

Identification of Critical Success Factors (CSFS) for PPP Scheme Toll Road Projects in Indonesia

Asep Suhana^{1*}, Pratikso², Rachmat Mudiyo³

Sekolah Tinggi Teknologi Mandala, Indonesia¹, Universitas Sultan Agung Semarang, Indonesia^{2,3}

Email: asuhana1963@gmail.com

*Correspondence

ABSTRACT

Keywords: Critical Success Factors, PPP, Indonesian Toll Roads. Public-private partnership (PPP) models represent an innovative procurement approach and offer promising prospects for the construction industry's future worldwide. However, not all PPP projects, particularly toll road projects, achieve their goals. This poses a unique challenge in determining the Critical Success Factors (CSFs) as the basis for evaluating project success. Therefore, this research aims to identify and explore the concept of CSFs for toll road projects under the PPP scheme based on reputable academic journals in the last ten years. This study employs a sequential exploratory mixed methods methodology to identify and explore CSF indicators for PPP scheme projects and to verify and validate the findings. The results of this study reveal 13 indicators crucial for project success, categorized into eight factors. The findings of this research contribute significantly to the management of PPP toll road projects in Indonesia, serving as a reference for stakeholders in decision-making to enhance the effectiveness and efficiency of toll road project management.



Introduction

The right strategy to stabilize the economy and increase people's income is to invest in infrastructure, especially toll roads. Building toll roads is expected to provide convenience for the mobility of goods and services, accelerate the delivery of raw materials to factories, and facilitate the distribution of production products. Thus, toll road infrastructure positively impacts the community's economy, expanding employment, increasing GDP, and regional growth.

The development of toll road infrastructure requires very high investment costs that must be prepared by the government and cannot continue to depend on the availability of APBN funds. Therefore, one of the strategies designed by the government to overcome toll road infrastructure financing is to adopt the Public Private Partnership (PPP) procurement model, known in Indonesia as Public Private Partnership (PPP). Thus, funding sources can be obtained from both the public and private sectors (Simon, 2020).

The PPP model is an innovative procurement process approach and provides good opportunities for the future of the construction industry in the world (Osei-Kyei & Chan, 2016) and has been used by most developing countries (Kavishe et al., 2019) and is increasingly popular among governments as an excellent alternative method to traditional models (Debela, 2022). However, in practice, not all PPP projects achieve their objectives because the results cannot meet initial expectations regarding cost, completion time, construction quality, and project impact issues. These mistakes become a challenge in itself, as well as determining the success factors for evaluating project success. Evaluating the success of PPP projects includes assessing benefits, i.e., value streams arising from the project (Chih & Zwikael, 2015). Thus, projects should be managed with a focus on achieving strategic and long-term goals.

One approach to evaluating project success is determining the critical success factors (CSFs) that lead to successful completion. CSFs are essential issues for an organization's current and future operations that must be met by an organization, business, or project to achieve its objectives. Therefore, if the project outcome is the goal, CSFs must meet the objectives and relate directly to the business strategy. According to (Mahmood, 2021), CSFs can improve project performance by proactively minimizing cost and quality failures and effectively managing CSFs.

Based on a review of reputed journals in the past ten years, many studies have identified CSFs (Chou & Pramudawardhani, 2015). However, the concept of CSFs is interpreted differently, which may be due to the complexity of project problems, the involvement of public and private parties who have different perceptions of critical issues, and geographical, economic, social, and cultural conditions in each country. Therefore, this study aims to identify, explore, and review the concept of CSFs for toll road projects under the PPP scheme. The results of this study make a significant contribution with empirical evidence on PPP scheme toll road CSFs in Indonesia that can be used as a reference for stakeholders in making decisions to improve the effectiveness and efficiency of toll road project management. In addition, the results of this research can be used as a basis for further research in developing the concept of measuring the success of PPP scheme toll road projects in Indonesia.

