International Journal of Engineering Research-Online
A Peer Reviewed International Journal
Email:editorijoer@gmail.com http://www.ijoer.in

Vol.4., Issue.3., 2016
(May-June)

RESEARCH ARTICLE

ISSN: 2321-7758

RISK MANAGEMENT IN CONSTRUCTION PROJECTS IN IRAQ: CONTRACTORS' PERSPECTIVE

HAITHAM ABDULHUSSEIN[1], Dr. ABDUSSALAM SHIBAANI[2]

[1]MSc Construction Management, Coventry University

[2]Lecturer Construction management, Coventry University

ABSTRACT

The importance of risk management practices has been increased in construction industry due to the high risky industry environment and its high competitive market nature. However, a several researches and investigations have been conducted regarding to the risk management aspect and principles that practiced by different construction projects parties in Iraq. The research aim is to identify, assess and to get the sufficient understanding of the main risk factors in construction projects in Iraq, it is also aims to investigate the significance for each risk factor and their allocation regarding to the contractors' perspective. The research includes two kinds of risk management actions; preventive and mitigation. A questionnaire survey was conducted consisted of 36risk factors. The research findings showed that corruption was the most significant risk followed by war and military operations and terrorism attacks risks respectively. The research also found that the contractors showed their acceptance to bear the logistics risks(laborersand equipment productivity,resources availability and poor coordination between head office and site offices) more than other types of risks. The research also revealed that relying on expert judgment is the most effective risk preventive method used by Iraqi contractors, as well as, it found that close supervision to subordinates to reduce abortive work is the most effective risk mitigation method.

Key words: Risk management, construction, risk significance, risk allocation, contractors, Iraq.

1.0 INTRODUCTION

Construction industry considers as one of the largest industries in the world (Nunnally, 2004), it is also considered as one of the economic basis for many countries and important source of income for the treasury (Cox, et al., 2006), but in comparison with other industrial sectors, construction industry nature does not encouraging, because it is usually associated with business failures and financial obligations related to poor records associated with non-completion of projects due to cost and time overruns, high level of disputes, low profits margins in comparison with risks linked with construction projects, bad health and safety records and intense competitive market environment (Barrie & Paulson, 1992) and (Cooke & Williams, 2009). It considers as high risky business because it is affected by many factors such as different types of stakeholders

(employers, designers, contractors, suppliers…etc.), different resources (labourers, materials and equipment), complex design and construction, political, economic and managerial factors (Al-Sayegh, 2008) .

Many authors provide different definitions for risk; it is an exposure to economic loss or gain arising from involvement in the construction process (Perry & Hayes, 1985) whereas (Mason, 1973) has describes risk as an exposure to loss only(PMI, 2013) defined risk as uncertain event that if it occurs has a positive or negative impact on one of the project objectives (cost, time, scope, quality...etc). In order to achieve the research objectives for the risk avoidance and mitigation actions, risk has been defined asthe loss that occurs in the physical phase on a project (Garner & Black, 2004).

Iraq construction and reconstruction projects specially for infrastructure projects in continuing growing specially since 2008, but due to the unstable economic and political situation since 2014 especially with the invasion of (ISIS) to many provinces of Iraq, the continued of decline of oil prices in the global market led Iraqi government to implement the austerity policy and the amounts that have been allocated to finance the construction projects were re-allocated to cover war expenses which had a severe impacts on construction industry and led to suspending most of construction projects due to the lack of funds which caused many of contractual issues specially with the international construction companies, so it became necessary to take a particular actions against these risks. Risk management plays a major role in success of any project and it is a complicated issue in any management process for each project especially in the planning and control project phases. The majority of construction contractors in Iraq have lack in knowledge or ability about how to employ risk management in their projects and specially what relating to how to identify, analyse and manage risks. This can be attributed to two main factors:

a) Iraqi economy mainly depends on oil and gas revenues and the construction industry does not have an effective influence on Iraq economy (CBI, 2012).
b) Little number of researches has been conducted and published regarding to construction project management in Iraq.

That's why this research is important domestically.

The objectives of this paper are to investigate the present attitude of Iraqi contractors towards risk factors that threaten the construction projects in terms of significance and allocation, as well as, to find out what are the most useful, effective and successful actions which are applied and employed to avoid and mitigate the consequences of targeted risks.

2.0 Risk Management

Risk management is an essential element of project management process that aims to identifying the possible risks which linked with project objectives. RM is a process which aims to prevent, mitigate and manage risks,it is the systematic approach that alloworganizations to deal with unknown events by taking actions to protect their strategic objectives and assets from being affected by negative influences whether are internal or external (Sharma &Swain, 2011), this approach consisting of a systematic techniques which requires a highly experienced and trained management team who have the ability to apply these techniques in their projects. Experts and professionals should have sense of balance about how to use contingencies reserves which relating to their area of expertise and their organizations objectives and having knowledge about how to implement risk identification and assessment processes is major part to achieve this balance. (Sharma & Swain, 2011). However, it does not lead to eliminate all the project risks completely, it is only minimizing the risks occurrence possibility and the implications from occurrence of these risks and to make sure that the most effective method is adopted to manage and control those risks (Goh & Abdul-Rahman, 2013). The main benefit of implementing risk management in construction projects is to improve the project performance through making sure from achieving project objectives and seeking to maximize the positive outcomes of these objectives.

Many risk management processes have been proposed by researchers. (Bohem, 1991) Suggested process contains of two main stages; the first stage is risk assessment which includes risk identification, risk analysis and risk prioritization, the second stage is risk control which includes the following steps: risk management planning, risk resolution and risk monitoring. Systematic risk management process in construction projects is comprised of three main stages which are:

1- Risk Identification: It is the process of defining which risk might have impact on the project and documenting their characteristics (PMI, 2013). It is the most important phase in risk management process where the risk analysis and response stages can be implemented only on risks that have been already identified during project early stages and the results of those stages are depend on the accuracy of risk identification stage. (Wang, et al., 2004). The key advantage of this process is the documentation of existing risks and providing the necessary knowledge and ability to project team to anticipate events (PMI, 2013). There are different tools and techniques that used to identify risk for example and not limited are: brainstorming, workshops, interviews, questionnaire survey, Delphi technique, expert judgments, checklists and assumption analysis.

