

## Identification of Critical Success Factors (CSFs) for Public-Private Partnerships Across Infrastructure Sectors

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**Abstract:** Public-private partnerships (PPP) projects are becoming popular in both developed and developing countries due to their ability to access new financing sources and transfer certain project risks to the private sector. PPP has been an active research area where the concept of Critical Success Factors (CSF) is often discussed by researchers. This study aims to identify the CSFs for various PPP infrastructure projects that have been explored in previous CSF studies. This article reviewed the literature about CSF in PPP projects from the years 2002 to 2021, compared the findings of studies regarding the identified CSFs, and consolidated the CSFs that can be applied to various PPP infrastructure projects. The results showed that dominant research focused on general infrastructure, where CSFs can be applied to all infrastructure sectors rather than any specific sector. The most identified CSFs from the study are favorable and efficient legal frameworks, appropriate risk allocation and sharing, a robust and reliable private consortium, a competitive and transparent procurement process, and political support and stability. The findings from the study can provide an overview of CSFs that are relevant to specific PPP infrastructure sectors like building infrastructure, transportation, water, etc. as well as for general infrastructure. In addition, the results can also be used for further empirical analysis.

**Key words:** Public-private partnerships, Critical success factors, Infrastructure, PPP, Construction

### 1. INTRODUCTION

The concept of public-private partnerships (PPPs) has been promoted to provide public services in both developed and developing countries over the past few decades [1] due to their benefits in delivering public infrastructure projects [2]. With PPP schemes, governments worldwide are trying to use private sector expertise and resources for the provision of terminating large infrastructure gaps in public assets or services [3]. Given the fact that PPP projects are gaining considerable attention among governments, PPP has drawn many researchers' interest, and the success and advantages of adopting PPP in different countries have been well documented in the literature [1].

Despite the enthusiasm from both public and private sectors, there has been a slow progress in the implementation of PPP policies, and many PPP partnerships have failed or have been distressed [4]. The substantial interest and mixed results over PPPs [2] emphasizes the need for an investigation of the critical factors to deliver successful PPP projects. The critical success factors

(CSFs) are considered vital enablers for the successful development of any project. Regarding critical factors in PPP projects, a significant amount of research has been carried out that contributes to the successful implementation of PPPs in both developed and developing countries. Moreover, due to an emerging number of PPPs worldwide, the drivers of success for PPP projects have become a subject for investigation [5].

PPP schemes have been used in a wide range of infrastructure sectors, but over the last decade, the dominant research on CSFs in PPPs has focused on general infrastructure projects [3]. The rationale for CSF studies focusing on general infrastructure can include the desire for CSF implementation across all infrastructure sectors. However, to support the government's investment preferences and to give priority to sectors in which PPPs are expected to be more successful [6], a more in-depth analysis on the CSFs in PPPs in specific infrastructure sectors is required. Therefore, this study aims to highlight the CSFs for PPP projects across various sectors of infrastructure and provide an extensive overview of literature related to CSFs on PPP projects.

## **2. LITERATURE REVIEW**

### **2.1. CSF studies in general infrastructure**

Different research methods like a literature review, a questionnaire survey, interviews, and case studies were used to investigate the success factors of PPPs in different countries and infrastructure sectors. Critical examination of the previous journal articles from 2000 to 2019 revealed that the dominant research focuses on a multi-sector type of infrastructure research, and irrespective of the infrastructure sector, the study identified the factor most significant in supporting a PPP project's success as appropriate risk allocation and sharing [3].

While lists of CSFs for PPP projects vary from study to study, through exploratory factor analysis, Sehgal & Dubey [7] determined the first and most significant success factor in PPP projects is managerial competence, whereas project administration ranked second in the study. Niazi & Painting[8] listed possible CSFs from a questionnaire survey while identifying six factors that have the greatest importance in the successful implementation of PPPs in the Afghanistan construction industry. The six main identified CSFs are: favorable legal framework, political support, transparency in the procurement process, good governance, availability of the financial market, and lastly, appropriate risk allocation and risk sharing. For Taiwan's PPP projects, Hsueh & Chang [9] identified supportive legal frameworks and a favourable investment environment as its principal critical factors. In the context of UAE, Saadi & Abdou [10] explored critical factors for PPP projects using in-depth interviews. The study revealed that availability and effectiveness of proper regulatory and legal framework; proper risk allocation and sharing among project stakeholders; clear project brief and client outcomes; comprehensive and business viability of project feasibility study; and proper project value management systems during different project phases were the five CSFs for PPP projects in the UAE construction industry.

