

Alvanchi, A., Hosseini, S. M. T., Nili-Ahmadabad, M. H., & AmiriDiba, A. (2020). Improving public-private partnership project procurement, addressing major shortfalls in the standard-form contract. *International Journal of Procurement Management*, 13(4), 482-506.

## **Improving Public-Private Partnership Project Procurement, Addressing Major Shortfalls in the Standard-Form Contract**

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### **ABSTRACT**

Standard-form contracts facilitate the sophisticated public-private-partnership (PPP) procurement process. Special care should be taken during the preparation of these documents since any remaining flaws affect subsequent projects. Reviewing the standard-form contract capabilities after its application help to identify its major flaws and improve the contract clauses. This research proposed a novel structured method to address this need and verified its capability. In the proposed method, a comprehensive list of risks is first created for the PPP projects in the specified project environment. The identified risks are prioritized to highlight the priority of the required adjustments in the contract, contractual responses to all risks are then assessed, and improvements are recommended through a

novel expert consensus approach. The method was applied to the PPP standard-form contract in Iran. Among 21 identified risks, nine contract risk responses were found reasonable; nine risk responses were found partial; no contract risk response was found for three risks.

*Keywords: PPP project; contract risk response; risk prioritization; standard-form contract; Iran*

## **1- INTRODUCTION**

Alternative methods of financing infrastructure projects are taken into account by the public sector due to the governmental budget constraints and the increasing demand. Among different financing methods, public-private partnership (PPP) has been appreciated as an efficient method in delivering infrastructure and public service projects (Shang et al., 2017; Ke et al., 2009; Lewis and Roehrich, 2009). Taking advantage of the private sector's technical expertise, management skills, and specialized technologies are some benefits of PPPs. These advantages encourage governments to turn to these types of procurement methods and increase the number of infrastructure projects performed (Ke et al., 2009; Eadie et al., 2013; Williams, 2014; Wang et al., 2018). PPP projects, however, are highly subject to the risk over the project life cycle. In a PPP project, the public party seeks to maximize public welfare while the private party seeks the maximum profit (Soomro and Zhang, 2013). This divergence between the main stakeholders increases the risk of disagreements and disputes in PPP projects.

Additionally, a single PPP project often covers a wide range of phases in the lifecycle, including design, construction, operation, and maintenance (Oyegoke et al., 2009). Embedding contractual requirements of a PPP project in a single contract sophisticate the contracting process and increases the project risks considerably. Risk management has been identified as one of the most critical success factor (Ke et al. 2010; Adetola et al., 2013; Kavishe et al., 2018; Wang et al., 2018) and a research frontier in PPP projects (Song et al. 2016).

Project contracts are an important means in the project risk management process. They can outline risk allocation among different contract counterparts and highlight responses to the possible risks in the project. The critical role of PPP contract documents has encouraged researchers to focus on the contractual risk management. Wang et al. (1999) investigated the adequacy of key contract clauses in a PPP power plant project in China in response to the political and emergency risks using international practitioners' perspectives. They recommended adjustments to the contract clauses as a result.

Marques and Berg (2011) found risk allocation between public and private sectors inadequate in PPP contracts in Portugal. They proposed updates to the contract clauses to balance the contract. Brandão et al. (2012) analyzed risk mitigation strategies utilized in the PPP contract of Metro Line 4 project in Sao Paulo through the analysis of the real options. They added new clauses to the contract to reduce the risks and increase value for money considerably. Cruz and Marques (2013) found a flexible contract concept in PPP projects would enhance value for money.

Van Den Hurk and Verhoest (2016) investigated the significant advantages of PPP standard-form contracts such as encouraging competition and reducing transaction costs. They also found that the realization of these advantages highly depends on the public party's attitude on how a standard-form contract should be used, i.e., as a guideline document or as a control tool. Demirel et al. (2017) focused on the potential changes in the pre-contract phase of PPP projects and found that providing PPP projects with flexible contractual mechanisms can improve these projects. Wang & Zhao (2018) explored how different PPP project elements, including the selection process of the private party, financial arrangement, contractual risk allocation, and project specification, can affect the project performance. Nguyen et al. (2018) analyzed the contract structure of 21 PPP highway projects in the US to identify the trend of contractual risk allocation.

Different countries and organizations have prepared PPP contracting guidelines, regulations, and standard-form contracts. PPPIRC (2018) reports on the set of PPP laws, guidelines, and standard

contract forms for 149 countries. PPP standard-form contracts of South Africa (National Treasury 2004), New Zealand (The Treasury 2013), Iran (PBO 2015), the United Kingdom (HMT and IPA 2016), and The World Bank (2017) are among the instances. Here, PPP standard-form contract is considered as a facilitating tool for the complex contracting process of the PPP projects (Van Den Hurk & Verhoest, 2016). Current shortfalls in the standard-form contracts, however, can be populated to various PPP projects adopted these standard-forms in their contract documents.

Different public and private parties in the country can suffer as results of the existing shortfalls. Despite the efforts made in the preparation of standard-form contracts, flaws in the standard-form contracts show up after the project implementation. Methods to identify and eliminate these flaws can prevent the occurrence of similar problems in the future. Many standard-form contract shortfalls show up in response to the project risks. Evaluating the responsiveness of the past projects to the prevalent risks is an approach to be followed for identifying and eliminating the existing flaws in the standard-form contracts. Current research proposed this approach to improve PPP projects implementation by enhancing the capability of the applicable standard-form contracts in response to the prevalent project risks.

## **2- METHODOLOGY**

This research proposed a novel structured method was proposed in to improve PPP standard-form contracts. The capability of the proposed method was verified in the specific conditions of PPP projects in Iran. The proposed method in the research consists of five main steps. In the first step, the global PPP research efforts focused on identifying PPP risks are reviewed. A comprehensive list of risks identified is prepared in different research efforts. Subsequently, in the second step, the identified global risks are localized for the specific condition of the project environment. In this step, the comprehensive list of risks is presented to the group of PPP experts in the project environment, e.g., a specific country. Inapplicable global risks to the specific condition of the project environment are removed and missing locally applicable risks are added. In the third step, a questionnaire survey

among PPP project experts is conducted to prioritize the PPP project risks in the project environment. Here, high attention needs to be paid to the contract responsiveness to the high-priority risks. In the fourth step, the contractual risk responses to different risks are extracted from the PPP standard-form contract by thoroughly reviewing the contract clauses. In the fifth step, the adequacy of the responses is assessed by the group of experts through an expert consensus convergence method. Figure 1 presents these five steps.

