Using the theory risks for assessing the oil prices and its impact on construction projects in the Iraq

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Использование теории рисков при оценке цен на нефть и ее влияние на строительные проекты в Ираке

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Abstract: *construction projects have a special nature and affect them many factors making them exposed to multiple risks as a result of the length of the implementation period and the multiplicity of stages, starting from the decision stage through implementation until the final delivery, which leads to increased uncertainty and the likelihood of risk. The process of analysis and risk management is one of the effective and productive methods that are used in managing the construction projects for the purpose of increasing the chances of ending the project successfully in terms of cost, time and quality and at the lowest possible problems.*

The research aims first to the effective planning for analysis and risk management with different levels of importance according to specific strategy and effective based on experts in the field of risk management and, second, reaching measures to respond to the risks in order to ensure the management of these risks in construction projects.

It appeared that the most important risk in construction projects in Iraq is Financial risks one of the factors important is the delayed payment or don't pay the money to the companies and contractors because the lower oil prices led to stop work and claim compensation. From the study of a number of construction projects by theoretical studies and interview a number of construction industry experts to determine the extent of the impact of this risk in each of the project's objectives and safety. It also appeared that the biggest effect of the risk is on the duration and cost of the project. And the best response to the risk is to fix certain conditions in the contract followed by other responses.

Аннотация: *реализация строительных проектов носит длительный характер. За это время, начиная со стадии принятия решения до окончания проекта (порой на это уходят годы), проекты подвергаются воздействию множества различных факторов, возникают неопределенность и риски. Процесс анализа и управления рисками является одним из эффективных и продуктивных методов, которые используются в управлении строительными проектами. Управление и анализ рисками дают возможность предотвратить критические, а порой и катастрофические ситуации и успешно окончить проект: качественно и с наименьшими затратами времени.*

Один из главных рисков, присущих строительным проектам в Ираке, - это финансовый риск. Колебания цен на нефть влекут за собой задержки выплат или вовсе невозможность денежных выплат компаниям и подрядчикам. В итоге работы по реализации проектов «замораживаются», а компании требуют у правительства компенсации убытков. Изучение ряда строительных проектов и интервью ряда экспертов в строительной отрасли позволили определить степень влияния риска, связанного с изменением цен на нефть, на каждую из стадий проекта. Выяснилось, что безопасность проекта в первую очередь связана с продолжительностью реализации проекта.

Цель данного исследования - эффективное планирование анализа и управления рисками, принятие определенной стратегии реагирования на критические ситуации, ориентированной на специалистов в области управления рисками. Разработка мер по реагированию на риски, с тем, чтобы грамотно обеспечить управление рисками в строительных проектах.

Keywords: *risk, uncertainty, risk - management, risk analysis, construction projects, price of oil.*

Ключевые слова: *риск, риск-менеджмент, анализ рисков конструкционные проекты, неопределенность, изменение цен на нефть.*

1-Introduction

The construction sector of the group's activities are related to acts of buildings and constructions building consists in addition to the maintenance work, and distinction sector a close relationship with all the other economic sectors, making it important and reliable movement of the national economy and trends indication, however, that many of the risks faced by construction projects and construction, these risks may affect the work of implementation of the project may lead to delivery delays and increased cost sometimes affect the quality of work. That the most important thing to be taken into account that the construction industry inherently risk and that are difficult to avoid or predictable their impact, has called for it to interest the subject of risk in the industry in the last two decades at the international level, the experts agreed that in the interests of the owner of the economic work that is avoided or reduce the acceptance or transfer the risk to another party with the capacity and efficiency to afford management and that he must abandon the idea that the Contractor shall be sterile alone all of these risks and that the interest of the project [3].It has now become necessary to understand the nature of risks and analyzed in order to develop certain Strategy is to manage and handle. The administration of the risks in the construction sector is the process of achieving the objectives of the project (time, cost, quality, occupational safety and environmental), and helps project managers manage risk in scheduling priorities and the allocation of resources and also help them in decision-making is more reliable process which contributes to the Success of the project and the achievement of its objectives [1].

2 - The reality of risk management in Iraq:

The continuing decline in oil prices for a long time and will likely lead to a slowdown in the economy of the Iraq and projects in the field of infrastructure. Represents Iraq's oil lifeline, and considers the oil resources of the main pillar in the general budget and economic policy in the country, accounting for more than 94 percent of the state budget, has been the real estate sector at the forefront of the affected sectors of the decline in oil prices, as the author of this decline austere spending government and a decline in economic performance, reflected negatively on the construction projects.