2- Risk analysis: It is the process of assessing the risks that have been identified in advance and to find out their magnitude (Loosemore, 2006). Risk analysis comprised of two approaches: qualitative and quantitative. Selection of approach mainly depending on the type of risks and experience (Gajewska & Ropel, 2011).

- Qualitative risk analysis: "it is the process of prioritizing risk for further analysis or action by assessing and combining their probability of occurence and impact" (PMI, 2013). It is the most commonly used approach as it is simple and not expensive. The process starts with acquiring data and information regarding to risk factors, then followed by rating of these risks in terms of 'low ' 'high' 'medium'or acceptable' and 'unacceptable', example of such tools and techniques are used in qualitative risk analysis process are: risk probability and impact assessment and probability and impact matrix. (Radu, 2009), (PMI, 2013).
- Quantitative risk analysis: "The process of numerically analyzing the effect of identified risks on overall project objectives (PMI, 2013).It is applied on the risks that have been identified and have been rated in qualitative risk analysis process. There are different tools and techniques that used in quantitative risk analysis process which are for example not limited: Sensitivity analysis, Monte Carlo simulation and decision tree.
- Risk Response: (PMI) defined the risk response as "it is the process of developing options or actions to enhance opportunities and reduce threats on project objectives" The selection of risk response action has to be suitable to the risk severity degree and it must be realistic and cost- effective regarding to the project schedule, as well as, the selected action must be agreed by parties who are involved in the project(Goh & Abdul-Rahman, 2013). PMI proposed four different ways to respond for risks which are:
- Avoidance: it is the action which aims to eliminate project risks through removing the sources or the causes of these risks.
- Transference: it is the action when the risk impact or consequence shifted to third party.(Perry & Hayes, 1985), there are four common paths of risk transference in construction projects which are;
  a) Owner to contractor or designer,
  b) Contractor to subcontractor
  c) Owner, contractor, designer and subcontractor to insurer.
  d) Contractor or subcontractor to surety.
- Mitigation or reduction; It is the strategy which aims to find ways to mitigate or

minimize the risks occurrence probability(Klemetti, 2006).

- Acceptance: it is the strategy when the project team decide to do nothing until the risk occurs. It is common strategy when the risk occurrence probability is low, it is an effective strategy when the risk consequences is less expensive than the remedial actions.

There is misconception about the risk management process objective, risk management objective is to create an organized a framework to help the decision makers to control and manage risks effectively and efficiently not to eliminate all project risks.(Wang, et al., 2004)

3.0 Methodology

This paper is based on using both qualitative and quantitative research approaches for collecting data. Qualitative approach is represented by in-depth unstructured interviews which is selected to provide the absolute freedom for the selected interviewers to express their opinions, observations and judgements regarding to their area of experience. Whereas quantitative approach is represented by questionnaire survey. Questionnaire has been selected to gather the contractors' opinions and judgements in order to determining the relative significance, and allocation of the identified risks. There are various types of risks associated with construction projects. These areenvironment, managerial, design, construction, physical, political, legal, financial, logistic and security risks.Table (1) clarifies the 36 risk factors included in questionnaire. These factors are selected based on (a) intensive literature review, particularly the work of (Perry & Hayes, 1985), (Kartam & Kartam, 2001), (Enshassi, et al., 2008), (Hatami & Beshan, 2012),(Fisk, 2000)(Akintoye & MacLeod, 1997), (Ahmed, et al., 1999), (b) consulting with key domestic experts and academics. The research limitations are: a) only contracting companies with first class ranking are targeted and b) contracting companies must have a valid membership in association of Iraqi contractors.

The questionnaire comprised of four main parts. The first part intends to obtain the general information about the contractors who participated in this survey and their organizations. The second part is designed to obtain sufficient understanding for the present attitudes of Iraqi contractors regarding to risk identification and allocation,the third part deals with the measurement of the significance of different risk factors, and the fourth part deals with the practical risk management actions.

For risk significance responses, contractors have to rank each risk factor included in questionnaire from scale of 1 to 10 by taking into consideration its impacts on project delays, whereas 1-3 scale is assigned to factors with low significance, 4-7 scale assigned to factors with medium significance and 8-10 scale assigned to risk with high significance. In order to achieve sufficient understanding about the relative significance for each of the identified risks weighting score method has been adopted in this paper to rate each risk. The risk significance is classified based on the total weighted score, the risk with highest total weighted score represent the most significant risk, the total weighted score is obtained by using the following equation:

Total weighted score (TWS) = N x W

N= Number of respondents.

W= Risk significance rate scale.

For risk allocation the respondents must choose the party who is actually bearsthe risk and its consequences from the one of the following four choices: owner, contractor, shared and insurance. The results of this section of the questionnaire are described in terms of percentages of the total number of contractors who are responded to this survey.The criterion to allocate any risk to one of the proposed options (owner, contractor, shared, insurance), is that each risk must get at least (60%) response rate, those risks which failed to achieve the targeted response rate are categorized as undecided.