### **3- METHOD IMPLEMENTATION IN THE PPP STANDARD-FORM CONTRACT OF IRAN**

The Iranian government plans to attract near \$600 billion in its infrastructure projects in the next ten years (Ambrose, 2017). The majority of these projects is implemented with the participation of the private sector (IPI, 2017) in the form of PPP. In recent years, PPP contracts of more than 4,000 projects with a value of 12 billion USD have been signed (PBO, 2018). According to the feedback received from the planning and budget organization (PBO), the regulatory body in charge of PPP projects, existing flaws have suffered implementation of many PPP projects in the country. The proposed method in the research was implemented for the applicable standard-form contract in Iran to address the existing shortfalls and improve the contract document.

#### **3-1- Identification of Global PPP Project Risks**

Risk identification in PPP infrastructure projects is a challenging job due to the projects complexity, high volume of work, long implementation period, and project-specific conditions (Ng and Loosemore, 2007; Lee and Schaufelberger, 2013). The titles and the number of identified risks vary in different PPP research efforts. For example, Grimsey and Lewis (2002) identified nine risks, Li et al. (2005) identified 46 risks, Chan et al. (2010) identified 34 risks, Wibowo and Mohammed (2010) identified 39 risks, and Hwang et al. (2013) identified 42 risks. The wide range of PPP project risks identified in different research efforts originates from the cultural, socio-political, and economic differences in different countries (Thomas et al., 2003; Osei-Kyei and Chan, 2017).

This research extracted a comprehensive list of 66 different risks from various past PPP risk identification efforts, presented in Table 4 of the Appendix. In most reviewed studies, PPP project risks were classified into three different levels, which was also adopted in this research. At the first level of the risk classification, risks were divided into two main categories of 1) external risks and 2) internal risks. At the second level, the external risks were subcategorized to the political, economic, social, legal, and natural risks. Contract development, financing, design, construction, operation, and management were subcategories under the internal risk category. Different identified risk items fall under their corresponding subcategories at the third level.

### **3-2- Identifying PPP Project Risks in Iran**

The checklist of 66 PPP universal risks was discussed with five PPP experts with more than ten years of experience to extract an initial list of applicable PPP project risks in Iran. Three experts were practitioners, and the other two were academicians. As a result of the expert consensus, several global risks were identified as irrelevant to the current condition of the country, several were merged and one new risk was added. For example, the risk of union strikes was identified as irrelevant and removed from the list since construction work in Iran is not done by union workers. The government instability and unfavorable political condition risks were identified, overlapping and merged. The risk of sanctions was a new risk identified for the specific condition of Iran.

Consequently, an initial list of 21 risks in PPP projects of Iran was formed. Further investigation on the inclusiveness of the identified risks was also conducted in two PPP project cases in the country. The first case study was Isfahan-Kashan 160 km freeway in the central-Iran. The second case study was Zahedan desalination plant project on the east of the country for producing 20,000 cubic meters of potable water a day. The list of 21 risks was discussed with both project teams to verify the inclusiveness of the list. In both cases, no additional risk was identified and the list of 21 risks was deemed complete. Table 1 represents the identified risks of PPP projects in Iran.

### 3-3- Risk Evaluation of PPP Projects in Iran

Identified risks were evaluated and ranked in a questionnaire-based survey using five-level Likert scale questions. In the design of the questionnaire, the research team members argued that the survey reflects the collective judgment of the respondents over the years. Therefore, survey respondents can more appropriately evaluate the overall importance of the identified risks than separately indicating the risk likelihood and severity. The target statistical society of the survey was experts with at least five years of experience in PPP projects in Iran.

The PBO was approached for directing the research group to the target respondents. First, a pilot study was conducted among eight experts with at least ten years of experience; minor updates were made to the questionnaire as results. The minimum required sample size of 25 was estimated in the pilot study according to the Cochran's adequacy formula (Cochran, 2007) with a 95% confidence level and permissible error of 0.2. The questionnaires were distributed by email among 30 experts; 27 responses were returned, 12 from the private sector and 15 from the public sector. The high response rate of 90% was due to the direct involvement of the PBO in the process. Table 2 presents the profile of the respondents.

SPSS was used for analyzing the collected data. Cronbach's alpha value of 0.920 affirmed the reliability of the responses. Achieved chi-square value of 272 compared to the critical chi-square value of 40 implies an agreement between the survey respondents (Cheung and Chan, 2011). Table 1 presents the relative importance index (RII) of different risks calculated based on Equation 1:

$$\text{RII of risk } i^{\text{th}} = 100 \times \frac{\sum_{j=1}^{N_i} R_j}{5 \times N_i}; i = 1 \text{ to } 21 \text{ (total number of risks identified)} \quad (1)$$

$N_i$ : Number of valid responses of risk  $i^{\text{th}}$

$R_j$ : Score received for the risk from the  $j^{\text{th}}$  respondent

### 3-4- Risk Response Assessment of Iran's PPP Standard-Form Contract

The capability of the standard-form contract was examined to respond to the identified risks properly.

The consensus of eleven participants was sought with more than twelve years of relevant experience

in the risk assessment process. The majority of these participants were working in high managerial positions; it was difficult to set multiple appointments with them. Therefore, a customized approach was designed for reaching the consensus. First, the research team assessed the contractual risk responses and made initial recommendations. Then, the achieved results were discussed with the first group of four experts. Recommendations received from these experts were summarized and concluded by the research team. The achieved results were again presented and discussed with the second group of three experts. The concluded results from the second group of experts were taken to the third group. The consensus was reached among four members of the third group of experts and they proposed no modification.

Figure 2 summarizes steps taken in the risk response assessment process. In the rest of the section assessment results for the identified risks are presented. Identified risks are presented based on their achieved priorities. First, the negative impacts of each identified risk are explained. Then, related responses in the current PPP standard-form contract (PBO, 2015) are analyzed. Finally, concluded recommendations are provided.

### **3-4-1- Inability of Private Sector in Project Financing**

The inability of a private sector to properly supply the financial requirement delays the project implementation and increases the cost as a result. This risk is divided into two periods: 1) after the contract is signed and before it comes into effect, and 2) after the contract comes into effect.

#### *Contract response:*

The risk occurs in the first period is addressed in Appendix 7 of the standard-form contract, where providing proof of the project financing is set as a precondition for making the contract effective. If the private sector fails to fulfill this condition, the public sector is eligible to cash the private sector's performance bond and take the indicated penalty by Clause 4-4. The inability of the private sector in financing investment costs in the second period might happen if project costs go beyond the



guaranteed financial support. Clause 27, the cancellation clause, entitles the public sector to dismiss the private sector if it becomes unable to fulfill its committed progress.