Research Methods

This study uses an exploratory sequential mixed methods approach to gain a deep understanding of the research phenomenon while facilitating a more comprehensive understanding of its application. According to (Pardede, 2019), the sequential mixture method is suitable if a phenomenon has not been conceptualized or explored in depth in the literature. The first step of this research uses the qualitative method with a systematic literature review to explore CSFs in depth and identify gaps in the existing literature. The literature selection process is carried out in four stages. A brief review of reputable academic journals in the last ten years related to CSFs and PPPs was conducted, obtained from academic databases such as Science Direct, Taylor & Francis Online, Cambridge Core, and Google Scholar, and based on the keywords. Critical success factors for public-

private partnerships (PPPs) obtained 13686 journals, Science Direct 1464 journals, Taylor & Francis Online 1395 journals, Cambridge Core 1850 journals, and Google Scholar 8970 journals. The second stage continued with the selection process by eliminating journals irrelevant to this research's purpose, such as social, economic, business, health, and others. Hence, the research objectives were obtained from 252 journals. The third stage is a content analysis, which examines and analyses the year of publication, origin/country of author, country of study, findings, and use of research methodology. Based on the results of the analysis of the content of academic journals, 33 journals were obtained that were relevant and qualified for this study that could identify CSFs of PPP scheme infrastructure projects. The fourth stage identifies CSFs of PPP scheme infrastructure projects, the results of which are classified into eight factors, namely factors related to Planning and design (PD), Procurement process (PROC), Project management (PM), Human resources (HR); Stakeholder management (STH); Contractor (CON); Business (BIS) and Sustainability (SUS). The results of identifying CSFs are then ranked based on eight factors and total CSFs.

The second step is to use quantitative methods to verify and validate findings by experts, practitioners, and academics who are experienced and knowledgeable in CSFs and PPP. To verify and validate CSFs, a questionnaire survey using the Guttman scale includes statements related to the variables studied. The primary purpose of making the Guttman scale is to find out the unity of dimensions and attitudes of respondents to the field under study.

Results and Discussion

Publication of statistics and research areas of CSF projects under the PPP scheme

In this study, 33 CSF journals of PPP scheme projects were found to be relevant and eligible for analysis. The International Journal of Project Management ranks first with ten articles published, followed by the International Journal of Construction Management with eight articles published, and the rest published by various publishers.

Based on literature studies, countries or research areas regarding CSFs of PPP scheme projects are pretty diverse. Nigeria is the country that is most active in researching CSF PPP scheme projects, contributing 23%, followed by the UK, which contributed 11.50%, and the countries Abu Dhabi, China, Ghana, Iran, Malaysia, and Indonesia each contributed 7.70%. Figure 3 shows the 11 most active countries as research areas.

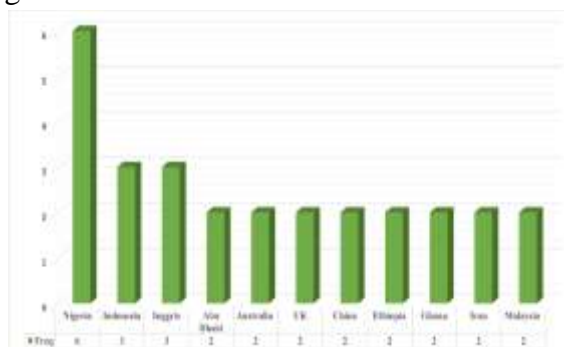


Figure 3. CSFs and PPP Research Areas

Findings of identification of CSFs in PPP scheme projects

This study found 51 CSFs of the PPP scheme project have been found in 33 reputable academic journals. The top three rankings for each factor are presented in Table 3.