Table (1) Risk factors significance

No.	Risk Factor	Risk Significance										TWS	Significance (1-10)
		1	2	3	4	5	6	7	8	9	10		
1	Poor project planning.	1 (0)	2(0)	3(0)	4(1)	5(1)	6 (1)	7 (2)	8 (9)	9(5)	10 (3)	175	8.3
2	Information availability	1 (1)	2(4)	3(9)	4(3)	5(2)	6 (1)	7(2)	8 (0)	9(0)	10 (0)	78	3.7
3	Incorrect project feasibility study	1 (4)	2(6)	3(5)	4(2)	5(1)	6 (1)	7(1)	8 (1)	9(0)	10 (0)	65	3.1
4	Incitement to change the government.	1 (0)	2(0)	3(5)	4(2)	5(1)	6 (6)	7(3)	8 (4)	9(2)	10 (0)	130	6.2
5	The intervention of political parties to get kickbacks.	1 (0)	2(0)	3(0)	4(4)	5(3)	6 (2)	7(3)	8 (7)	9(2)	10 (3)	158	7.5
6	War and military operations	1 (0)	2 (0)	3 (0)	4 (0)	5 (0)	6 (0)	7 (0)	8 (4)	9 (8)	10 (9)	195	9.3
7	Terrorism attacks	1 (0)	2 (0)	3 (0)	4 (0)	5 (1)	6 (0)	7 (0)	8 (3)	9 (7)	10(10)	193	9.1
8	Vandalism	1 (0)	2 (0)	3 (2)	4 (1)	5 (3)	6 (2)	7 (7)	8 (3)	9 (3)	10 (1)	147	7.0
9	Theft	1 (0)	2(0)	3 (2)	4 (0)	5 (2)	6 (7)	7 (5)	8 (2)	9 (2)	10 (1)	137	6.5
10	Kidnapping and killing of foreign experts	1 (0)	2 (0)	3(1)	4 (5)	5 (7)	6 (2)	7 (3)	8 (2)	9 (1)	10 (0)	116	5.5
11	Undocumented change orders	1 (0)	2(0)	3 (1)	4 (1)	5 (1)	6 (2)	7 (5)	8 (6)	9 (3)	10 (2)	154	7.3
12	Design changes	1 (0)	2 (1)	3 (1)	4 (2)	5 (7)	6 (4)	7 (2)	8 (1)	9 (2)	10 (1)	120	5.8
13	Inaccurate contract quantities.	1 (2)	2 (1)	3(1)	4 (2)	5 (4)	6 (5)	7 (4)	8 (1)	9 (1)	10 (0)	110	5.2
14	Inappropriate specification or drawings	1 (0)	2 (0)	3 (1)	4 (1)	5 (3)	6 (3)	7 (5)	8 (3)	9 (4)	10 (1)	145	6.9
15	Unforeseen site conditions	1 (1)	2 (5)	3 (1)	4 (4)	5 (3)	6 (1)	7 (4)	8 (1)	9 (1)	10 (0)	95	4.5
16	Legal disputes between project parties.	1 (0)	2 (0)	3 (1)	4 (1)	5 (2)	6 (3)	7 (4)	8 (6)	9 (3)	10 (1)	147	7.0
17	Ambiguity of work legalization.	1 (1)	2 (1)	3 (2)	4 (1)	5 (2)	6 (7)	7 (4)	8 (6)	9 (3)	10 (1)	110	5.2

18	The differences between central government and Kurdistan region laws.	1 (0)	2 (0)	3 (1)	4 (2)	5 (4)	6 (8)	7 (2)	8 (3)	9 (1)	10 (1)	126	6.0
19	Weakness of disputes arbitration system.	1 (0)	2 (0)	3 (1)	4 (2)	5 (4)	6 (8)	7 (2)	8 (3)	9 (1)	10 (1)	118	5.6
20	Changes in permits and regulations.	1 (2)	2 (1)	3 (1)	4 (6)	5 (4)	6 (2)	7 (2)	8 (2)	9 (1)	10 (1)	103	4.9
21	Corruption	1 (2)	2 (1)	3 (1)	4 (6)	5 (4)	6 (2)	7 (2)	8 (1)	9 (8)	10 (12)	200	9.5
22	Delay of payment on contract.	1 (0)	2 (0)	3 (1)	4 (1)	5 (1)	6 (1)	7 (1)	8 (7)	9 (6)	10 (4)	175	8.3
23	Changes of materials prices.	1 (0)	2 (0)	3 (0)	4 (1)	5 (1)	6 (1)	7 (6)	8 (7)	9 (3)	10 (2)	160	7.6
24	Currency exchange rate	1 (0)	2 (0)	3 (1)	4 (2)	5 (6)	6 (4)	7 (4)	8 (2)	9 (1)	10 (0)	118	5.6
25	Financial failure of contractors	1 (0)	2 (0)	3 (1)	4 (2)	5 (6)	6 (4)	7 (4)	8 (2)	9 (1)	10 (0)	185	8.8
26	Resources availability	1 (0)	2 (1)	3 (1)	4 (1)	5 (1)	6 (4)	7 (8)	8 (3)	9 (1)	10 (2)	147	7.0
27	Poor coordination between head office and site offices.	1 (0)	2 (0)	3 (1)	4 (1)	5 (2)	6 (5)	7 (7)	8 (3)	9 (1)	10 (1)	139	6.6
28	High competition of bidsprices	1 (0)	2 (1)	3 (0)	4 (2)	5 (3)	6 (6)	7 (6)	8 (2)	9 (1)	10 (0)	128	6.1
29	Defective design.	1 (0)	2 (0)	3 (1)	4 (0)	5 (1)	6 (3)	7 (2)	8 (6)	9 (7)	10 (4)	175	8.3
30	Granting designs to unqualified designers	1 (0)	2 (0)	3 (1)	4 (1)	5 (3)	6 (2)	7 (6)	8 (4)	9 (3)	10 (1)	145	6.9
31	Poor coordination between designers.	1 (0)	2 (0)	3 (1)	4 (1)	5 (2)	6 (8)	7 (3)	8 (3)	9 (2)	10 (1)	138	6.5
32	Accidents / safety	1 (0)	2 (0)	3 (0)	4 (1)	5 (3)	6 (2)	7 (7)	8 (4)	9 (3)	10 (1)	149	7.1
33	Laborers and equipment productivity	1 (0)	2 (1)	3 (2)	4 (1)	5 (2)	6 (4)	7 (5)	8 (4)	9 (2)	10 (0)	131	6.2
34	Supply low quality or defective materials.	1 (0)	2 (1)	3 (2)	4 (1)	5 (1)	6 (2)	7 (7)	8 (4)	9 (4)	10 (2)	158	*7.5*
35	Adverse weather conditions	1 (0)	2 (1)	3 (2)	4 (2)	5 (7)	6 (5)	7 (3)	8 (1)	9 (0)	10 (0)	110	5.2
36	site access	1 (0)	2 (0)	3 (1)	4 (1)	5 (3)	6 (4)	7 (7)	8 (5)	9 (0)	10 (0)	135	6.4