*Risk analysis:*

The response given to this risk was found appropriate for the first period and incomplete for the second period. In the second period, by the dismissal of the private sector public sector takes total responsibility for the project. A risk the public sector initially was not interested in or able to take.

*The recommended response:*

This risk is related to an essential obligation of the private partner (APMG, 2017). To mitigate this risk, it is recommended that the public sector becomes entitled to attract new financing sources. The public sector should be entitled to penalize the private sector based on the amount of money that failed to supply. Cash penalties, decreased rate of return, or reduced operation duration can be considered. For completing the project, the public sector can opt to continue the project under management of the current private sector, transfer it to a new investor, or take over the project management itself.

### **3-4-2- Delay in Obtaining Necessary Permissions and Land Acquisition**

The extensive geographical scope of many PPP infrastructure projects increases the chance that these projects confront areas with specific permissions required. Some examples are areas with mining, historical, or natural values and right-of-the-way acquisition requirement. This risk can delay the entire project and increase the project's cost.

*Contract response:*

This risk was not addressed in the contract.

*Risk analysis:*

Reducing this risk requires close involvement of various stakeholders in different parts of the projects, including feasibility study, design, and construction. Despite prior coordination, there is still a chance

that permissions are not acquired according to the schedule. The contract should contain proper clauses for supporting this risk.

*The recommended response:*

Contractual responses for this risk should be proportional to the source of the risk. The risk can happen due to the negligence of one contract party or a third party. In cases that the private sector is responsible, the resulting damage was deemed unjustified and liquidated damage was proposed. If the issue occurs due to the public sector or a third party hindrance, the private sector deserves compensation. A new clause is proposed to be added to the contract to reflect the abovementioned response in the contract.

### **3-4-3- Unexpected Increase in the Exchange Rate**

An important consequence of this risk is an increased cost of the imported materials, parts and equipment.

*Contract response:*

Appendix 10 of the contract, the strategy of the price adjustment, intends to offset the impacts of the exchange rate increase. Cost adjustment criteria for different project components are specified in this appendix.

*Risk analysis:*

A mechanism should be seen in the contract for the private sector to take the risk for the trivial negative impacts of the risk on the project's internal rate of return. Cost adjustment is made if the exchange rate affects the rate of return beyond a specified threshold. Adjustment methods, such as increasing the private sector's operation period and subsidizing some parts of the project by the government, might be included in the contract.

*The recommended response:*

A new clause needs to be added to the contract to link the specified levels of changes to the accepted rates of return. The private sector should be in charge of reporting the breach of the specified thresholds and preparing its proposed solution by the agreed risk response method.

#### **3-4-4- Government Change and Changes Made to the Governmental Law and Policies**

The government change may harm its support for the project and result in the construction delays, cost increase, reduced project demand, and interrupted project implementation and operation.

##### *Contract response:*

Clause 32 of the contract indicates if new the governmental law and policies cause the cost to increase or project delay, the project's milestones are updated to impose no related damage to the private sector. In cases, this risk adds the operation costs or reduces productivity during the operation period, the public sector adjusts the product cost to nullify the negative impacts of the risk. If the public sector discontinues its obligations for 180 days, the contract allows the private sector to cancel the contract and claim for the damages incurred.

##### *Risk analysis:*

The response was found reasonable.

#### **3-4-5- Mistakes in Preliminary Studies Conducted by the Public Sector**

This risk may bring about design errors, construction errors, poor quality, increased costs, decreased revenues and project delays.

##### *Contract response:*

This risk was not addressed in the contract.

##### *Risk analysis:*

Preliminary studies conducted by the public are usually intended to determine the scope of the project. In cases the information provided by the public sector is partial, the private sector is responsible for either completing the information or asking the public sector to complete it. However, in cases the public sector falsifies the information it is responsible to provide, the public sector is in charge of the

related mistakes (Nguyen et al., 2018). In this situation, incurred damages are deemed compensable by the public sector.

*The recommended response:*

A clause should be added to the contract indicating if the information is misrepresented by the public sector while the public sector is contractually accountable for providing them, the public sector is responsible for the resulting damages to the private sector. To cover the resulting damages, the private sector deserves to be compensated by updating the project milestones, increasing the project's product price, or receiving the penalties from the public sector. The extent of the damages should be justified in a damage report prepared by the private sector.

#### **3-4-6- Fluctuation in the Inflation Rate and Price of Primary Materials**

Highly increased costs can result in the project delay and the reduced internal rate of return.

*Contract response:*

Appendix 10 of the contract, the strategy of the price adjustment, is intended to counteract the impacts of high fluctuations in the inflation rate. It describes adjustable project costs and the adjustment criteria for different project cost items.

*Risk analysis:*

Similar to the analysis made for the risk of change in the exchange rate (Section 3-4-3), here, it is proposed that the adopted internal rates of return become the base for the updates to the financial agreement.

*The recommended response:*

Adjustments should be made to the contract according to the agreed levels of changes in the rates of return. Methods such as extended operation term, the public sector money investment, or subsidies from the public sector, can be considered based on the private sector's report.

#### **3-4-7- Failure to Properly Manage Contractual Disputes**

Project delays increased overhead costs, and costs spent on the prolonged dispute resolution process are some negative impacts of the failure to properly manage contractual disputes.

*Contract response:*

Dispute resolution method is indicated in Clause 35 of the contract. According to this clause when a dispute arises, it is firstly dealt with the direct negotiation between two parties. In cases dispute is not resolved in the negotiation process, parties can refer to an expert or directly apply for the arbitration process. As long as the arbitration process is not completed, no party should take the dispute to court. Results achieved in the expert judgment and arbitration process are made to the court if the parties did not reach consensus.

*Risk analysis:*

Scope changes are among the main sources of the project disputes. Although a complete set of dispute resolution method is considered in the standard-form contract, the need is ignored for a proper change management method.

*The recommended response:*

A new clause elaborating on different conditions of a scope change is recommended to clearly determine procedures to follow in cases of the scope change.

**3-4-8- Reduced Project Revenue Not Resulting from the Private Sector's Mistake**

This risk endangers the private sector's profit and rate of return.

*Contract response:*

Clause 26 indicates that the private sector's investment return is compensated by selling the project's product to the public sector. If the project's revenue is reduced from the agreed level without the private sector's negligence, in addition to the product price, the public sector pays the capacity price to the private sector. If the public sector delays this payment, it is subject to the delay penalty equivalent to the bank interest rate of long-term saving accounts, announced by the central bank of the Islamic Republic of Iran.