Table 3
Frequency of occurrence of critical success factors (CSFs)

No	CSFs	Freq	References	Rank Factor	Total Rank CSFs
I	Planning and Design-Related Factors				
1	Clear and realistic project definitions and objectives	10	[1]; [6]; [15]; [17]; [18]; [21]; [24]; [23]; [26]; [27]	1	4
2	Comprehensive scope, drawings, and specifications.	9	[1]; [2]; [8]; [12]; [17]; [21]; [22]; [24]; [26]	2	5
3	Comprehensive project feasibility and business feasibility studies	7	[6]; [16]; [17]; [22]; [25]; [30]; [33]	3	7
II	Procurement Process Related Factors (PROC)				
1	Effective, competitive, and transparent procurement methods	11	[2]; [3]; [6]; [7]; [10]; [16]; [18]; [21]; [28]; [32]; [33]	1	3
2	Cost transparency and funding adequacy	10	[1]; [4]; [6]; [13]; [20]; [24]; [26]; [27]; [28]; [32]	2	4
3	Comprehensive, effective, and flexible contract documentation	6	[6]; [17]; [20]; [22]; [26]; [29]	3	8
III	Project Management-Related Factors				
1	Effective communication and coordination	12	[1]; [2]; [8]; [9]; [12]; [15]; [17]; [18]; [19]; [22]; [23]; [27]	1	2
2	Project results meet quality and scope standards	6	[11]; [18]; [21]; [22]; [26]; [27]	2	8
3	Consistent and effective project control and evaluation	6	[1]; [17]; [18]; [22]; [31]; [33]	2	8
4	Effective Risk Management	6	[1]; [7]; [18]; [20]; [23]; [24]	2	8
5	Project management using innovative project	5	[11]; [20]; [22]; [28]; [29]	3	9

No	CSFs	Freq	References	Rank Factor	Total Rank CSFs
	management and effective control systems				
IV	Factors Related to Project Human Resources (SDM)				
1	Sufficient project manager competence and experience	10	[4]; [8]; [12]; [17]; [18]; [22]; [23]; [24]; [26]; [27]	1	4
2	Sufficient competence and experience of project team members	10	[4]; [8]; [12]; [17]; [18]; [22]; [23]; [24]; [26]; [27]	1	4
3	Project managers have good leadership, organization, decision-making, and conflict-handling skills.	8	[2]; [11]; [18]; [21]; [22]; [23]; [27]; [34]	2	6
4	Project priorities and Clarity of project team roles and responsibilities	8	[6]; [7]; [8]; [14]; [17]; [18]; [23]; [27]	2	6
5	Sufficient project manager authority in managing the project	8	[1]; [15]; [17]; [18]; [22]; [23]; [24]; [27]	2	6
6	Pendidikan dan Pelatihan bagi tim proyek yang memadai	2	[17]; [21]	3	12
V	Factors Related to Stakeholder and Client Management (STH)				
1	Involvement and commitment of top management and stakeholders	10	[1]; [8]; [10]; [13]; [17]; [22]; [24]; [26]; [27]; [15]	1	4
2	The client's ability to make effective decisions	5	[18]; [27]; [29]; [23]; [21]	2	9
3	Project participants' commitment to meeting project objectives	4	[17]; [22]; [24]; [29]	3	10
VI	Contractor Related Factors (CON)				
1	Adequate and efficient allocation of all resources	10	[8]; [13]; [17]; [22]; [26]; [27]; [31]; [15]; [12]; [4]	1	4
2	Effective project scheduling and control	7	[1]; [11]; [17]; [21]; [22]; [24]; [26]	2	7
3	The contractor's work fulfills legal responsibilities through contractual commitments	6	[16]; [17]; [21]; [22]; [23]; [24]	3	8
VII	Business-Related Factors (BIS)				
1	Proper risk allocation and sharing	13	[5]; [6]; [7]; [16]; [17]; [24]; [25];	1	1

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No	CSFs	Freq	References	Rank Factor	Total Rank CSFs
			[28]; [29]; [32]; [33]; [35]; [41]		
2	Government policies, commitments, and support provide assurance	10	[3]; [8]; [9]; [16]; [17]; [22]; [26]; [27]; [28]; [33]	2	4
3	Stable political, social, and economic environment	10	[3]; [5]; [7]; [14]; [16]; [23]; [27]; [28]; [33]; [31]	2	4
4	Appropriate regulations and legal framework	9	[6]; [7]; [8]; [16]; [20]; [23]; [28]; [30]; [33]	3	5
VIII	Sustainability-Related Factors (SUS)				
1	Thorough and realistic cost and benefit assessment	5	[6]; [16]; [25]; [31]; [33]	1	9
2	Consistent environmental Performance Monitoring	3	[17] [20]; [27]	2	11
3	Innovation and Technology Transfer	3	[16]; [23]; [27]	2	11
4	Minimal impact of the project on society and the environment	3	[8]; [24]; [27]	2	11
5	Integration of sustainability into project management practices	2	[8]; [25]	3	12