In this survey two types of risk management actions have been sent to respondents: preventive and risk mitigation actions. Six risk mitigation actions and seven risk preventive actions are included in questionnaire. Same weighted score approach which used to measure the risk factors significance is adopted to illustrate the effectiveness for both preventive and mitigation methods. The effectiveness degree ranges from Very high (5) to inapplicable (0). These actions are generated from related researches regarding to risk management practices in construction and revisions and consultations from the domestic experts and academics.

Questionnaire draft includes of 33 risk factors has been sent to five local experts and academics for conducting a pilot study test to revise the questionnaire validation during the questionnaire preparation process. In order to make the questionnaire suitable to achieve the research objectives. The experts proposed to add eight risk factors and to ignore another five risks due to the lack of clarity and repetition.SPSS reliability test (Cronbach's Alpha) method used in this research. Generally, reliability coefficient 0.70 and higher gives a positive indicator that the research is reliable,the reliability coefficient was 0.955, which means the research considered as reliable. The questionnaires have been distributed on 25 contracting company, four of the returned questionnaires were ignored due to incompleteness, therefore, only 21 of the completed questionnaires were returned with response rate of (84%) which can be used for data analysis.

4.0Results and findings

4.0.1 Risk significance and allocation

Table (1) demonstrates the relative significance for the identified risk and table (2) illustrates the respondents' percentage towards risk allocation for the same factors.

Poor project planning: The survey revealed that the contractors accept to bear this risk with response rate of (74%) because they believed that it is their duty to prepare an accurate project plan. It considered as high risk with 175 (TWS) and ranked it as the 7th of most significant risks.

Information availability: Contractors rated this risk as low significance risk. They failed to decide which party should bear this risk and they ranked it penultimate which is the 35th ranking.

Incorrect project feasibility study: Contractors failed to assign this risk to any of project parties. They determined it as the lowest significant risk in this survey with 65 (TWS). Contractors expressed their opinions that it is the owner responsibility to assume this risk because this risk usually occurs during the project initiation stage which commonly the contractors are not participating at that stage of project life cycle.

Incitement to change the government: Contractors determined this risk as medium risk with 130 (TWS)and they showed their desire to share this risk with owners (69% response rate).The contractors expressed their concerns because this risk is too common in the large projects in Iraq especially the governmental infrastructure projects. This risk occurs because most of the Iraqi government ministers should be belongs to particular political parties, therefore, most of contracts are granted to the contractors who have contacts with particular party or minister. For the private projects the contractor must to pay kickbacks for the political parties who have militias which have control on the area where the project site is located specially if the projects located far from the centers of provinces.

The intervention of political parties to get kickbacks: The survey found that this risk should be shared (supported by 66% response rate), the contractors rated it as medium risk with 158 (TWS) and they ranked it as 9th of the most significant risks.

War and military operations: This risk found to be an owners' responsibility (85% response rate) and it comes at 2nd place of the most significant risks with 195 (TWS). Contractors concerns have arisen because of their projects might be destroy and the Iraqis insurance companies do not cover the whole damages, as well as, the compensations claim against the government of Iraq may take long time

to get fair settle and that means an extra cost on contractors

Terrorism attacks: This risk is found as owner's responsibility with 65% response rate. The survey also found that this risk at the top of the most significant risks 3rd with 193 (TWS).

Theft: Results showed that this risk should bore by contractor (90% response rate) and considered as medium risk with 137 (TWS).

Kidnapping and killing of foreign experts:The contractors rated this risk as medium risk with 116 (TWS) and this risk is assigned to contractor in case of those foreign experts are members of contractor staff not an owner's employees (80% response rate). This risk has two major impacts on projects. The first one is deterioration of project staff performance and Morales because of frustration and not feeling safe which affects negatively on achieving project objectives. The second impact is the security requirements that should be provided for foreign employees and experts is very expensive; this includes contracting with specialized security companies to transport the foreign experts and workers from and to project sites. Undoubtedly, the security risks will effect on these foreign experts' wages and it will be raised if the project is implemented in a risky area that means another side effect leading to unexpected financial risk.

Vandalism: This risk got 65% response rate which support allocating this risk to contractor because it is their responsibility to keep the project site secure after obtaining the full site access from the owner. It is ranked 13th of the most significant risks with 147 (TWS).

Undocumented change orders: The survey revealed that it is the contractor duty to bear this risk because they believed that it is their responsibility to keep such changes documented (72% response rate) and the respondents rated it as medium risk with 154 (TWS), because it is difficult to get payments for these changes from the owners after projects are completed and handed over.

Design changes: Survey results revealed that it is owner's responsibility to assume this risk (73%). This risk is at the 26th rank of most significant risks

inaccurate contract quantities: The survey results showed that it is the owner's responsibility to bear this risk (70% response rate). This risk is at the 30th place of risks ranking with 110 (TWS).