*Risk analysis:*

Project products produced in the operation phase of PPP projects can be sold either to the public sector or directly to the clients of the built infrastructures, i.e., citizens. This contract only properly covers reduced revenue of the project in the former case where the sole customer of the project's products is the public sector.

*The recommended response:*

A separate clause should be considered if the project products directly are sold to the citizens. Here, risk distribution between the public and private sector should be clearly determined based on the project conditions. When the public sector becomes in charge of the risk, compensation should be based on the agreed levels of rate of return. Various strategies, such as increased operation period and direct subsidies can be included.

#### **3-4-9- Sanctions**

Sanctions pose problems in supplying foreign equipment and services and leave the project with limited project supply options.

*Contract response:*

In Clause 33 of the standard-form contract, international sanctions are treated as political force majeure risks. If a sanction causes a delay in the project, related project milestones are adjusted. If the project implementation or operation costs are increased, they are deemed compensable. If sanctions block the project operation, the public sector is obligated to pay a capacity charge for the project. If the public sector could not fulfill its obligations for six months, the private sector has the right to request the termination.

*Risk analysis:*

The response was found reasonable.

#### **3-4-10- Inability to Exchange Iran's Rial to the Foreign Currencies and Vice Versa**

This risk can highly affect PPP projects with foreign investors. PPP projects which require imported supplies also might be negatively affected as a result of this risk. The occurrence of this risk can delay or even stop the implementation of the project and increase the project's implementation.

*Contract response:*

In Appendix 8 of the exchanging Iran's Rial to the foreign currencies has been treated as a project permit which public party needs to obtain from the Central Bank for making the contract effective.

*Risk analysis:*

Exchanging foreign currencies to Iran's Rial has not been discussed in the contract. The public party should guarantee both directions of the money exchange and in case of inability of exchanging required currencies, the public party should be accountable.

*The recommended response:*

Another contractual precondition is recommended for the public party to obtain the required permit for the foreign to local currency exchange. It should be explicitly stated that in case of issues occurred for the currency exchange in either direction, public party compensates for the resulting damages to the private party.

**3-4-11- Technical Inability of Private Party to Operate**

As a result of this risk, the operation services might be interrupted, suspended, or even stopped. The project's revenue drops correspondingly.

*Contract response:*

Selecting a competent operating company is set as a precondition for the contract to come to effect in Clause 20 of the contract. If the private party fails to fulfill this obligation, the public party is eligible to cash the private party's bond. Furthermore, Clause 14-2-2 assumes the private party responsible for hiring and controlling a competent operator. According to this clause, the private party is also responsible for replacing the operating company if it fails to properly perform its duties.

*Risk analysis:*

The response was found reasonable.

### **3-4-12- Technical Inability of Private Party to Construct**

Delayed or stopped implementation phase are among the negative impacts of this risk.

*Contract response:*

Choosing a competent construction company has been indicated in Clause 20 of the contract as a precondition for the contract to come to effect. If the private party could not pass this criterion, the public party can cash the private party's bond.

*Risk analysis:*

The response was found reasonable.

### **3-4-13- Unclear Definition of the Project Scope**

The undesirable project output is the main result of this risk.

*Contract response:*

In the contract guideline for the corresponding public party, performing a complete project feasibility study and clarifying different aspects of the project has been indicated as a prerequisite for the project announcement.

*Risk analysis:*

The provided guideline mitigates this risk. However, the contract should clearly allocate the risk impact in case of the risk occurs during the project implementation. Clearly defining the project scope is the responsibility of the public party and the private party is eligible for compensation for the corresponding damages.

*The recommended response:*

A clause needs to be added to the contract to explicitly indicate the public party's accountability or the unclear definition of the project scope.

### **3-4-14- Imbalance clauses**



Imbalance and unfair contract clauses can increase the chance of the dispute and claims in the project. Current research proposed a new structured approach for improving the standard-form contract resulting in balanced clauses. Achieved results of PPP standard-form contract assessment are discussed in Section “3-5- Result Analysis”.

#### **3-4-15- Public Opposition to the Project**

This risk can result in project interruption, delay, and slowdown.

*Contract response:*

This risk was not addressed in the contract.

*Risk analysis:*

If public opposition against the project corresponds to the scope of the project, the public party is deemed accountable. However, in cases the public objection originates from the adopted implementation method, the private party is responsible.

*The recommended response:*

Adding a new clause to clarify each parties’ responsibilities in case of public opposition against the project is recommended. The responsible party should be held accountable for compensating damages occurred to the other party.

#### **3-4-16- Design or Scope Change Due to the Private Party’s Mistake**

Project delay, construction or operation cost overrun, and reduced service quality is among the effects of this risk.

*Contract response:*

Clause 10 of the contract obliges the private party to implement the project with prudent utility practice and has delegated the whole responsibility for the design and construction of the project to this party. According to Clause 13-5 private party is not entitled to any cost reimbursement or project duration extension for the additional time and cost incurred because of its negligence.

*Risk analysis:*

The response was found reasonable.

### **3-4-17- Poor Operation Service**

As a result of this risk quality of the operation, services might drop, or the operation services might be interrupted, suspended, or even stopped. The projected revenue can drop correspondingly.

*Contract response:*

Clause 14-2-2 assumes the private party responsible for hiring and controlling a competent operating company. According to this clause, the private party is also responsible for replacing the operating company if it fails to perform its duties properly.

Clause 14-2-2 assumes the private party in hiring and controlling a competent operator.

*Risk analysis:*

The response was found reasonable.

### **3-4-18- Natural Disasters**

Natural disasters can harm the project during the construction and operation phases. Increased cost, reduced revenue, and the delayed process can be results of natural disasters.

*Contract response:*

Clause 33 of the contract outlines responses to the special condition caused by natural disasters. It requires contracting parties to buy insurance for the project against natural disasters. Therefore, incurred damages as results of natural disasters to the contracting parties are compensable by the insurance company. In cases the compensation received from the insurance company does not cover additional costs resulting from the disaster, private party deserves extension of the operation period, and increased capacity or product price. If natural disasters delay the project implementation, project milestones are amended correspondingly.

*Risk analysis:*

*The response was found reasonable.*

### **3-4-19- Unfavorable Project Soil and Weather Condition**

This risk can increase the construction and operation costs of the project, reduce the projected revenue, and delay the project implementation.

*Contract response:*

Appendix 1 of the contract outlines acceptable weather condition, including maximum and minimum temperature, maximum and minimum humidity, rainfall, and wind. If weather condition exceeds the agreed weather condition limits, private party deserves a project duration extension in accordance with the duration of unfavorable weather condition.

