation of planned and customized risk management plans in the project and track, identify, and evaluate any remaining effects. The process aims to increase the efficiency of dealing with the risks facing the construction project throughout its life cycle by raising the level of competencies and making the necessary decisions and measures.

Tenth: The cost of risk management in construction projects.

One or two working days from the start of the construction project, up to a maximum of 5% and 10% of the total cost of the construction project, can be spent on risk management, which is an essential issue that has to be addressed (Amoatey and Danguan, 2018). The size of the project and the level of accuracy necessary account for the cost of risk management, which represents a very tiny portion of the overall project expenses. The amount of time needed for the project's risk analysis depends on the accessibility of the data and information required for risk management (Bieser and Batra, 2020). The duration of risk management in construction projects typically ranges from one to three months, contingent upon the project's complexity. Effective risk management requires one or two individuals with a strong background in risk management, as well as the ability to apply risk analysis and management techniques. A set of strategies are employed in this context (Khairy El-Din, 2018); (Dahliz and Anbar, 2017).

Eleventh: Risk Response Strategies:

There are several risk management strategies in construction projects that are known and proven to respond to risk, and the most common of these strategies to face risks are: . (Amoatey and Danquah, 2018)

1. **Risk Avoidance strategy**: Although not all project risks can be eliminated or avoided, there are some that can. This method is based on modifying the construction project plan to eliminate risks or shield project objectives from their consequences.
2. **The strategy of transferring the risk** to a different entity. Risk transference is a tactic that involves shifting the burden of risk management to other parties while leaving the risks in place and without eliminating or avoiding them. This is frequently the case when there are dangers associated with financial responsibilities; project managers may turn to different strategies, such as providing guarantees or using insurance services.
3. **Risk Mitigation Strategy:** Under this strategy, the project management takes steps to lessen the likelihood of risks occurring rather than taking action to address their effects. These steps might be taken prior to the start of construction projects or during the implementation of related tests. The goal is to mitigate or reduce the consequences of the risks faced by the construction project to an acceptable extent.
4. **Risk acceptance strategy**: Risk acceptance is a strategy that relies on the senior management of the project being unable to identify or implement any other plan, or on the project's plan not being altered to address risks. Acceptance of risks involves the creation of a contingency plan, whereas passive acceptance refers to doing nothing and handling risks directly. When risks materialize and have a significant impact, a backup plan is created to address these major risks, such as assigning resources that are ready in case of emergencies.

Conclusion:

The results:

- Risk management serves as a project's safety valve by planning the preliminary, executive, and follow-up studies needed to manage project money, putting all anticipated outcomes in line with data, and understanding the project's particular scope as well as the products it produces in general.
- Risk management is the process of identifying all upcoming obstacles that could either favorably or unfavorably impact the project's advancement.
- There are several risk response techniques used in construction projects, including risk minimization, risk acceptance, and risk avoidance.

Recommendations:

- Boost employee knowledge and draw in experienced personnel to improve the efficacy of the construction project risk management process.
- The need that construction projects include experts in the field of construction in the planning phase of the project and conduct the process of risk management in a methodical and formal manner.
- Strive to enhance construction project performance by following the guidelines, policies, and fundamentals required to control project risks, which will have an impact on the projects' long-term viability.

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