Legal disputes between project parties: Contractors rated this risk as medium risk with 147 (TWS) and they ranked it at the middle of risks ranking table (14th). The contractors were unsure about which party has to bear the consequences of this risk.

Ambiguity of work legalization: This risk determined to be medium risk with 110 (TWS). The results revealed that this risk to be shared supported by 92% response rate.

inappropriate specification or drawings: This risk should be shared supported by 64% response rate. The results indicate that contractors determined this risk as medium risk and ranked it as the 16th of most significant risks. This risk can be mitigated through employing a professional consultants and provide an adequate budget to get correct design.

Weakness of disputes arbitration system: The survey showed that the contractors failed to select the appropriate party to bear this risk. It is rated as medium risk 118 (TWS), and at the 27th place of the most significant risks.

Unforeseen site conditions: Results showed that the contractors failed to decide which party is in the best position to deal with this risk, as well as, they rated it as low risk with 95 (TWS) and ranked it as 34th of the most significant risks.

Changes in permits and regulations: The results revealed that contractors were not be able to decide about allocation of this risk. They rated it as lower- medium risk with 103 (TWS) and as shown in table (3) they ranked it as 33rd of the most significant risk factors

Corruption: This risk recorded as the 1st of the most significant risks (Table 3). The contractors did not allocate this risk to any of the project parties because all parties suffering of it, it occurs during various project life cycle phases from initiation until closure. It is mostly common in the governmental

projects especially during the bidding documents preparation phase, bidding submission and evaluation process and project construction phase.

Delay of payment on contract: It is awarded the 5th rank of the most significant risks. The results indicated that this risk should be assigned to owner (83% response rate) and rated as high- medium risk 178 (TWS).It is common in government projects due the current economic situation and bankruptcy of many of Iraq provinces which drove the government to stop make payments for contractors to cover other expenses therefore, thousands of projects have been suspended recently and it has a severe impact on completing the projects successfully

Changes of materials prices: This risk is found to be high – medium risk with 160 (TWS) and considered to be shared risk based on contract type. It is attributed by external factors such as war situation which forced many of national factories to close their production lines which leads to import these materials from overseas factories which causing increase of transportation costs.

Table (2) Risk factors allocation

No	Risk Factor	Contractor	Owner	Shared	Insurance
1	Poor project planning	74%	9%	17%	0%
2	Information availability	21%	43%	4%	0%
3	Incorrect project feasibility study	5%	95%	0%	0%
4	Incitement to change the government	5%	26%	69%	0%
5	The intervention of political parties to get kickbacks	28%	6%	66%	0%
6	War and military operations	0%	85%	0%	15%
7	Terrorism attacks	12%	65%	4%	19%
8	Vandalism	73%	4%	7%	16%
9	Theft	90%	10%	0%	0%
10	Kidnapping and killing of foreign experts	80%	20%	0%	0%
11	Undocumented change orders	72%	7%	17%	0%
12	Design changes	27%	73%	0%	0%
13	Inaccurate contract quantities.	12%	70%	18%	0%
14	Inappropriate specification or drawings	11%	25%	64%	0%
15	Unforeseen site conditions	35%	19%	46%	0%
16	Legal disputes between project parties.	35%	23%	42%	0%
17	Ambiguity of work legalisation.	3%	5%	92%	0%
18	The differences between central government and Kurdistan region laws.	14%	19%	67%	0%
19	Weakness of disputes arbitration system.	19%	28%	53%	0%
20	Changes in permits and regulations.	26%	22%	52%	0%
21	Corruption.	35%	18%	47%	0%
22	Delay of payment on contract.	17%	83%	0%	0%
23	Changes of materials prices.	37%	18%	45%	0%
24	Currency exchange rate.	42%	24%	34%	0%
25	Financial failure of contractors	73%	27%	0%	0%
26	Resources availability	90%	10%	0%	0%
27	Poor coordination between head office and site offices.	92%	8%	0%	0%
28	High competition of bidsprices.	42%	25%	33%	0%
29	Defective design.	17%	83%	0%	0%

30	Granting designs to unqualified designers	19%	81%	0%	0%
31	Poor coordination between designers.	3%	85%	12%	0%
32	Accidents / safety	75%	4%	21%	0%
33	Laborersand equipment productivity	85%	5%	10%	0%
34	Supply low quality or defective materials.	80%	2%	18%	0%
35	Adverse weather conditions	25%	21%	54%	0%
36	Site access	4%	23%	73%	0%

Currency exchange rate: Contractors failed to allocate this risk and they rated it as lower-medium risk.

Financial failure of contractors: The findings indicate that this risk ranked as 4th of the most significant risks with 185 (TWS) and assumed to be assigned to contractors (73% response rate). The contractor could be facing the financial failure due many reasons such as: high interest rates on banks loans, lack of liquidity and funding, poor cash flow management, poor experience especially in procurement and contract management and awarding the contract to the least price. Small and medium construction companies in Iraq do not give high attention for the financial risk impacts on their projects, in spite of that about 80% of projects fail because of the financial risks, the negligence and underestimating of the financial risks are obvious because It is rarely to find an independent financial department as a part of the small and medium companies organization structure in Iraq. In addition, contracting companies do not give the sufficient attention for some of financial matters such as compensation of employees, managing the cost of equipment and their operation costs and waste management. If financial evaluation process is carried out based on all of these factors semi-annually or annually, it will reveal the extent to which this impacts on the growth and profits of these companies as a result of underestimating of some financial factors.

Resources availability: Results showed that the majority of contractors (90% response rate) assigned this risk on themselves and they rated it as high- medium risk with 147 (TWS). This may be due to the fact of subcontracting is common practice in construction industry in Iraq. On the other hand, there is no legal format or clauses which included in subcontract terms and conditions showing the number of laborers that should be provided in the project site by subcontractors

Poor coordination between head office and site offices: The results indicated that this risk should be contractors' responsibility (92% response rate). This risk has a medium significance as it is ranked at 18th place of most significant risks. These results showed that contractors should spend more efforts in order to improve their team communication and information sharing skills through provide the necessary training and support.