Especially since the Iraq relies on oil revenues to supply his locker liquidity to ensure the provision of other community requirements .You can recognize the reality of risk management by clarifying the rationale for the completion of this research, a first: an attempt to bring attention to the seriousness of the relationship and the importance of the subject holders, as the noticeable indifference and lack of experience with the contractors and employers subject of risks and impacts. Second, the presence of risk and not predictable, and the failure to take necessary precautions to counter the impact is considered too costly for the national economy and for the contractor and the employer with the depletion of the Muar and waste of time. Third: to provide companies and government structure to manage risk and to identify what the impact of those risks in the project objectives, and to achieve these goals should be study concept and manage risks in the construction industry, and then determine the most likely risks and the most influential in construction projects in order to get to determine the level of importance of these specific risks and then identify possible and appropriate response to it and risk the possibility of another.

3 – Risk management techniques and stages:

There are many techniques for each stage of risk management, as it requires no action on risk management tools for application [2]. And these stages are:

- Stage risk identification: using the brainstorming technique (Brainstorming) and

(Checklist) significantly more than any other

Techniques, the questionnaire is also of the techniques used in this area.

- Risk analysis and evaluation phase: the techniques used are classified at this stage into two types: the qualitative and quantitative as it used qualitative techniques more than quantity. And also the probability impact matrix and the way the Analytical Hierarchical Process.

- Responding to the risks mentioned by many researchers that stage there are four ways to respond to the risks in construction projects:

Risks retention, risk reduction, risk transfer and risk avoidance.

- Control Risks replies: respond to changes in risk over the duration of the project.

4- The benefits of the application of analysis and risk management:

One of the main benefits that can be achieved in the process of analysis and risk management in construction projects are [6]:

- A good understanding of the project and this understanding leads us to realistic and logical plans to estimate the cost of the project and determine the duration of the project, and that this understanding can be for all parties related to the project to learn to deal with those risks.

- A good understanding of the risks helps to choose the most appropriate for the type of contract.

- Knowledge of the risks in the project to enable an estimate logical thoughtful away from the random emergency reserve, which actually reflects the risk and also directed not to encourage acceptance ineffective projects financially.

- Contribute to building statistical information risk help design good projects.

- Facilitate the adoption of the serious risks to the reasonableness of more than more than interest earned from taking risks.

- Helping to distinguish between luck and good governance and the bad luck and bad management.

5 - Data collection and analysis

The questionnaire of was distributed either personally or via e-mail to 40 members of top and middle management in the construction project managers and engineers in the advisory offices and construction companies and university professors. A sample of 40 practitioners received the questionnaire and 36 valid questionnaires were returned for analysis with a response rate of 90 %.

5.1- Risk identification

It has been identified threat that actually happened in the construction projects under study, which included (municipal projects, roads, bridges, buildings, oil projects, school buildings) in the city of Karbala in addition to the theoretical review of the research literature and a number of interviews with experts in the field of construction industry and the results of the questionnaire. And the risk that led to changes in the cost, time and quality of the project.

5.2- The impact of the risks in the project's objectives

It adopted in this research two criteria in risk analysis:

The likelihood of risk occurrence.

- The degree of risk the impact of the project objectives have occurred if those risks.

Integrate the two criteria in the following equation to estimate the importance of the risk for the degree of risk [4].

Whereas:

R = Risk index or degree of the risk, and a value between (0, 1).

P = the probability of risk occurring and a value between (0, 1).

I = the impact of the risk, and a value between (0, 1).

Risk and impact assessment is according to the following themes:

1 - General information for members of the selected sample (competence, the labor sector career centre, the number of years of experience) as in tables 1 and 2.

2 - Description scale used for the probability of occurrence and impact of the risk, as follows:

Table 1. Aacademic achievement for members of the sample

Academic achievement	Repetition	Percentage
Bachelor of Engineering	19	53
Master Engineering	11	30
Doctor of Engineering	6	17
Total	36	100

Table 2. Years of Experience to member’s sample

Years of Experience	Repetition	Percentage	
3 - 8	6	17	50 % less than 15 years
8 - 15	12	33	
More than 15	18	50	50 % more than 15 years
Total			

	Very few	Few	medium	high	Very high
Probability	0.1	0.3	0.5	0.7	0.9
Influence	0.05	0.1	0.2	0.4	0.8

This measure is placed depending on the status scale (the US National Institute of Standards, 2004.

3 - Determine the probability of the risk occurring and the proportion of the effect of risk on the project goals.

4 - To determine the response action taken to address those risks Type.

Taking the opinion of construction project managers and engineers in the advisory offices and construction companies both public and private sector, university professors, support questionnaire personal interviews recovered, 36 of which form adopted for the purposes of analysis .

5.2.1 - Analysis and data processing:

The use of accounting software (Excel) for data processing.In order to benefit from these results and standardization to be of a uniform standard were given weights equivalent to the type certificate and the number of years of experience, as shown in Table (3).