Information:

[1] Ihuah et al., (2014); [2] (Amade, Ubani, Omajeh, Anita, & Njoku, 2015); [3] Osei-Kyei and Chan, (2015); [4] Jamal et al., (2022); [5] Kandiyoh et al., (2022); [6] (Chou & Pramudawardhani, 2015); [7] Wang, (2015); [8] (Bayiley & Teklu, 2016); [9] Osei-Kyei and Chan, (2016); [10] Liu et al., (2016); [11] (Banihashemi, Hosseini, Golizadeh, & Sankaran, 2017); [12] Sumadiyono and Husin, (2021); [13] (Kuwaiti, Ajmal, & Hussain, 2018); [14] Osei-Kyei and Chan, (2017b); [15] (Buniya et al., 2021); [16] (Babatunde & Perera, 2017); [17] (Adzmi & Hassan, 2018); [18] (Lappi & Aaltonen, 2017); [19] Osei-Kyei and Chan, (2017a); [20] Osei-Kyei et al., (2017); [21] (Mahmood, 2021); [22] (Altarawneh, Thiruchelvam, & Samadi, 2018); [23] Singh and Sharma, (2020); [24] (Asgari, Kheyroddin, & Naderpour, 2018); [25] (Kavishe et al., 2019); [26] (Ghanbaripour, Sher, & Yousefi, 2020); [27] Lamprou and Vagiona, (2018); [28] Zayyanu and Foziah, (2018); [29] (Altarawneh & Samadi, 2019); [30] (Demeke Cherkos & Jha, 2020).

Verification and validation of findings

Fifty-five respondents were collected based on the results of the questionnaire distribution through Google Forms. Then, the data analysis was divided into two parts: analysis of respondent characteristics and analysis of essential levels.

Analysis of respondent characteristics

The analysis showed that women's representation in this questionnaire survey contributed 9.10% and men's 90.90%. Most respondents over 50 amounted to 47.30%, followed by respondents aged 30 to 50 at 43.60% and those under 30 at 9.10%. This questionnaire survey involved 23.60% of respondents with S3 education and 76.40 respondents with S2 education, with more than ten respondents experiencing 76.40% and respondents experiencing 5 to 10 years of 23.60%. The elements of representation in the work response from academics amounted to 27%, Ministry of PUPR 24%, Planning consultants 22%, MK consultants 14%, contractors 9%, and practitioners 4%. Thus, based on descriptive analysis, the characteristics of respondents are sufficient to provide verification and validation of CSFs for PPP scheme projects.

Test the validity and reliability of the Guttman scale

Two parameters must be measured to validate the Gutmann scale questionnaire survey: the Coefficient of Reproducibility and the Coefficient of Scalability. The requirement for receiving the value of the reproducibility coefficient is if the reproducibility coefficient has a value of > 0.90, calculated by the formula:

$$K_r = 1 - \left(\frac{e}{n}\right) \quad (1)$$

Where:

Kr = Reproducibility Coefficient; e = number of errors/error value = 48; n = number of statements times number of respondents = 3025

$$K_r = 1 - \left(\frac{48}{3025}\right) = 0.984 > 0.90$$

The requirement for receiving the value of the scalability coefficient is if the scalability coefficient has a value > 0,60.

$$K_s = 1 - \left(\frac{e}{x}\right) \quad (2)$$

Where:

Ks = Scalability Coefficient; e = Number of error values = 48; x = 0.5 ({number of statements times number of respondents} – number of answer choices) = 1485.