*Risk analysis:*

The contractual response to the unfavorable weather condition is deemed adequate. However, no reference to the project ground condition is not indicated. In contrast to the weather condition, the quality of the ground does not change over time. The private party is responsible for properly studying the project site, determine the soil condition, and design and construct the project accordingly.

*The recommended response:*

The contract should explicitly indicate that the private party bears the risk of the unfavorable ground condition.

**3-4-20- Poor Construction Quality**

Delayed construction phase, increased construction costs, and reduced project revenue during the operation phase are among the negative impacts of this risk occurrence.

*Contract response:*

In the contract, the private party is deemed responsible for the quality of the project construction. If the private partner fails to deliver the constructed facility properly, the public party deserves compensation up to the amount of the performance bond. The poor construction quality might show up during the operation phase and affect the agreed level of service and the projected revenue during the operation phase. In the contract, the private party can receive the projected revenue for a limited time. If project revenue is decreased because of the low construction quality, the private party's

revenue is reduced correspondingly. If the low service level continues until the project operation transfer from a private party to the public party, the public party deserves compensation up to the amount of the ownership transfer bond.

*Risk analysis:*

The response was found reasonable.

### **3-4-21- War**

War can directly and indirectly negatively affect the project in various directions resulting in the increased cost and duration of the project construction, and the reduced project revenue.

*Contract response:*

In Clause 33 of the contract, war is treated as a political force majeure risk. If war causes delays in the project, the corresponding milestones are updated. If the project construction or operation costs are increased, they are assumed compensable. If war blocks the project operation, the public sector is committed to pay a capacity charge. If the public party does not meet its obligations for six months, the private sector deserves to request the termination.

*Risk analysis:*

The response was found reasonable.

### **3-5- Result Analysis**

Performed assessments in the research revealed that the PPP standard-form contract falls short to respond to the majority of identified PPP project risks appropriately. Among the 21 risks assessed in this research, only nine risks were reasonably addressed. Nine risks were partially addressed and three others were not responded in the contract. The contract, especially, falls short in properly addressing the high priority risks identified PPP projects of Iran. Among the ten high-priority risks, the contractual responses were found reasonable only for two risks. Therefore, in the current form of the standard contract, there is a high chance of increased costs, delays and contractual disputes as results of unevenly distributed or unforeseen risk transfer to the contract parties. To rectify the identified

shortfalls, improvements were recommended in different parts of the contract. Among 12 not-responded or partially-addressed risks, six risks were in favor of the public party, in four risks were both parties were affected, and two risks were in favor of the private party. In overall, the current formation of the contract was found imbalanced in favor of the public party and against the private party's interest. Table 3 lists risk responses which were found an imbalance in favor of different contract parties.

#### **4- SUMMARY AND CONCLUSION**

Standard-form contracts play critical roles in the growing demand for PPP project implementation in many countries. In this research , a novel method was proposed for improving the implementation of PPP projects with a focus on enhancing standard-form contract responses to the risks. To test the method's capabilities, the method was applied to the PPP standard-form contract in Iran. Twenty-one risks identified for the specific condition of PPP projects in Iran were prioritized, and the contract responsiveness to these risks was verified in a novel expert consensus process. As a result of this investigation, the appropriateness of contract risk responses to nine risks was affirmed. Adjustments were recommended for other twelve risks.

This research contributes to the literature by proposing a novel structured method for improving PPP projects. Although much effort is taken during the preparation of PPP standard-form contracts, the proper performance of the contract in response to a variety of project risks is not guaranteed over time. In this perspective, the proposed method in this research can be adopted by PPP practitioners and researchers in different countries to investigate and improve the performance of PPP project implementation. The inclusive list of risks created from various PPP projects, presented in Table 4, is also another unique outcome of the research. This list can be used as the main source during the risk identification process in PPP project implementation in different parts of the world. Furthermore, the list of prioritized project risks prepared in the case study can be used as an input of the risk evaluation process in the prospective PPP projects in Iran.

The proposed method of the research was designed for the countries and organizations which use the standard-form contract as the main input in their PPP project contracting process. Set of valid and prevalent PPP project risks in an environment are changed over time. Therefore, the proposed method can be adopted in the environments with recent PPP project implementation experiences and desire to implement new PPP projects in the near future. The achieved results need to be updated after a period of time. Annually, many public projects implemented in various countries are delivered by different project procurement methods than PPP, e.g., design-bid-build, design-build, and Engineering-Procurement-Construction. Similar methods to the proposed method in this research can be adopted for improving the performance of projects delivered under other procurement methods.

## APPENDIX

A comprehensive list of different risks was identified by reviewing and analyzing literature, as Table 4 shows.

**Table 4.** Universal risks identified for the PPP project in different research efforts

<b>Risks</b>	<b>References</b>
1) Bank interest rate	UNIDO (1996), Cahn et al. (2011), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017)
2) Change in standards	Li et al. (2005), Wibowo & Mohamed (2010), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015),
3) Changes in the laws	UNIDO (1996), Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
4) Corruption in government	Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
5) Decrease in demand	UNIDO (1996), Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
6) Delay in construction	UNIDO (1996), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
7) Delay in project procurement	Wibowo & Mohamed (2010),
8) Delayed or stopped operation	Grimsey & Lewis (2002), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
9) Design changing	Li et al. (2005), Cahn et al. (2011), Grimsey & Lewis (2002), Hwang et al. (2013), Chou & Pramudawardhani (2015),

<b>Risks</b>	<b>References</b>
10) Differences in work practices between the two sectors	Li et al. (2005), Hwang et al. (2013), Chou & Pramudawardhani (2015),
11) Difficulty in financing	Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
12) Effective Economic Events	Li et al. (2005), FHWA (2007), Chou & Pramudawardhani (2015),
13) Environment	Li et al. (2005), Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
14) Exchange rate	Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), FHWA (2007), Osei-Kyei and Chan (2017),
15) Failure to complete the project	UNIDO (1996), Cahn et al. (2011),
16) Force majeure	UNIDO (1996), Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
17) General opposition to the project	Li et al. (2005), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
18) Government instability	UNIDO (1996), Li et al. (2005), FHWA (2007), Chou & Pramudawardhani (2015),
19) Government weakness in decision making	Li et al. (2005), Cahn et al. (2011), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
20) Government's view on the transfer of infrastructure projects to the private sector	UNIDO (1996),
21) High changes in contract and scope	Li et al. (2005), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
22) High cost of financing	Li et al. (2005), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
23) High cost of transfer of facilities to the public sector	FHWA (2007), Chou & Pramudawardhani (2015),
24) Immature Legal System	UNIDO (1996), Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015),
25) Inability to convert project revenue into foreign currency	UNIDO (1996), Wibowo & Mohamed (2010), Chou & Pramudawardhani (2015),
26) Inadequate competition in tendering	Cahn et al. (2011),
27) Inappropriate contractual provisions	Cahn et al. (2011), Chou & Pramudawardhani (2015),
28) Inappropriate sharing of power and discretion	Li et al. (2005), Hwang et al. (2013), Chou & Pramudawardhani (2015),
29) Inappropriate sharing of responsibilities and risks	Li et al. (2005), Hwang et al. (2013), Chou & Pramudawardhani (2015),
30) Increase in construction cost	UNIDO (1996), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),

