

# CONTINGENCY PERCEPTIONS OF TRADITIONAL VERSUS COLLABORATIVE-BASED CONSTRUCTION CONTRACT CLAUSES

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Although contracts are viewed mostly as legal documents whose main objective is to manage risk, its clauses reflect the collaboration level expected between parties. The objective of this paper is to empirically investigate the contracting parties' perception of collaboration in contract clauses and their correlation to the risk allocation (depicted by the contingency percentage allocated by contracting parties). Through surveys administered to both owners and contractors, survey participants were presented with different project scenarios, including varying degrees of 1) risk allocation in contract clauses (contract collaboration level), 2) project site conditions (project risk level), as well as, 3) prior working relationship with the other contracting party (trust level). Based on these scenarios, participants were asked to allocate a contingency percentage (perception of risk). Results show that clauses identified as low-level collaborative clauses are highly correlated with high contingency percentages. In general, participants representing owners tend to place a lower contingency percentage compared to contractors in all the presented scenarios. This finding reinforces the need to communicate risk perceptions between parties to align their expectations, and thus their estimates of an adequate contingency percentage, ultimately reducing unnecessary project costs. The study also highlights the importance of developing balanced contracts that reflect the trust level exhibited between the parties.

*Keywords:* Contracts, Collaboration, Risk, Differing site conditions.

## 1 INTRODUCTION

Although contracts are viewed mostly as legal documents whose main objective is to manage risk, its clauses reflect the collaboration level expected between parties. Contractual relationships are also based on the amount of trust between parties involved in a contract; the level of trust or mistrust can possibly lead to an increase in the contract cost. It is perceived in the construction industry that the increase in the cost of a contract is related to the percentage contingency that the contractor places based on the amount of trust between both parties (Zaghloul and Hartman 2002a), and the level of risk allocation in the project contract clauses. The objective of this study is to empirically investigate these perceptions of the contracting parties and quantitatively determine their correlation to the contingency allocation. Differing Site Condition clause (DSC) was used as an example through excerpts of different types of contracts that vary in the risk level borne by contractors and owners. DSC was specifically selected as it reflects a highly debatable clause that frequently leads to claims and disputes between owners and contractors on construction projects. The paper starts with a summary literature review of pertinent work, followed by the methodology used, results and analysis, and finally, conclusions are presented.

## 2 LITERATURE REVIEW

Since the purpose of the study is to investigate the relationship between the three variables identified as the contract clause collaboration level, level of trust between parties, project risk level, and the contingency percentage, this section will present studies pertinent to the work that has been conducted in these areas.

Construction projects have mostly relied on contracts that define and enforce the contracting parties' responsibilities and rights (Cheung *et al.* 2006). These include standard forms of traditional contracts, such as the American Institute of Architects (AIA) A201-2017 General Conditions of the Contract for Construction (AIA 2017). However, the importance of teamwork on construction projects necessitated the need for partnering approaches to project delivery, including relational contracts that reflect trust and encourage communication (Cheung *et al.* 2006). Such forms include Integrated Project Delivery (IPD) contracts that Alves and Shah (2018) describe as having "more instances where collaboration-related words and practices are indicated." All forms of contracts' objective are to allocate risks appropriately between the parties to avoid contractors not bidding due to unfair risk allocation, contractors assigning high contingency values for such risks, or disputes arising after award. DSC is one of the significant reasons leading to claims and disputes on construction projects due to the contractor encountering different site conditions than those depicted in the contract. DSC clauses could be drafted with varying degrees of risk allocation (Mahfouz 2009). These clauses, like any other, end up with contractors trying to assess the risks entailed and allocating a contingency amount accordingly. Thus, reflecting the parties' perceptions of risks.

