

DEVELOPMENT OF CONTRACTORS' MITIGATION PRACTICES TOWARDS RISKS OUT OF CONTRACTORS' CONTROL IN CONSTRUCTION INDUSTRY

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Research has shown that public construction projects in Saudi Arabia have exhibited poor performance for the past three decades. Recent studies have identified that contractors are not the main party that cause risks as owners, designers, and other parties have the major share of causing risks in the industry. The traditional risk management practices have been ineffective at helping contractors deliver projects on time and within budget while meeting quality expectations. The aim of this study is to develop a risk mitigation model for the contractors to mitigate risks out of contractors' control (caused by other parties). The developed model is validated through identifying contractors' perceptions who work in public construction projects in Saudi of the new approach through conducting a questionnaire survey. The developed model focuses on increasing accountability of project parties through mitigating parties' activities and risks, measuring the activities and risks deviations (time and cost), and identifying sources of deviations. Transparency is utilized in the model through sharing weekly updates of the activities and risks combined with updated information of performance measurements of all project parties. The analysis of the study results showed that project risks will be minimized and performance of projects can be increased if contractors shift their focus using the new model from only managing their own activities and risks to managing all project parties' activities and risks.

Keywords: Risk management, Performance measurement, Accountability, Transparency, Project parties, Project delivery.

1 INTRODUCTION

Different parties are involved in construction projects such as owner, designer, consultant, contractor, suppliers, and other stakeholders and all of these parties certainly carry certain risks (Peckiene *et al.* 2013). In the context of the Saudi construction Industry (SCI), three researchers have identified the ownership of parties who cause risks and lead to low performance. Assaf and Al-Hejji (2006) identified that time overruns in construction are mostly created by owners, followed by vendors, designers, labors and consultants. Another study identified that designers are the most party that cause risks in the aviation projects in Saudi and owners were ranked second followed by consultants and then contractors (Baghdadi and Kishk 2017). Another study identified the ownership percentages of project parties who cause risks in the SCI (Elawi *et al.*

2016). This study identified that 53% of the risks are caused by owners and other stakeholders (excluding contractors) were responsible for 20% of the risks.

The reported data are perceptions of poor performance of projects in SCI as there is a lack of centralized systems that track and collect actual performance data to provide precise and quantitative data on projects performance in the governmental organizations in Saudi (Almutairi 2017, Al-Otaibi and Price 2009). Alsulamy (2015) identified that the construction projects in public organizations in Saudi suffer from the absence of performance measurement systems that identify the performance of projects and identify the performance of all project parties.

So far, in the SCI, there has been little consideration given to applying risk management practices to minimize risks' affects in the construction sector. According to Baghdadi and Kishk (2015) there is a lack of efficient risk management practices in the SCI. Ikediashi *et al.* (2014) identified that poor risk management practices in the SCI is the most critical factor for construction projects failure. In addition, according to Albogamy and Dawood (2015) there is a clear lack of applying risk management practices in the SCI that reveal the impact of the risks for project parties. In the traditional practices in managing risks in the SCI, most of the risks are allocated to contractors and none to owners (Al-Salman 2004) as owners do not take accountability and automatically transfer them to other parties (Al-Sobiei *et al.* 2005). However, in the literature discussed above, owners and project parties other than contractors cause a major share of project risks in the SCI. According to Kashiwagi *et al.* (2013), risk is defined as what contractor has no control over including risks and activities of other parties in projects. Assaf *et al.* (2015) stated that it is important to identify and manage the risks that impede contractors from delivering projects on specified cost, time and quality objectives. To minimize effects of project risks, according to Algahtany *et al.* (2016), contractors should identify risks out of their control (caused by other parties) and plan in advance how to reduce the effects of these risks.

2 OBJECTIVE OF THE STUDY

The literature discussed above showed that project parties other than contractors cause the major share of project risks, which lead to low performance in SCI. However, with the identification that risks out of contractors' control are a leading cause of low performance, there is a lack of efficient risk mitigation practices by contractors to manage these risks. The aim of this study is to develop a risk mitigation model for the contractors to mitigate risks out of contractors' control.

3 METHODOLOGY

The methodology of the study will include the following steps:

- (i) Propose a risk management framework to manage risks out of contractors' control.
- (ii) Conduct a questionnaire survey to identify the contractors' perceptions of the new approach in managing risks out of contractors' control through.
- (iii) Identify the practical framework in mitigating risks out of contractors' control.