<b>Risks</b>	<b>References</b>
31) Increase in maintenance and operation costs	Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
32) Inflation rate	UNIDO (1996), Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
33) Lack of experience in providing public sector services by the private sector	Li et al. (2005), Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015),
34) Low capacities of the labor force	Li et al. (2005),
35) Low project's service fees	Cahn et al. (2011), Wibowo & Mohamed (2010),
36) Low revenue project	Li et al. (2005), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), FHWA (2007), Osei-Kyei and Chan (2017),
37) Low value of facilities at the end of the operation period	Li et al. (2005), Cahn et al. (2011), Grimsey & Lewis (2002),
38) Conflict between partners and dispute resolution	Osei-Kyei and Chan (2017),
39) Mistakes in early studies	UNIDO (1996),
40) Nationalization and Termination of Contract	UNIDO (1996), Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015),
41) Obtaining the necessary permissions for the project and land acquisition	Li et al. (2005), Cahn et al. (2011), Grimsey & Lewis (2002), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
42) Organizing and ordering	Li et al. (2005), Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015),
43) Political opposition to the project	Li et al. (2005), Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
44) Poor construction quality	Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015)
45) Poor financial market in the host country	Li et al. (2005), Hwang et al. (2013), Chou & Pramudawardhani (2015),
46) Private sector's inability to implementing	Cahn et al. (2011), Osei-Kyei and Chan (2017),
47) Private sector's lack of commitment	Li et al. (2005), Cahn et al. (2011), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
48) Productivity and low quality in operation	Li et al. (2005), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015),
49) Project ground conditions	Li et al. (2005), Cahn et al. (2011), Grimsey & Lewis (2002), FHWA (2007), Hwang et al. (2013), Chou & Pramudawardhani (2015),
50) Project's lack of financial attractiveness for investors	Li et al. (2005), Hwang et al. (2013), Chou & Pramudawardhani (2015),
51) Public sector credit	Cahn et al. (2011), Chou & Pramudawardhani (2015),



<b>Risks</b>	<b>References</b>
52) Public sector's lack of commitment	Li et al. (2005), Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
53) Reducing government control over the project	FHWA (2007),
54) Failure in signing the contract	UNIDO (1996),
55) Failure to define the project properly	Grimsey & Lewis (2002),
56) Inadequate required infrastructure	UNIDO (1996), Cahn et al. (2011), Chou & Pramudawardhani (2015),
57) Risk of intense competition in the market	Cahn et al. (2011), Wibowo & Mohamed (2010),
58) Risk of the participants' failure in the tendering	UNIDO (1996),
59) Strikes	Li et al. (2005), Wibowo & Mohamed (2010), Grimsey & Lewis (2002),
60) Supply of raw materials and labor force	Li et al. (2005), Cahn et al. (2011), Wibowo & Mohamed (2010), Hwang et al. (2013), Osei-Kyei and Chan (2017),
61) Third party's lack of commitment	Li et al. (2005), Cahn et al. (2011), Chou & Pramudawardhani (2015), Osei-Kyei and Chan (2017),
62) Unfair selection of tender winner/negotiation	FHWA (2007), Chou & Pramudawardhani (2015),
63) Unfavorable domestic and foreign political conditions of the host country	UNIDO (1996),
64) Using unproved engineering techniques	Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015),
65) War and terrorist attacks	Wibowo & Mohamed (2010),
66) Weather	Li et al. (2005), Cahn et al. (2011), Hwang et al. (2013), Chou & Pramudawardhani (2015),
67) Sanction	Identified in the current research

## REFERENCES

- Adetola, A., Goulding, J. and Liyanage, C. (2013) 'Public-private perception of collaborative infrastructure projects in Nigeria', *International Journal of Procurement Management*, Vol. 6, No. 2, pp.235–254.
- Akintoye, A., & Beck, M. (Eds.). (2009) 'Policy, management and finance of public-private partnerships', *John Wiley & Sons*.
- Ambrose, J. (2017, April 16) 'UK cautiously eyes \$600bn opportunity in Iran investment drive', *The telegraph*, (accessible from: <http://www.telegraph.co.uk/business/2017/04/16/uk-cautiously-eyes-600bn-opportunity-iran-investment-drive/>)
- APMG. (2017) 'The public private partnership certification guide', APMG International, Buckinghamshire, UK.
- Brandão, L. E., Bastian-Pinto, C., Gomes, L. L., & Labes, M. (2012) 'Government supports in public-private partnership contracts: Metro Line 4 of the Sao Paulo Subway System', *Journal of Infrastructure Systems*, 18(3), 218-225.
- Chan, A. P., Yeung, J. F., Yu, C. C., Wang, S. Q., & Ke, Y. (2010) 'Empirical study of risk assessment and allocation of public-private partnership projects in China', *Journal of Management in Engineering*, 27(3), 136-148.
- Cheung, E., & Chan, A. P. (2011) 'Risk factors of public-private partnership projects in China: Comparison between the water, power, and transportation sectors', *Journal of urban planning and development*, 137(4), 409-415.
- Chou, J. S., & Pramudawardhani, D. (2015) 'Cross-country comparisons of key drivers, critical success factors and risk allocation for public-private partnership projects', *International Journal of Project Management*, 33(5), 1136-1150.
- Cochran, W. G. (2007) 'Sampling techniques', *John Wiley & Sons*.