Table 3. Weights equation for members of the sample (Uday

Personal information public	Description of data	Equivalent weight
Academic achievement	BA	1
	M.A	1.25
	Doctorate	1.5
Experience	less than 15 years	1
	more than 15 years	2

The application of the following equations can be used in the calculation of answers probability rate and the impact of risk:

The probability of the occurrence rate of risk =

$$= \frac{Sum(probability of occurrence of risk \times recurrence risk)}{Sum duplicates} (1)$$

The impact of risk occurrence rate =

$$\frac{\text{Sum (impact of risk occurrence} \times \text{recurrence risk)}}{Sum duplicates} (2)$$

Whereas:

The probability of the impact of the risk probability of occurrence of risk = Standard values each.

Recurrence = Number of repetition of certain answer multiplied by weights equation for each answer.

Sum duplicates = The cumulative total of the occurrences of all the factors with weights.

Has been arranged in descending order of risk index values as in the table number (4), where it is clear that the likelihood of risk occurrence. There are several measures of the probability of impact when replacing the scale qualitative numbers when loading the statistical measure has been adopted. The following [5].

the scale	very low	Low	Average	high
the field %	0 - 10	11 - 30	31 - 60	> 60

It was determined based on the level of importance of this measure of the likelihood and impact of risks and in accordance with the principle of calculating the difference between the largest value Index risk and the smallest value from the table if the No. 6 and the symbol to him the letter D and this principle can be relied upon and to define the limits of Risk index for the purpose of processing, according to the designated resources, as follows:

D = 0.799943 - 0.001855 = 0.798088

Table 4. Descending order of risk depending on the level of importance Index

N	Risks	Probability	impact	Risk Index	Significance level
1	Failure to pay money to companies and contractors	0.9674	0.8269	0.799943	Very high
2	Delays in the receipt of financial advances to companies and contractors	0.7558	0.4793	0.362254	High importance
3	Delayed decision-making by the employer (approvals)	0.7327	0.4884	0.357850	

4	The presence of pipes, tubes and cables for sewer services, communications or other	0.5321	0.232	0.123447	Medium importance
5	Religious holidays sudden events	0.5336	0.2236	0.119312	
6	Poor coordination and communication between the employer and companies	0.5271	0.2231	0.117596	
7	Delays in the completion of design changes	0.5105	0.2142	0.109349	
8	Differences in quantities between design and speculative detection	0.5016	0.2053	0.102978	
9	Lack of clarity in contractual obligations	0.3674	0.1602	0.058857	Low importance
10	The late arrival of some materials and equipment from the country of origin	0.355	0.1568	0.055664	
11	Delayed delivery of location for companies	0.3427	0.1432	0.049074	
12	Direct action by the companies delayed	0.3316	0.1325	0.043937	
13	Delayed delivery of operational advances by companies	0.3211	0.1241	0.039848	
14	The deterioration of the security situation in the city	0.3132	0.114	0.035704	
15	Bad weather conditions	0.3045	0.1002	0.030510	
16	Cause internal problems between team members	0.2114	0.0482	0.010189	Very low importance
17	Scheduling inaccurate project	0.1931	0.0401	0.007743	
18	A slight rise in prices of construction materials	0.1872	0.0373	0.006982	
19	The difficulty of access to the site	0.1588	0.0302	0.004795	
20	Delayed the implementation of some clauses of the project	0.1329	0.0286	0.003801	
21	A slight difference of course the ground	0.1243	0.0203	0.002532	
22	Failure to allocate a place to throw the rubble	0.0982	0.0189	0.001855	

And so can the minimum and maximum index of risk calculation (area) at each level, as in the table (5) note that the figures are rounded to four orders of ease, so the upper limit for each group is the minimum for a group of risk that followed in importance, is located index risk is very low importance between (0.0018 and 0.0101), while the low importance risk indicator is located between (0.0305 and 0.0588), and so on, and has been the risks are ranked according to the level of importance in the grandfather well No. 4, where is located top importance first, the risk (Failure to pay money to companies and contractors and others) is an important indicator of very high (0.799943), and this reflects the importance of addressing these risks. The risk (Failure to allocate a place to throw the rubble), the index (0.001855), meaning that the level of significance is very low in the goals of the project.

Table 5. Limits the risk index for each level of importance

Significance level	minimum	maximum
Very low importance	0.001855	0.010189

Low importance	0.030510	0.058857
Medium importance	0.102978	0.123447
High importance	0.357850	0.362254
Very high importance	0.799943	0.799943

5.2.2 - Testing the hypothesis:

5.2.2.1 -Chi-square test

The probability and impact of risks.