Chan et al [11] explored 18 CSFs for adopting PPP projects in China and grouped them into five underlying CSFs groups using the factor analysis technique. The five groups were: stable macroeconomic environment; shared responsibility between public and private sectors; transparent and efficient procurement process; stable political and social environment; and judicious government control. In the case of Nigeria, good governance, protective policy against political risks, appropriate risk allocation and risk sharing, strong private consortium, and political stability and favourable legal framework top the list of the most CSFs for realizing PPP projects [12]. The study results of Kyei et al [4] showed that effective risk management; meeting output specifications; reliable and quality service operations; adherence to time; satisfying the need for public facility/service; long-term relationship and partnership; and profitability are the seven very

critical criterias for PPP projects in Vietnam. Hardcastle et al [13] examined the relative importance of eighteen CSFs for PPPs in the UK and revealed that effective procurement, project implementability, government guarantee, favourable economic conditions, and an available financial market are the appropriated factor groupings relevant to UK construction projects using factor analysis.

## **2.2. CSF studies in specific infrastructure sectors**

CSF studies on PPPs have been performed in a wide range of infrastructure sectors. Alteneiji et al [14] identified the most critical success factors for affordable housing as political support and stability, a favorable and efficient legal framework, appropriate risk allocation and sharing, and trust and openness. Commitment and responsibility of public and private sectors and government/political support and stability were identified to be important CSFs by different studies for housing/building projects [14–16]. In addition, using a questionnaire survey, Patel et al [17] determined the top critical factors for PPP projects in India as planning and design with approvals, operational cost over-run, formation of strong partnerships (contracts), quality risk, right partner selection, safety considerations, assistance in PPP, commitment and responsibility of public and private sectors, funding and its provisions, and transparent procurement.

As for the highway sector, Ahmadabadi & Heravi [5] identified the CSFs for highway projects in Iran by literature review and interviews. The main identified CSFs were: reliable private consortium, appropriate risk allocation, reliable contractual arrangement, operation stage-government guarantee and experience, and favorable legal and political support. Prabhudesai & Serade [18] established the top five CSFs for PPP in road sector development in India as sufficient financial viability, appropriate dispute resolution mechanisms, favorable government policy measures, long-term low interest rate finance, and suitable adjustment formulas for toll revenue. In the context of PPP highway projects in Malaysia, the most prioritised CSFs were project implementability, judiciary government control, and a transparent procurement process [19].

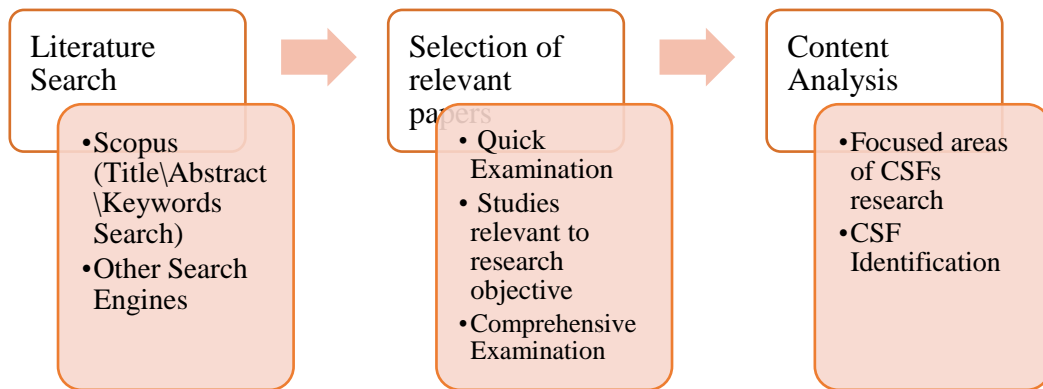
Surachman et al [20] performed a questionnaire survey to explore the critical success factors of the water PPP projects in developing countries with evidence from Indonesia and found out that the most critical success factor in PPP water projects is the support and acceptance of the stakeholders from the community. A study performed for water infrastructure assets in South Africa revealed that planning for project viability, high levels of transparency and accountability, and a legal framework stipulating policy continuity are the CSFs for water infrastructure projects under the PPP initiative [21]. However, other authors identified commitment of partners, strength of consortium, asset quality and social support, political environment, and a national PPP unit as the most critical success factors for water supply projects in developing countries [22,23].