- Cruz, C. O., & Marques, R. C. (2013) 'Flexible contracts to cope with uncertainty in public-private partnerships', *International Journal of Project Management*, 31(3), 473-483.
- Demirel, H. Ç., Leendertse, W., Volker, L., & Hertogh, M. (2017) 'Flexibility in PPP contracts- Dealing with potential change in the pre-contract phase of a construction project', *Construction Management and Economics*, 35(4), 196-206.
- Eadie, R., Millar, P., & Toner, L. (2013) 'Public private partnerships, reevaluating value for money', *International Journal of Procurement Management*, 6(2), 152-169
- FHWA (Federal Highway Administration). (2007) 'User guidebook on implementing public-private partnerships for transportation infrastructure projects in the United States- task order', (accessible from: [https://www.fhwa.dot.gov/ipd/pdfs/ppp\\_user\\_guidebook\\_final\\_7-7-07.pdf](https://www.fhwa.dot.gov/ipd/pdfs/ppp_user_guidebook_final_7-7-07.pdf))
- Grimsey, D., & Lewis, M. K. (2002) 'Evaluating the risks of public private partnerships for infrastructure projects', *International Journal of Project Management*, 20(2), 107-118.
- HMT (Her Majesty's Treasury) and IPA (Infrastructure and Projects Authority) (2016) 'Forms and instructions specific to PFI/PF2/PPP arrangements', Government of The United Kingdom, HM Treasury and Infrastructure and Projects Authority, published on Dec 20, 2016. (accessible from: <https://www.gov.uk/government/publications/pfipf2ppp-forms>)
- Hwang, B. G., Zhao, X., & Gay, M. J. S. (2013) 'Public private partnership projects in Singapore: Factors, critical risks and preferred risk allocation from the perspective of contractors', *International Journal of Project Management*, 31(3), 424-433.
- IPI (Islamic Parliament of Iran) (2017) 'The Sixth Five-Year Development Plan Act', (accessible from: [http://bodjeh.areeo.ac.ir/\\_bodjeh/documents/6th\\_agenda\\_full.pdf](http://bodjeh.areeo.ac.ir/_bodjeh/documents/6th_agenda_full.pdf))
- Kavishe, N., Jefferson, I., & Chileshe, N. (2018) 'An analysis of the delivery challenges influencing public-private partnership in housing projects: The case of Tanzania', *Engineering, Construction and Architectural Management*, 25(2), 202-240.

- Ke, Y., Wang, S., & Chan, A. P. (2010) 'Risk allocation in public-private partnership infrastructure projects: comparative study', *Journal of Infrastructure Systems*, 16(4), 343-351.
- Ke, Y., Wang, S., Chan, A. P., & Cheung, E. (2009) 'Research trend of public-private partnership in construction journals', *Journal of Construction Engineering and Management*, 135(10), 1076-1086.
- Lee, N., & Schaufelberger, J. E. (2013) 'Risk management strategies for privatized infrastructure projects: Study of the build–operate–transfer approach in East Asia and the Pacific', *Journal of Management in Engineering*, 30(3), 05014001.
- Li, B., Akintoye, A., Edwards, P.J., Hardcastle, C. (2005) 'The allocation of risk in PPP/PFI construction projects in the UK', *International Journal of project management*, 23(1), 25-35.
- Lewis, M. and Roehrich, J. (2009) 'Contracts, relationships and integration: towards a model of the procurement of complex performance', *International Journal of Procurement Management*, Vol. 2, No. 2, pp.125–142.
- Marques, R. C., & Berg, S. (2011) 'Risks, contracts, and private-sector participation in infrastructure', *Journal of Construction Engineering and Management*, 137(11), 925-932.
- PBO (Plan and Budget Organization of Iran) (2015) 'Agreement of Public-Private-Partnership (PPP)', Circular No. 93172804 (March 17, 2015), (In Farsi) (accessible from: <https://bpms.mporg.ir/FileSystem/View/File.aspx?FileId=2b709ff3-69cf-4779-ae33-519b0554fd6e> )
- PBO (Plan and Budget Organization of Iran) (2018) 'Biennial Performance Report of Project procured through Public-Private Partnership delivery methods', (In Farsi) (accessible from: <https://ppp.mporg.ir/FileSystem/View/File.aspx?Mode=Download&FileId=f8b10487-c015-4d4a-aa8f-124da05e3725>)

- National Treasury (2004) 'Standardized Public-Private Partnership Provisions', South African Government, National Treasury, PPP Unit, First Issue: 11 March 2004. (accessible from: [http://www.ppp.gov.za/Legal%20Aspects/Standardised%20PPP%20Provisions/National%20Treasury%20PPP%20Practice%20Note%20No%201%20of%202004;%20Standardised%20PPP%20Provisions;%20First%20Issue;%2011%20March%202004\\_1.pdf](http://www.ppp.gov.za/Legal%20Aspects/Standardised%20PPP%20Provisions/National%20Treasury%20PPP%20Practice%20Note%20No%201%20of%202004;%20Standardised%20PPP%20Provisions;%20First%20Issue;%2011%20March%202004_1.pdf))
- Ng, A., & Loosemore, M. (2007) 'Risk allocation in the private provision of public infrastructure', *International Journal of Project Management*, 25(1), 66-76.
- Nguyen, D. A., Garvin, M. J., & Gonzalez, E. E. (2018) 'Risk Allocation in US Public-Private Partnership Highway Project Contracts', *Journal of Construction Engineering and Management*, 144(5), 04018017.
- Osei-Kyei, R., & Chan, A. P. (2017) 'Risk assessment in public-private partnership infrastructure projects: Empirical comparison between Ghana and Hong Kong', *Construction Innovation*, 17(2), 204-223.
- Oyegoke, A., McDermott, P. and Abbott, C. (2009) 'Achieving sustainability in construction through the specialist task organisation procurement approach', *International Journal of Procurement Management*, Vol. 2, No. 3, pp.288–313.
- PPPIRC (Public-Private-Partnership in Infrastructure Resource Center) (2018) 'Public-Private Partnerships Laws / Concession Laws', World Bank Group, Public-Private-Partnership in Infrastructure Resource Center, Last Updated: Apr 30, 2018. (accessible from: <https://ppp.worldbank.org/public-private-partnership/legislation-regulation/laws/ppp-and-concession-laws> )
- Shang, L., Aziz, A. A., & Migliaccio, G. (2017). An Investigation of the Traffic Safety Performance of PPP Transportation Projects in the United States (No. 17-06654).
- Song, J., Zhang, H., & Dong, W. (2016) 'A review of emerging trends in global PPP research: analysis and visualization', *Scientometrics*, 107(3), 1111-1147.