**Trust between contracting parties.** Trust is defined as the belief that one can rely on the goodness, strength, and ability of somebody or something (Oxford dictionaries 2010). Many researchers addressed the significance of trust in construction contracts. One study analyzed 220 samples in China and concluded that "A positive relationship exists between uncertainty and the supplier's opportunistic behavior, including both environmental and behavioral uncertainty" (You *et al.* 2018). Other studies aimed to distinguish trust and categorize it. For example, a study by Wong *et al.* (2008) categorized the assessment of trust into system-based, cognition-based, and affect-based. System-based trust reflects the organization's formal and procedural arrangements, not including any personal experiences, and is developed through organizational policy, communication system, and formal agreements. Cognition-based trust is developed based on the parties' previous experience on similar projects. Affect-based trust is mostly based on personal and emotional bonds between individuals, which decreases defensiveness, unhealthy competitiveness, and eliminates frictions (Gad 2012).

**Project Risks.** Construction projects are accompanied with risks. Risk in construction projects can be identified as possible events that might occur over the duration of a project, having implications on project performance (Gad 2012). Risk allocation in contracts is used to transfer certain risks to various parties. Researchers studied the relationship between trust and risk in contracts. Through Zaghoul (2003) study, it was seen that when contractors are faced with disclaimer clauses, they cannot manage; they either add a contingency or insure it, which translates to higher bids. Proper risk allocation among parties is thus essential for project success, and thus should be allocated using proper risk management techniques (Zaghoul and Hartman 2002a), including balanced contracts.

**Contingency Allocation.** Contingency is defined as "the percentage of construction budget that is put aside to accommodate for unknown factors and uncertainties connected to the project" (Lam 2017). The amount of contingency is usually determined as a percentage of the total cost of the project. Some agencies, such as the US Army Corps of Engineers mandate a fixed 5%

contingency amount, while others such as the US Department of Energy (DOE) binds the contingency issue to the project's characteristics, such as the status of design, construction; and the complexity and uncertainties of the component parts of the project (Gransberg *et al.* 2011). It is evident, however, from previous research that the relationship between the parties involved is not taken into consideration when determining the amount of contingency of a project (Zaghloul and Hartman 2002b, Gad *et al.* 2016).

### 3 METHODOLOGY

To achieve the study objective, online surveys targeted to both parties involved in the formation and negotiation of construction contracts, contractors, and owners (or parties representing them), were used. The survey was divided into two scenarios, each tailored to either a contractor or an owner respondent. Participants were prompted to their respective sections using a filtering question at the beginning of the survey. The contractor's section asked the participant to determine the amount of contingency they would allocate if they were to bid on a contract given various levels of project risk, trust, and DSC clauses. The owner's section asked owners to determine an appropriate contingency amount they think contractors would allocate. The two sections read as follows:

- Contractor Scenario: *“Assume you are a contractor bidding on a \$500 million low-bid Design-Bid-Build project (selection based on lowest responsive responsible bid). Below are 3 different options of the DSC clauses that the owner could have used in their contract document with you. Based on (1) different levels of trust identified in the first column below, and (2) the corresponding different project characteristics, please select -based on your experience- the appropriate range of contingency percentage that you would allocate for each of these scenarios and trust levels.”*
- Owner Scenario: *“Assume you are in the selection phase of awarding a \$500 million Design-Bid-Build project for the lowest responsive responsible bidder. Below are 3 different options of the DSC clauses that you could have used in your contract with the contractor. Based on (1) different levels of trust identified in the first column of the table below, and (2) the corresponding different project characteristics, please select an appropriate range of contingency percentage that you think the contractor would allocate for each of these scenarios and trust levels.”*

**Contract collaboration/risk level - DSC.** The first independent variable, which is the contract collaboration level, was measured using three different DSC clauses from three contract forms developed by different professional organizations, representing different parties. These DSC clauses' options will highlight whether the amount of contingency will vary based on the collaboration/risk level of the clause. The first DSC clause was extracted from AIA-201 contract form primarily developed by architects, and perceived to allocate more risk to the contractor. The second DSC clause was extracted from the American General Contractors (AGC) 200 contract, developed by contractors and perceived to allocate more risk to the owner. The third DSC clause was extracted from AIA IPD Contract C191, known to balance the risk between the parties.