The literature review revealed that a majority of studies have investigated the CSFs influencing PPP on both developed and developing countries. Most empirical studies on PPP projects related to CSF identification have mainly centered on the infrastructure sector in general; however, few studies have focused on specific sectors. Since PPPs have been used in various sectors to acquire several types of public assets and services, it is equally important to investigate success factors for specific sectors of infrastructure in order to assist government investment priority policies and priotize areas where PPPs are expected to be more successful [6].

## **3. METHODOLOGY**

Reviewing the literature showed that a majority of studies have been published related to CSFs for PPPs in the infrastructure sector, whereas few studies have identified CSFs for PPPs in specific sectors of infrastructure. The study emphasizes three specific sectors of infrastructure, which are under the focus areas in PPPs [24].

This study consists of identifying the CSFs for PPP projects that have been explored in previous CSF studies. Therefore, to analyze the qualitative content of the literature, a summative content analysis approach has been used. In Summative content analysis approach, data analysis begins with searches for occurrences of specific words and word frequency counts for each term are calculated [25]. For this study, the use of Summative content analysis approach helped authors to explore word usage and discover meanings of words from the context of text data. The frequency of terms were then generated by understanding the the underlying contexts for the use of words. The methodological framework used for the study is presented in Figure 1.



**Figure 6.** Research framework

### 3.1. Identifying academic papers

The academic journals that published articles with CSF research in PPP projects were searched and identified first in the study. A search engine “Scopus” was selected as the primary search tool to identify the journals that have published CSF related articles because of its adoption in other construction related literature review papers and its wide coverage in the field of construction engineering and management [26]. At the first stage, with the help of the “Scopus” search engine, keywords related to CSFs in PPPs were used for search purposes. Initially, a comprehensive search was conducted within the “title/abstract/keyword” field of “Scopus.” The search keywords included “critical success factors,” “public-private partnerships,” “PPP,” “infrastructure,” and “construction.”

### 3.2. Selecting relevant academic papers

Following the search results from “Scopus,” and other search engines the retrieved papers were reviewed to ensure that their content matched the search requirements. Only those papers that were found to be relevant to the research objectives were included for the study. The selected papers are expected to provide an overview of CSF research trends that are identified across PPP infrastructure sectors along with the most frequently cited success factors for future implementation.

### 3.3. Examining the relevant academic papers

The reviewed studies implemented different research methodologies to identify and rank the CSFs relevant to PPPs in infrastructure sectors. Several studies adopted the mixed method of quantitative and qualitative analysis methods to identify and rank of CSFs. In the final stage, the retrieved articles were then analyzed by reading the entire content, including the research objectives, methodology, results, and conclusions. Based on the research objective, the reviewed papers were grouped under different infrastructure sectors like general infrastructure, housing, highway, and water. The papers were subjected to summative qualitative content analysis. This

approach provided basic insights to study phenomenon of interest of our research and how the keywords are actually used in the number of publications on the CSFs for PPPs. Thorough review was done to extract and refine the collected factors across different infrastructure sectors. Most relevant CSFs were adopted, and word frequency counts for each identified CSFs were calculated based on the focused sectors.

#### 4. RESULTS

A summary of findings for identifying CSFs for reviewed articles is presented in Table 1. Following the comprehensive review of 26 publications, a total of 21 CSFs were identified and summarized based on various infrastructure sectors. The differing names or descriptions of the CSFs identified were merged to facilitate the grouping of factors. The CSFs were prioritized and ranked as per the frequency of each factor occurring within the study objective. The most frequent CSFs in the reviewed studies was ranked first. The reported studies on PPPs have highlighted favourable and efficient legal frameworks as the most important CSFs for the efficiency of PPP delivery in general infrastructure and other sectors. The most identified CSFs in the studies were favorable and efficient legal frameworks, appropriate risk allocation and sharing, financial feasibility and attraction, competitive and transparent procurement processes, and government/political support and stability. The top five CSFs identified for general infrastructure, housing, highway, and water sectors are presented in Table 2.