High competition of bidsprices: This risk has a lower-medium significance (supported by 128 TWS) and ranked at 24th place of the most significant risks. The respondents failed to allocate this risk to a particular party. The competition between contractors when they submit their bids lead to lower prices significantly and award the contract to the lower bid, then when contractor starts in implementation of work, he discovers that he submitted a losing price then he starts to defaults in work or even withdraw from executing of the contract which could leads to stop the work on project completely.

Defective design: The contractors assigned this risk to owners and they rated it as high significant risk (175 TWS), it is also at 7th of most significance risk.

Granting designs to unqualified designers: The results revealed that this risk rated as medium significance and ranked at 16th of most significant risk factors. The majority of contractors allocated this risk to owners (81% response rate).

Poor coordination between designers: This risk is allocated to owners (85% response rate), it considered as medium significance risk with 138 (TWS) and it is also ranked as 19th of most

significant risks. This risk can be controlled by pay more attention and coordination correctly between different project designers (Structural, architectural, MEP...etc.) that's can be done through applying new generation of design and management systems such as BIM (Building Information Modeling), which leads to increase the coordination and collaboration between the designers.

Table (3) Risk factors ranking

No	Risk Factor	Total Weighted Score (TWS)	Rank
21	Corruption	200	1
6	War and military operations	195	2
7	Terrorism attacks	193	3
25	Financial failure	185	4
22	Delay of payment on contract.	175	5
29	Defective design.	175	6
1	Poor project planning.	175	7
23	Changes of materials prices.	160	8
34	Supply low quality or defective materials.	158	9
5	The intervention of political parties to get kickbacks.	158	10
11	Undocumented change orders	154	11
32	Accidents / safety	149	12
26	Resources availability	147	13
16	Legal disputes between project parties.	147	14
8	Vandalism	147	15
30	Granting designs to unqualified designers	145	16
14	Inappropriate specification or drawings	145	17
27	Poor coordination between head office and site offices.	139	18
31	Poor coordination between designers.	138	19
9	Theft	137	20
36	Site access	135	21
33	Laborersand equipment productivity	131	22
4	Incitement to change the government.	130	23
28	High competition in prices of bids.	128	24
18	The differences between central government and Kurdistan region laws.	126	25
12	Design changes	120	26
19	Weakness of disputes arbitration system.	118	27
24	Currency exchange rate	118	28
10	Kidnapping and killing of foreign experts	116	29
17	Ambiguity of work legalisation.	110	30
35	Adverse weather conditions	110	31
13	Inaccurate contract quantities.	110	32
20	Changes in permits and regulations.	103	33
15	Unforeseen site conditions	95	34
2	Information availability	78	35
3	Incorrect project feasibility study	65	36

Accidents / safety: 75% respondents believed that it is their responsibility to bear this risk whereas 21% tried to shift this risk to insurance and only 4% showed their desire to share this risk with the owners. They rated this risk as higher – medium risk and ranked it as 12th of most significant risks. This indicates that the contractors in the best position to deal with and control this risk. However, the top management of Iraqi contracting companies consider health and safety as unnecessary procedures and it does provide such kind of luxury for the laborers. As well as, they consider health and safety training as an extra cost on project budget. There is no commitment towards site safety inspection, therefore, laborers depend on their experience to keep themselves safe. This occurs as a result of; firstly, the owners do not ask from construction companies to provide health and safety records as an essential document with their bids, secondly, weak legislation that obligate the construction companies to apply health and safety standards.

laborersand equipment productivity: The contractors allocated this risk to themselves (85% response rate) supported by the results of (Enshassi, et al., 2008)(Kartam & Kartam, 2001) and (Hameed & Woo, 2007), they considered it as medium risk (131 TWS) and ranked as 22nd.

Supply low quality or defective materials: Contractors decided to bear this risk (80% response rate) and rated it as high- medium risk (158 TWS). It is 9th of the most significant risks. This risk is one of the major sources of the conflicts between project owners' and contractors' in Iraq because the project finishing quality in Iraq is low.

Adverse weather conditions: The results indicate that contractors failed to allocate this risk to particular party. This is because this risk depends on the contract type; in general, in lump sum contracts the construction projects owners' in Iraq are protected legally through inclusion of some clauses in the contract allowing them to evade their responsibility to bear the consequences of weather risks. The risk is rated as lower-medium risk and get the 6th rank among the lowest response rates and it is ranked as 31st of the most significant risks.

Site access: This risk should be shared. The results showed that this risk is a medium significance risk (135 TWS). This risk commonly occurs due legal conflicts related to land acquisitions, these kinds of conflicts usually occur between government contracting entities, landlords and contractors, because landlords claim that they have the right to use the land, so they prevent contractors from accessing land to execute their project until they are compensated. This problem was settled officially in article (3) first (F) of Iraq public contracting law by instructing that the contracting entities settle all legal issues related to site land before bidding documents preparation. Actually, this issue still exists today due to the contracting entities leaving issues like these to project construction phase.

4.02 Risk management actions

4.02.1 Risk preventive action

According to survey findings (Table 5) depend on subjective judgment to produce proper program is the most effective preventive method. Judgments or subjective works by using experience which obtained from similar previous projects relating to the risk occurrence and ability to evaluate its impacts. Experience might be the most useful information source to use in case there is no sufficient time for preparing the project program. However, relying on experience and subjective judgment is not always correct.

Setting a proper schedule by getting updated project information is the second most effective preventive method. The interviews findings indicate that a full clear information relating to all project aspect must be available before preparing project program therefore, information should be updated constantly.