**Trust Levels – Cognitive and Affect-based.** The second dependent variable is the level of trust. Cognitive and affect-based trust were used to measure trust between contracting parties, as they describe the trust developed based on the party's qualification, and knowledge of each other prior to contract negotiation, respectively. System-based trust was assumed to be consistent throughout all scenarios as the respondents were asked to assume dealing with one organization. Cognitive-based and affect-based were categorized into three levels of trust. For example, for the contractor's survey section, trust was defined as follows:

- Trustworthy: You are bidding on a project in which you worked with its owner before with whom you have had a positive experience (*Cognitive-based*). They knew their responsibilities in the contract and fulfilled them, and they completed the job in a professional timely manner (*Affect-based*).
- Neutral: You have never experienced working with this Owner on a project before (*Cognitive-based*) and this is your first working relationship with this party (*Affect-based*).
- Not Trustworthy: You worked with this Owner before and had a negative experience, such as payment and schedule delays (*Cognitive-based*). However, you must bid on this project.

**Project Risk Levels - Site Conditions.** The third dependent variable is the project site conditions. Three levels of risk were provided, as explained below:

- High Risk Scenario: Assumes the project is within a brown space, have high possibility of containing hazardous materials, the site's weather has effects on the site conditions, and the site's conditions have experienced major changes in the past.
- Medium Risk Scenario: Assumes the project is within a green space, has a 50% chance of containing hazardous materials, the site's weather might influence the site conditions, and the site's conditions have experienced slight changes in the past.
- Low Risk Scenario: Assumes the project is within a green space, have a low possibility of containing hazardous materials, the site's weather has no effect on the site conditions, and the site's conditions have not experienced any changes in the past.

**Contingency.** The dependent variable is the amount of contingency allocated by the contractor. The contingency percentage was assigned five ranges from which respondents would select based on each of the scenarios presented: 0%, 0.1-2%, 2.1-4%, 4.1-6%, and more than 6%.

To summarize, each survey section included a table for each DSC option with three levels of trust (Trustworthy, Neutral, Non-Trustworthy) and three levels of project risks (Low, Moderate, High). For each level of trust and project risk, respondents were asked to provide the contingency they would give for each scenario and DSC clause. The hypothesis below was tested to determine the relation between the three independent variables and the dependent variable:

*H:* There is no significant difference between the percentage contingency selected by the contractor and the owner respondents.

Data collected from the survey was analyzed using the SPSS Statistical Software. For the hypothesis, t-test was used to determine if there is a significant difference between the means of the two groups, owners, and contractors.

## 4 RESULTS AND ANALYSIS

Surveys were sent to 83 potential respondents, including contractors, owners, and owner representatives. Thirty out of 83 responded (36% response rate). Eighteen were complete, and thus were considered for further analysis. Eleven responses were from owners or owner representatives (consultants, lawyers, and contract managers), and the rest were from contractors.

### 4.1 Descriptive Analysis

*Respondents' demographic data.* Most respondents (89%) had more than 15 years of experience negotiating construction contracts. Respondents had experience working with infrastructure projects (69%), commercial (19%), and a combination of both (12%). Only responses from contractors working as Operation Managers, Chief Estimators, Area Managers, and Project Managers with more than three years of experience in negotiating contracts were considered.