**Table 8.** Findings from studies on the CSFs for PPP

S.No.	Critical Success factors	General Infrastructure												Housing					Highway				Water				Frequency			
		I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	HO 1	HO2	HO 3	HO 4	HO 5	H1	H2	H3	H4	W1	W2		W3	W4	
1	Favorable and efficient legal frameworks, and	✓	✓		✓		✓	✓	✓	✓						✓	✓					✓	✓		✓	✓	✓		15	
2	Appropriate Risk allocation and sharing	✓			✓			✓	✓	✓			✓			✓						✓	✓				✓		11	
3	Financial feasibility and attraction		✓		✓		✓		✓	✓				✓	✓				✓				✓		✓				11	
4	Competitive and transparent procurement processes	✓			✓			✓		✓	✓		✓	✓								✓			✓				10	
5	Government/political support and stability				✓			✓			✓					✓	✓	✓				✓	✓		✓			✓	10	
6	A robust and reliable private consortium.	✓		✓				✓	✓		✓		✓									✓						✓	8	
7	Commitment and responsibility of the public and private sectors,	✓															✓		✓	✓								✓	6	
8	Good governance				✓			✓	✓							✓		✓	✓							✓			5	
9	Public support/co-operation and acceptance of stakeholders							✓																		✓	✓	✓	✓	5
10	Economic environment			✓							✓	✓							✓										4	
11	Effective Risk management		✓	✓		✓																							3	
12	Clear defined responsibilities and roles									✓	✓			✓															3	
13	Timely land acquisition and appropriate compensation		✓																			✓							2	
14	Financial capacity of the private sector		✓																								✓		2	
15	Long term relationship and partnership					✓													✓										2	
16	Profitability					✓						✓																	2	
17	Meeting output specifications				✓																		✓			✓			2	
18	Shared responsibility			✓							✓																		2	
19	Trust and openness															✓		✓											2	
20	Contractual arrangement											✓										✓							2	
21	Dedicated PPP unit																										✓	✓	2	

**Table 9.** Most identified CSFs in different infrastructure sectors

<b>Ranking</b>	<b>General Infrastructure</b>	<b>Building Infrastructure</b>	<b>Highway</b>	<b>Water</b>
1	Favorable and efficient legal frameworks	Commitment and responsibility of the public and private sectors	Appropriate risk allocation and sharing	Public support/co-operation and acceptance of stakeholders
2	Appropriate risk allocation and sharing	Government/political support and stability	Favorable and efficient legal frameworks	Favorable and efficient legal frameworks
3	Competitive and transparent procurement processes	Favorable and efficient legal frameworks	A robust and reliable private consortium	Commitment and responsibility of the public and private sectors
4	Financial feasibility and attraction	Trust and openness	Government/political support and stability	Government/political support and stability
5	A robust and reliable private consortium	Good governance	Financial feasibility and attraction	Dedicated PPP unit

## 5. CONCLUSION

In the study, a literature review of published studies was conducted to summarize the CSFs using a summative content approach. Journal publications and academic sources were identified to highlight the CSFs that are relevant to different infrastructure sectors. A methodical analysis was conducted with reference to prior studies and research published in academic journals. It was noticeable that a majority of research has been carried out in the general infrastructure sector rather than specific sectors of infrastructure. The findings of other researchers regarding the CSF identification for PPP projects in different sectors were collected, grouped, and compared. The findings of the study showed that there are certain critical success factors which can be applicable to PPP projects irrespective of their sectors, whereas there are also those that were sector specific.

It is hoped that the findings revealed in this study provide both public and private sectors an understanding of how certain critical factors can be applied for PPP projects in specific sectors of infrastructure, such as building, highway, and water, and also help stakeholders increase the likelihood of PPP success in a wide range of infrastructure sectors. Furthermore, the study findings can also act as a basis to identify areas where PPPs are expected to be more successful and to prioritize government investment decisions.

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