3.1 Proposed Risk Management Framework

The main components in the developed risk mitigation model are derived from a delivery structure called the Performance Information Procurement System/ Performance Information Risk Management System (PIPS/PIRMS). The PIPS\PIRMS model replaces insufficient decision making (expectations made by project parties) by the expert vendor plan that states a clear difference between expectations and reality and can identify the project scope and how it will be

accomplished (Kashiwagi and Kashiwagi 2012). The expert vendor preplans the project from beginning to end in a clarification period with identifying activities and risks they don't control (Kashiwagi *et al.* 2010). The contractors minimize activities deviations and risks' effects by performing risk management and performance measurement through mitigating project activities and risks throughout the project execution stage (Kashiwagi 2016).

3.1.1 The use of performance measurement in managing risks

In the process of applying risk management in projects, identified and emerging risks should be measured during project phases to identify the areas, which require enhancement and to identify project team's performance in mitigating risks (Kashiwagi 2016). According to Hatry *et al.* (1990), performance measures are needed in planning, monitoring and evaluating project activities and risks. Performance measurement can be combined with risk management in order to measure and minimize risks affects (Kashiwagi and Kashiwagi 2012). According to Kim (2010) applying performance measurement methods in managing project risks is necessary to help in measuring risks influence on project time and cost. The use of performance measurement in projects will dramatically increase the performance level of vendors and the overall level of the industry productivity (El-Mashaleh *et al.* 2007). Measuring performance increases projects' performance because it increases accountability and provides a transparent environment. Measuring performance provides transparency to projects by giving insights into activities, responsibilities, costs, and outputs. Furthermore, it is a way of incentive or rewards for projects' activities outputs (De Bruijn 2002). Considering accountability, performance measurement helps in increasing the accountability of the responsible parties (Ammons 1995) and it is considered as an effective method of shaping accountability in projects (De Bruijn 2002).

3.2 Survey Analysis and Results

The targeted population in this study is contractors who work in public projects in Saudi Arabia. 252 contractors responded to the survey. The survey was formed in English and then translated into Arabic and then distributed through online survey. Of the 252 respondents, 29 contractors are classified in grade 1 in the contractors' classification system in Saudi Arabia. 28 classified in grade 2. Most of the participated contractors are classified in grades 3 and 4 with 72 in grade 3 and 76 in grade 4, 44 contractors in grade 5, and 3 non-classified contractors. A total of 103 respondents (41%) have more than 15 years of experience in the construction industry. 26% in the group of 10-15 years of experience, 28% have from 5 to 10 years of experience, and 5% have less than 5 years of experience. Considering the participants' academic qualifications, 84% of the participants have bachelor's degree as their minimum level of education, with 14% holding master's degree, and 5% holds PhD degrees. Considering the participants' working position at the company, the majority were the companies' owners (59%), 16% are projects managers, 5% are field engineers, 13% are administration managers, and 7% choose the final choice (others).

The survey questions were divided into two parts. The first part identifies the contractors' perceptions of the proposed risk mitigation framework. The second part of the survey identifies the contractors' perceptions towards the effectiveness of the new approach in managing risks out of contractors' control. The respondents were required to select one of five choices that reveal their agreement about each statement. The five choices are strongly agree, agree, not sure, disagree, and strongly disagree. Table 1 shows the descriptive statistics for the contractors' perceptions of the new approach in mitigating risks out of contractors' control. The answers' scale ranges from 5 for strongly agree to 1 for strongly disagree. It shows the analysis of sample response using the concept of weighted mean and standard deviation.

Table 1. Contractors' perceptions of the new approach in mitigating risks out of contractors' control.

#	Question	%					Mean	Sd
		Strongly agree	Agree	Not sure	Disagree	Strongly disagree		
1	The existence of an expert project manager with the contractor (who can plan project from start to end and can identify all activates out of contractor control) is essential to the success of project.	85.03	13.61	0.00	1.36	0.00	4.82	0.48
2	When contractors make a milestone schedule for a project, they should identify and include all risks and activities of client and other related parties in the plan.	53.74	36.05	6.80	2.72	0.68	4.39	0.79
3	Following up with risks and activities of project parties by reminding them what, when, and how to manage them, would help responsible parties to act better to perform their tasks.	53.74	38.10	5.44	2.72	0.00	4.43	0.72
4	Being transparent by sharing with project's parties a weekly update of all upcoming activities and risks that need to be managed will help and motivate those responsible to be more accountable for their activities.	54.42	38.78	4.76	1.36	0.68	4.45	0.71
5	Identifying activities' deviations from the planned schedule and cost, explaining why the deviation occurred and identifying the responsible party would help in measuring all parties' performance.	40.14	49.66	7.48	2.04	0.68	4.26	0.74
6	Being transparent by sharing with project's parties a weekly update of all parties' performance information will help and motivate them to be more accountable for their activities.	44.90	45.58	6.80	2.72	0.00	4.33	0.72
7	The addition of projects plans that include all parties' activities in the project contracts will help the parties to comply with their responsibilities.	62.59	32.65	4.08	0.68	0.00	4.57	0.61
8	Contractor who is doing the work is the best party that can prepare the weekly reports to mitigate and measure project activities and risks and client or consultant can review the report.	46.26	38.10	6.80	6.80	2.04	4.19	0.97
Effectiveness of the new approach in mitigating risks out of contractors' control								
1	The identification and mitigation of project parties' risks by the contractor (by knowing how they will manage or minimize the risks) will help in reducing risks' affects.	45.58	48.98	4.08	1.36	0.00	4.39	0.63
2	If the contractor makes a milestone schedule for project plan from beginning to end that includes risks and activities of all stakeholders and measures all parties' performance during projects, this will increase the performance of the project.	54.42	36.73	7.48	1.36	0.00	4.44	0.69