Prepare an accurate project time estimation for project by using risk analysis techniques such sensitivity analysis and Primavera did not considered as an effective risk preventive method. Lack of knowledge of using risk analysis techniques might be the reason for these results.

Table (4) Risk allocation summary

	Risk factor		Risk factor
Contractor	Vandalism Theft Kidnapping and killing of foreign experts Undocumented change orders Financial failure of contractors Resources availability Poor project planning Poor coordination between head office and site offices. Accidents / safety Laborers and equipment productivity Supply low quality or defective materials.	**Owner**	Incorrect project feasibility study War and military operations Terrorism attacks Design changes Inaccurate contract quantities. Delay of payment on contract. Defective design. Granting designs to unqualified designers. Poor coordination between designers.
Shared	Incitement to change the government. The intervention of political parties to get kickbacks. Ambiguity of work legalisation. The differences between central government and Kurdistan region laws. Site access	**Undecided**	Information availability. Inappropriate specifications or drawings Unforeseen site conditions. Legal disputes between project parties. Weakness of disputes arbitration system. Changes in permits and regulations. Corruption. Changes of materials prices. Currency exchange rate. High competition in prices of bids. Adverse weather conditions

Table (5) Effectiveness for risk preventive methods result

Avoidance method	**Effectiveness of preventive methods**						
	V. high	**High**	**Moderate**	**Low**	**V. low**	**Inapplicable**	**TWS**
	5	**4**	**3**	**2**	**1**	**0**	
Rely on subjective judgement to produce proper program	5 (12)	4 (6)	3 (2)	2(1)	1 (0)	0 (0)	92
Prepareproper schedule by getting updated project information	5 (9)	4 (7)	3 (3)	2(1)	1 (1)	0 (0)	85
Add time and risk premium to project time estimation	5 (7)	4 (4)	3 (6)	2(1)	1 (2)	0 (1)	73
Set alternative plans/methods on standby	5 (4)	4 (2)	3 (5)	2(5)	1 (4)	0 (0)	57
Transfer or share risk to/with other parties	5 (1)	4 (2)	3 (4)	2(6)	1 (6)	0 (2)	43
Refer to previous or ongoing similar projects which have an accurate program	5 (5)	4 (6)	3 (4)	2(3)	1 (3)	0 (0)	70
Utilize quantitative risk analysis techniques for accurate time estimation	5 (3)	4 (1)	3 (5)	2(5)	1 (4)	0 (3)	48

The results showed that the respondents considered the “Transfer or share risk to/with other parties” as an effective preventive method, serious losses might be occur if particular risk shifted to

party who does not have the sufficient financial ability or resources to deal with a such risk. It is also indicated that the respondents do not have the sufficient knowledge and awareness about the full benefits of this method and how to use it effectively. Respondents recommended to add risk premium which takes form of contingencies reserve to cover any unforeseen events. Adding risk premium leads to increase the bid price, which reflects on possibility of winning the contract due the highly competitive environment between local construction firms.

4.02.2 Risk Mitigation action

As shown in table (6) the contractors considered "Close supervision to subordinates to reduce abortive work" as the most effective method to mitigate risks and "Change construction method" was the least one.

Respondents recommended "Increase the working hours" as the second most effective mitigation method to reduce the impacts of project delay. In fact, it speeds up the project completion process, but this is subject to particular conditions such as availability of materials, manpower, equipment and supervisors on site.

Result showed that change in construction method is rarely used to mitigate risks in construction projects in Iraq, this may refer to the importance of efforts which should be spent at the site as one of the most important factors of project progress.

Table (6) Effectiveness for risk mitigation methods

Mitigation method	Effectiveness of mitigation methods						
	V. high	High	Moderate	Low	V. low	Inapplicable	TWS
	5	4	3	2	1	0	
Close supervision to subordinates to reduce abortive work	5 (11)	4 (5)	3 (3)	2 (1)	1 (1)	0 (0)	87
Change work sequence by overlapping between activities	5 (6)	4 (3)	3 (7)	2 (3)	1 (2)	0 (0)	71
Increase labourers and/or equipment	5 (4)	4 (5)	3 (7)	2 (2)	1 (0)	0 (3)	65
Increase the working hours	5 (9)	4 (5)	3 (4)	2 (2)	1 (0)	0 (1)	81
Coordinate closely with subcontractors	5 (7)	4 (5)	3 (6)	2(2)	1 (0)	0 (1)	77
Change construction method	5 (3)	4 (4)	3 (2)	2 (8)	1 (3)	0 (0)	56

5.0 Conclusion and recommendations

The paper illustrates the present views for first class contractors in Iraq regarding to significance and allocation for 36 risk factors included in questionnaire survey (Table 1). It also examines the effectiveness of different preventive and mitigative risk management actions (Table 5 and 6). It is also shows that the contractors did not succeed to some extent to give decisive allocation of all risks factors, they failed to allocate 11 risk factors. This number considers high because these factors could increase the likelihood of disputes between contractors and other project parties about who should assume these risks. Such kind of disputes could lead to arbitration or legal procedures which cause an extra cost on Litigants. On the other hand, the contractors showed their responsibility to assume the logistics risks (Laborers and equipment productivity, resources availability and poor coordination between head office and site offices).

The survey results indicate that risk management is still in its early stages and traditional risk management represented by depending on intuition and expert judgement is the most commonly used in construction industry in Iraq rather than a systematic risk management. Accidents on site, failing meeting deadlines, cost and time overruns and low quality construction work is just a conclusive evidence of lack in systematic risk management practices.

The results revealed that corruption, war and military operations and terrorism attacks were the

most significant risk factors which threaten construction projects in Iraq. The contractors showed their significant concerns regarding to these risks due the current unstable political situation and current war in Iraq which effects on their business as described in advance.