- Soomro, M. A., & Zhang, X. (2013) 'Roles of private-sector partners in transportation public-private partnership failures', *Journal of Management in Engineering*, 31(4), 04014056.
- The Treasury (2013) 'Standard-form public private partnership (PPP) project agreement, base agreement', New Zealand Government, The Treasury, Kaitohutohu Kaupapa Rawa, Treasury: 2768838v1. (accessible from: <https://treasury.govt.nz/sites/default/files/2015-03/sfppppa-v3-base-oct13.pdf>)
- The World Bank (2017) 'Guidance on PPP Contractual Provisions. The World Bank, International Bank for Reconstruction and Development', Washington DC, USA. (accessible from: [https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/Guidance\\_%20PPP\\_Contractual\\_Provisions\\_EN\\_2017.pdf](https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/Guidance_%20PPP_Contractual_Provisions_EN_2017.pdf))
- Thomas, A. V., Kalidindi, S. N., & Ananthanarayanan, K. A. B. T. (2003) 'Risk perception analysis of BOT road project participants in India', *Construction Management and Economics*, 21(4), 393-407.
- UNIDO (United Nations Industrial Development Organization). (1996) 'Guidelines for Infrastructure Development through Build-Operate-Transfer (BOT) Projects', ISBN-10: 9211063043
- Van Den Hurk, M., & Verhoest, K. (2016) 'The challenge of using standard contracts in public-private partnerships', *Public Management Review*, 18(2), 278-299.
- Wang, L., Zhang, P., Zhang, P., Li, R., Zhang, Y., & Wu, Y. (2018) 'A systematic approach for public-private partnership projects CSFs evaluation', *Engineering, Construction and Architectural Management*, 25(9), 1127-1145.
- Wang, Y., & Zhao, Z. J. (2018) 'Performance of public-private partnerships and the influence of contractual arrangements', *Public Performance & Management Review*, 41(1), 177-200.
- Wang, S. Q., Tiong, R. L., Ting, S. K., & Ashley, D. (1999) 'Political risks: analysis of key contract clauses in China's BOT project', *Journal of construction engineering and management*, 125(3), 190-197.

Wibowo, A., & Mohamed, S. (2010) 'Risk criticality and allocation in privatised water supply projects in Indonesia', *International Journal of Project Management*, 28(5), 504-513.

Williams, A.M. (2014) 'Succeeding in transportation infrastructure public-private partnerships: examining a theory using the case of the Port of Miami tunnel', *Int. J. Procurement Management*, Vol. 7, No. 1, pp.35-49.

**Table 1.** Classification used to categorize identified PPP project risks in Iran

Category	Subcategory	Risk	RII	Rank
External	Political	1. Government change and changes made to the related governmental law and policies	74.8	3
		2. Sanctions	69.8	9
		3. War	48.9	21
	Economic	4. Fluctuations in inflation rate and the price of primary materials	71.9	6
		5. Unexpected increase in the exchange rate	74.8	3
		6. Inability to exchange Iran's Rial to the Foreign Currencies and Vice Versa	69	10
	Social	7. General opposition to the project	64	15
	Natural	8. Natural disasters	57.6	18
		9. Unfavorable project ground and weather condition	53	19
Contract development	10. Imbalance clauses	66.4	13	
	11. Inappropriate definition of project scope	66.4	13	
Financing the project	12. Inability of private sector in project financing	80	1	
Internal	Design	13. Mistakes in preliminary studies conducted by the public sector	73.3	5
		14. Changing in design or scope of work due to the private sector's mistake	61.2	16
	Construction	15. Delay in obtaining necessary permissions and land acquisition	78.5	2
		16. Technical inability of private sector to construct	68	12
		17. Poor construction quality	51.6	20
	Operation	18. Technical inability of private sector to operate	68.8	11
		19. Poor operation service	60.6	17
Management	20. Reduced project revenue not resulting from the private sector's mistake	70.4	8	
	21. Failure to properly manage contractual disputes	71.1	7	



**Table 2.** Profile of respondents

<b>Respondents profile</b>	<b>Categorization</b>	<b>N</b>	<b>Share</b>
Sector	Public	15	55.6%
	Private	12	44.4%
Years of experience	5-10	14	51.9%
	11-15	9	33.3%
	16-20	4	14.8%
Job title	Senior manager	4	14.8%
	Project manager	6	22.2%
	Contract expert	5	18.5%
	Public organization manager	6	22.2%
	Public organization legal advisor	6	22.2%

**Table 3.** Risk responses found an imbalance in favor of different contract parties

<b>Risk imbalanced in favor of the private party</b>	<b>Risk imbalanced in favor of the public party</b>	<b>Risk partially imbalanced for both parties</b>
3-4-1- Inability of Private Sector in Project Financing	3-4-3- Unexpected Increase in the Exchange Rate	3-4-2- Delay in Obtaining Necessary Permissions and Land Acquisition
3-4-19- Unfavorable Project Soil and Weather Condition	3-4-5- Mistakes in Preliminary Studies Conducted by the Public Sector	3-4-7- Failure to Properly Manage Contractual Disputes
	3-4-6- Fluctuation in the Inflation Rate and Price of Primary Materials	3-4-14- Imbalance clauses
	3-4-8- Reduced Project Revenue Not Resulting from the Private Sector's Mistake	3-4-15- Public Opposition to the Project
	3-4-10- Inability to Exchange Iran's Rial to the Foreign Currencies and Vice Versa	
	3-4-13- Unclear Definition of the Project Scope	

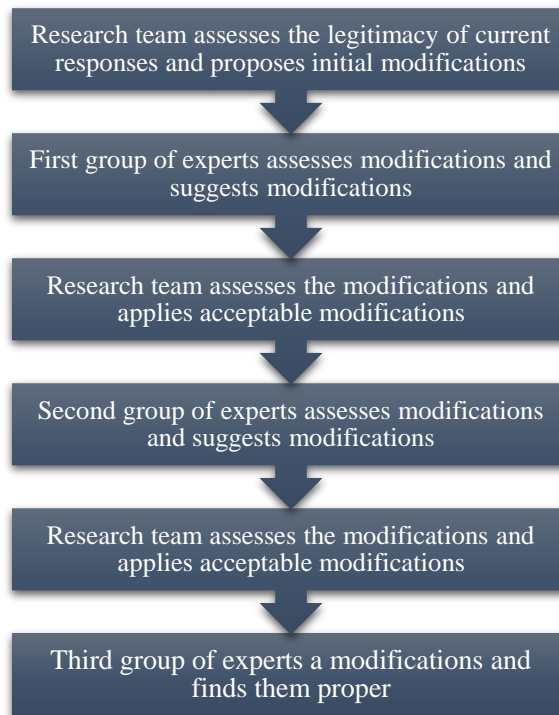
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**Figure 1.** Main stages of the proposed method



**Figure 2.**Steps taken in the risk response assessment of 9 main risks in the PPP standard-form contracts of Iran