The developed risk mitigation model shown in Figure 1, focuses on increasing accountability of project parties through mitigating parties' activities and risks with measuring their deviations (time and cost) and identifying sources of deviations. Transparency is utilized in the model through sharing weekly updates of the activities and risks combined with updated information of performance measurements of project parties. The practical framework in mitigating risks out of contractors' control consists of a Weekly Risky Report (WRR) that includes a project activities schedule & milestones table that identifies project activities with their responsible party,

percentage of completion, and deviation from the planned schedule. Secondly, the WRR includes a project risks deviations table that identifies the plan to minimize risk deviation, effect of risk on the planned schedule and budget, explaining why the deviation occurred and identifying the responsible party. Finally, the WRR includes a performance measurement table, which identifies the performance measurements of project and project parties based on deviations from the planned schedule and budget. The contractor is responsible for maintaining the WRR and sending it out weekly with project parties. The client's project manager or consulting engineer would be used to ensure that contractor is keeping the dominant performance information of time and cost deviations along with explaining the risk, why it occurred, and identifying the responsible party.

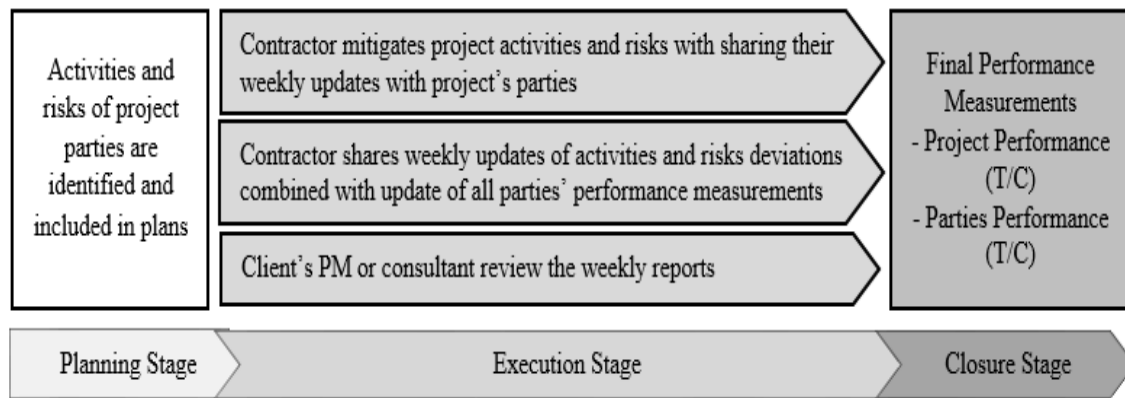


Figure 1. Risks out of contractors' control mitigation model.

4 CONCLUSION

The analysis of the collected data revealed the contractors' perceptions of the new approach in mitigating risks out of contractors' control. According to contractors' views, the activities and risks of all project parties should be identified, included in project plans, and added to project contracts to help project parties to comply with their responsibilities. The study results showed that accountability of project parties increases when contractors mitigate activities and risks and measure deviations with identifying sources of deviations. Furthermore, accountability also increases when transparency increases through sharing weekly updates of upcoming activities and risks with project parties combined with the updated information of performance measurements with updating project parties' performance information.

The study results identified that contractor is the best party that can maintain and distribute the weekly reports to mitigate and measure the project activities and risks and client or consultant can review the report. In this procedure, the client's project manager or consulting would be used to ensure that the contractor is keeping the dominant performance information of time and cost deviations along with explaining the risk, why it occurred, and identifying the responsible party. This assurance process is necessary to make sure contractors are performing the risk management and quality control process that can minimize deviations in project schedule and budget. The analysis of the study results showed that project risks will be minimized and performance of projects will be increased if contractors shift their focus using the new model from only managing their own activities and risks to managing all project parties' activities and risks.

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