Table (7) most ten significant risk and their allocation

No	Risk description	Allocation
1	Corruption	Undecided
2	War and military operations	Owner
3	Terrorism attacks	Owner
4	Financial failure	Contractor
5	Delay of payment on contract.	Owner
6	Defective design.	Owner
7	Poor project planning.	Contractor
8	Changes of materials prices.	Undecided
9	Supply low quality or defective materials.	Contractor
10	The intervention of political parties to get kickbacks.	Shared

The result also indicates that rely on subjective judgment to produce proper program has been selected as the most effective risk preventive action and utilize quantitative risk analysis techniques for accurate time estimation is rarely used due lack of knowledge of using risk analysis techniques. The result also indicates that close supervision to subordinates to reduce abortive work is the most effective risk mitigation method.

This survey recommends that Iraqi contracting firms should compute risks by adding time reserve to projects time duration and risk premium to their bids. These tendencies should be supported and approved by organizations like Iraqi contractors unions, Federation of Iraqi Chambers of Commerce (FICC), Iraqi Ministry of Planning and any other organization associated to the construction industry in Iraq. Contractors should make unremitting efforts to avoid financial failure occurrence by following strict cash flow management procedures. They also have to understand how to take advantages from transferring and sharing risks by employing a professional team or professional subcontractors. In addition, computerized risk analysis techniques such as Primavera should be used wider

References

[1]. Ahmed, S. M., Ahmad, R. & De Saram, D., 1999. Risk management trends in the Hong Kong construction industry: a comparision of contractors and owners perceptions. *Engineering, Construction and Architectural Management,* 6(3), pp. 225-234.

[2]. Akintoye, A. S. & MacLeod, M., 1997. Risk management and analysis in construction. *International Journal of Project Management,* 15(1), pp. 31-38.

[3]. Al-Sayegh, S. M., 2008. Risk assemssent and allocation in the UAE construction industry. *International Journal of Project Management,* Volume 26, pp. 431-438.

[4]. Barrie, D. & Paulson, B. C., 1992. *Professional Construction Management.* USA: McGraw-Hill.

[5]. Bohem, B. W., 1991. Software risk management: principles and practices. *IEEE software,* 8(1), pp. 32-41.

[6]. CBI, 2012. *Iraq economic annual report,* Baghdad: Central Bank of Iraq.

[7]. Cooke, B. & Williams, P. N., 2009. *Construction Planning, Programming and Control..* 3rd Ed ed. Chichester ; Ames,IA: Wiley-Blackwell..

[8]. Cox, A. W., Ireland, P. & Townsend, M., 2006. *(2006) Managing in construction supply chains and markets reactive and PROACTIVE options for improving performance and relationship management..* London: Thomas Telford.

[9]. Enshassi, A., Mohamed, S. & Abu Mosa, J., 2008. Risk Management in Building Projects in Palestine:Contractors' perspecive. *Emirates Journal for Engineering Research,* 13(1), pp. 29-44.

[10]. Fisk, . E. R., 2000. *Construction project administration.* 6th ed. Upper Saddle River, N.J: Prentice Hall .

[11]. Gajewska , E. & Ropel, M., 2011. *Risk Management Practices in construction projects - Case study. Msc Thesis..* [Online] Available at: Gajewska , E., and Ropel, M. (2011) Risk Management Practices in construction projects - Case study. Msc Thesis. CHALMERS < http://publications.lib.chalmers.se/records/fulltext/144253.pdf [Accessed 5 September 2015].

[12]. Garner, B. A. & Black, H. C., 2004. *Black Law Dictionary.* 8th ed. St.Paul,MN: Thomson/West .

[13]. Goh, C. S. & Abdul-Rahman, H., 2013. The Identification and Management of Major risks in Malaysian Construction industry. *Journal of Construction in Developing Countries,* 18(1), pp. 19-32.

[14]. Hameed, A. & Woo, S., 2007. Risk importance and allocation in Pakistan Construction industry: Contractors perspective. *KSCE Journal of Civil Engineering,* 11(2), pp. 73-80.

[15]. Hatami, F. & Beshan, H., 2012. Evaluation and investigation of risk management in Iranian construction industry. *Life Science,* 9(4), pp. 387-399.

[16]. Kartam, S. A. & Kartam, N. A., 2001. Risk and its management in the Kuwaiti construction industry; Contractors' perspective. *International Journal of Project Management,* Volume 19, pp. 325-335.

[17]. Klemetti, A., 2006. *Risk Management in Construction Projects Networks,* Helsinki: Helsinki University of Technology.

[18]. Loosemore, M., 2006. *Risk management for projects.* 2nd ed. London: Taylor & Francis..

[19]. Mason, G. E., 1973. *Quantitive risk management approach to selection of construction constract provissons.PhD thesis,* CAlifornia: Department of Civi Engineering, Stanford University.

[20]. Nunnally, S., 2004. *Construction methods and management.* 6th ed. NJ: Pearson Prentice Hall..

[21]. Perry, J. G. & Hayes, R. W., 1985. Risk and its Management in Construction Projects. *Proceedings of Insitution of Civil Engineers,* Volume 499-521, p. 78.

[22]. PMI, 2013. *Guide to the Project Management Body of Knowledge (PMBOK Guide).* 5th ed. PA, USA: Project Management Institute.

[23]. Radu, L., 2009. Qualitative, Semi-Quantitative and Quantitative Methods For Risk Assessment: Case Of The Financial Audit. *Analele Stiintifice ale Universitatii "Alexandru Ioan Cuza",* Volume 56, pp. 643-657.

[24]. Sharma, S. K. & Swain, N., 2011. Risk Management in Construction Projects. *Asia Pacific Business Review,* Volume VII, pp. 107-120.

[25]. Wang, S. Q., Dulaimi, M. F. & Aguria, M. Y., 2004. Risk management frameworks for construction projects in developing counteries. *Construction Management and Economics,* Volume 22, pp. 237-252.