*Comparing owner versus contractor contingency amounts.* The effect of the DSC clause type, risk and trust levels on the contingency amount perceived by contractors and owners was analyzed. As shown in Figure 1, based on the responses received, contractors tend to place a higher amount of contingency compared to owners for the AIA (mean of 2.8% versus 2.4%) and the IPD clauses (mean of 2.5% versus 2.1%). However, the contractor places a lower amount of contingency (mean of 1.8% versus 2.1%) for the AGC clause. As for trust, contractors selected a higher amount of contingency compared to owners in high trust (mean of 2% versus 1.7%) and low trust (2.9% versus 2.6%) scenarios, regardless of the amount of risk or the type of DSC clause. However, the analysis shows that the contractor places a slightly lower amount of contingency in medium trust scenario than that assumed by the owner (mean of 2.2% versus 2.3%). Finally, for varying project site conditions, i.e. risk levels, the analysis shows that the amount of contingency placed by the contractor is lower compared to the owner for low risk (mean of 2% versus 2.3%) and medium risk (2.2% versus 2.3%) scenarios regardless of trust level or the type of DSC clause. However, the contractors tend to place a higher amount of contingency in high risk scenarios compared to the owner (mean of 2.9% versus 2.1%), which was the highest reported difference in contingency percentage between the two groups.

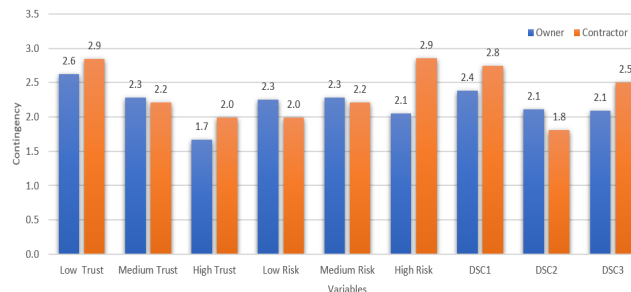


Figure 1. Relation of different variables (Trust, Risk, & DSC Clause) to contingency amount.

## 4.2 Inferential Analysis

Even though the descriptive analysis reveals a difference in the contingency amounts selected by owners and contractors for different scenarios, further inferential analysis was conducted to test the hypothesis chosen in this research.

*Hypothesis - Comparing Owner and Contractor perceptions.* To compare the perceptions of owners and contractors, one sample t-test was performed. There was a significant difference in the contingency amount selected by the Owner (Mean = 1.83, SD=1.795) and Contractor groups (Mean = 2.07, SD=2.136);  $t(485) = 20.223, p = 0.00001$ .

The analysis conducted shows that the only DSC clause with contractors placing a lower contingency amount compared to owners was the AGC DSC clause, which is drafted by contractors. The highest contingency amount difference was seen in high project risk scenarios, where owners placed the least amount compared to contractors, showing a remarkable difference in perception of risk. In general, in most scenarios - low and high trust, high risk, AIA and IPD DSC clauses, contractors tend to place a higher amount of contingency compared to that the owner assumes they will place. This shows that there is a difference in how both contractors and owners perceive risks in both the contract and the project. Comparing the results using inferential tests prove that this difference is statistically significant. This analysis proves empirically that the magnitude of perceived risks by both parties is not aligned, which often results in conflicts during contract negotiations or even after contract award when changes are being negotiated.

## 5 CONCLUSION

The amount of contingency is the contractor's quantification method of risk in the bid price. Different factors have different effects on the amount of contingency placed by the contractor. To find the significance of such factors and the parties' differing perceptions of such risks, a hypothesis that aim to determine the difference between contingency allocated by owners and contractors was tested. An in-depth analysis into each party's results shows that both parties agree on the significant relationship of two of the three independent variables while disagree on the third. The major contribution of this study is that it empirically provides evidence of the varying risk perceptions of owners and contractors, whether in terms of contractual or project risks. It also addresses the effect of level of trust on the contingency percentages and proves that different levels of trust have significant effect on the amount of contingency from the perspective of both owners and contractors. It is important to note that the results of this study should be taken with caution due to the small sample size. Thus, the future study recommendations are to increase the sample size and include additional clauses related to the riskiness (collaboration level) of the contract to investigate their effect on the contingency amounts. A greater sample size might help in understanding the different perspective of both parties resulting in creating a contract that is tailored to the expectations of both and thus resolving issues between them in the future.

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