A chi-squared test, also written as X^2test, is any statistical hypothesis test wherein the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true. Without other qualification, 'chi-squared test' often is used as short for Pearson's chi-squared test.

$$\boldsymbol{X^2 = \sum_{ij}^{n} \frac{(O_{ij} - E_{ij})2}{E_{ij}}}$$

n + i: Total Views values in the line that arranged

n + j: Total Views values in the column that arranged

Accept the imposition of independence if the value of (X^2) calculated from the above equation is less than the value of (X^2) spreadsheet. It was allowable error rate is equal to 5% and the degree of freedom equal to (C-1) (R-1) where:

R = the number of lines in the compatibility table.

C = the number of columns in the compatibility table.

It was a value (X^2) calculated equal to (3) smaller than Tabulated value and equal to (27.1345) and this proves the lack of relationship between variables is not a relationship between the probability of the risk occurring and the impact it has probability is high but the impact is low .

In the case of independence between the two variables is used the following formula to determine the degree of probability:

$$\mathrm{G} = \sqrt{\frac{X^2}{(X^2 + 1)}}$$

Whereas :

G : Contingency Coefficient (G < 1) .

The closer (G) of the number (3) is a high degree of probability. It was the value (G) is equal to (0.71) and this confirms the relationship of independence and existence of any failure to adopt between two variables probability and impact.

5.2.2.2 - Test correlation coefficient (R).

The likelihood and impact of risks:

We also investigate the extent of the correlation between the results by calculating the correlation coefficient and its value is equal to (R = 0.854) to the level of significance (importance) equal to (α = 0.05), which indicates the existence of a strong correlation between the results.

5.2.3 - Discuss the results of the impact of risks on project objectives:

You can examine the results in Table 6, where clear the following:

A – The very high level of importance of risk was one of the class of financial risks as the danger appeared (Failure to pay money to companies and contractors) degree of impact = 0.8269followed by high level of importance of risk (Delays in the receipt of financial advances to companies and contractors) degree effect = 0.4793, in addition to the high probability of occurrence so it was a high level of importance in the table (4) this reflects a priority to take action when responding to risk management .

B - The medium importance of risk was various risks where we see that the risk (The presence of pipes, tubes and cables for sewer services, communications or other) degree of impact = 0.232 these risks priority respond to second place at risk management.

C - The rest of the risk has been distributed among the low importance and very low importance.

We conclude from that that risk management procedures, the response depends on the level of importance of the risk, which in turn depends on three factors, namely the probability and degree of occurrence and risk index.

Risk, response and assess them:

When crude oil prices fell in 2014, 2015 and 2016, and the government's budget is retire budget and dependent on the sale of oil. The financial crisis because of falling crude oil prices led to the non-payment of dues companies and contractors who have accomplished works of various projects for the benefit of the public sector, as well as ongoing projects in the process of completion because they did not get the financial dues of government agencies, because of the financial hardship experienced by some of the ministries and state institutions of Iraqi government the issuance of government bonds to pay benefits companies, contractors and suppliers on the state institutions. And it can discount those bonds at banks or sell in the market, as can be provided for loans are a guarantee for loans at full face value. it will contribute to the termination of solving the problem of late delivery of benefits to contractors, companies and its aftermath, will also launch to stimulate economic activity and moving the work environment in all sectors .

Conclusions and recommendations:

The research found some results on the subject of assessing the impact and risk management in construction projects in the Arabian Gulf and Iraq, including:

- The most important risk in construction projects is the delay of the non-payment of dues of contractors and companies.
- The existence of a relationship between risk and that the occurrence of certain risks to be a cause of other risks and example of this drop in crude oil prices, which shows the importance of monitoring and control of risk as mitigate some of the risks leads to relieve other risks in the same procedure .
- It turned out that the risk response is to put contractual conditions is the preferred measure to respond to the risk, followed by risk acceptance and risk transfer procedure followed by other actions.

Among the recommendations that can be adopted in this research include:

- The drop in oil prices and the global market requires thinking on the part of the Gulf Cooperation Council countries and Iraq to embrace the vision of a unified strategy to diversify its economic base and to build a solid economic and industrial base, and disengagement on a near-total dependence on oil revenues.
- The oil-producing countries in general live oil crisis, experiencing their budget deficit is clear and large they must move to diversify its foreign investments, and should not remain solely with consumerism- The priority is to complete the project, which was initiated in the implementation and other issues of strategic importance or economic and social return high to diversify sources of income local projects.
- The need to develop a management culture extends beyond the projects through the use of modern technology in all construction projects facilities.
- Rehabilitation and development of engineering staff in the field of analysis and risk management through education and certification courses for engineers for the purpose of application and make use of them in the construction projects.
- The development of contractual formulas between the employer and the companies with respect to analysis and risk management ensures the rights of all parties with the work programs to manage these risks.

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