$$K_s = 1 - \left(\frac{48}{1485}\right) = 0.968 > 0,6$$

Guttman scale reliability test

Assessment criteria: If an instrument is reliable, the KR-20 reliability coefficient value is more than 0 (r0.70). The result of the etththe e the ePQe haPQPQ

$$K_r = \frac{S^2 - \sum p_i^2}{S^2} \quad (3)$$

Where:

$r = \text{Overall reliability} = \frac{\sum pq}{n} = \frac{3,602}{55} = 0,82$ $k = e r \text{ total} = 3,602 = \frac{55}{(55-1)} \left(\frac{3,602-0,825}{3,602} \right) > V_{re}$ produced based on the validity and reliability test of respondents' answers.

Important level analysis

The Relative Importance Index (RII) method is used to obtain the importance level of the analyzed factors. Based on the analysis results, the average standard error value is below 5%, and the critical level is high. Thus, the statements submitted by researchers as 51 indicators of CSFs can already represent the perceptions of experts, academics, and practitioners in the construction field and are qualified to be used as research analysis data.

The study found that 13 indicators, identified in 33 reputable national and international journals, were critical to the project's success. Table 3 shows the ranking of identified indicators for PPP scheme toll road projects.

Planning and design-related factors

Ten articles identified clear and realistic project definitions and objective indicators. These were followed by comprehensive scope indicators, drawings, and specifications, identified by nine articles, and project feasibility and business feasibility study indicators, identified by seven articles. The top two indicators are critical to the project's success, ranking fourth and fifth in total CSFs.

Project objectives are what you want to achieve at the end of the project. Thus, defining the proper project goals and objectives for all stakeholders is a prerequisite for success. The organization should have goals and a business plan with realistic short-term and long-term goals. Project feasibility and business feasibility studies must be conducted to achieve these goals, which are the principles for initiating a project. In addition, to achieve success in project implementation, the planner must make the scope, drawings, and specifications clear and comprehensive so that there is no ambiguous interpretation among construction implementers.

Factors related to the procurement process

The Effective, competitive, and transparent procurement methods indicator ranked first, identified by 11 articles, followed by the cost transparency and funding adequacy indicator, identified by 10 articles, and the Comprehensive, practical, and flexible contract documentation indicator ranked third, identified by six articles. The top two indicators are critical to the project's success, ranking third and fourth in total CSFs.

In the existing literature, procurement effectiveness is associated with the competence of the staff involved in the procurement process, resulting in an effective procurement process when the actions of each procurement staff lead to the achievement of project objectives (Changalima et al., 2021). Therefore, organizations must ensure that the procurement function runs well and is managed effectively and transparently to achieve project objectives. Information on the adequacy of funding in front of tender participants is essential and will give bidders confidence to follow the tender process. According to (Lappi Aaltonen, 2017), the PPP scheme tender process is more economical

than traditional procurement, but PPP scheme contract arrangements are usually long-term complex. Therefore, there is a need for some variation in contract arrangements to facilitate changes.

Project management-related factors

Indicators: Effective communication and coordination among project participants ranked first identified by 12 articles, followed by three indicators identified by six articles: Project results meet quality standards and planned scope; Consistent and effective project control and evaluation and feedback; and Effective Risk management. Indicators Effective communication and coordination among project participants are critical to the project's success, which ranks 2nd in total CSFs.

These findings validate (Aghania et al., 2019) that ineffective communication is the leading cause of one-third of project failures. Therefore, communication is a significant indicator because project success requires effective communication. In managing a project, it is necessary that the project scope is defined at the beginning of the project, and any changes in the scope must be appropriately managed. Every work included in the project scope must meet quality requirements. To achieve this, consistent and effective project control, evaluation, and feedback to monitor the progress of cost, time, and quality are needed to minimize project risks. Therefore, effective risk management is needed to achieve project success.

Human resources (HR) related factors

The first rank is occupied by two indicators, namely Competence and experience of adequate project managers and Competence and experience of adequate project team members, each identified by ten articles, followed by three indicators identified by eight articles, namely, Project managers have good decision-making, leadership, organizing and conflict handling skills; Project priorities and clarity of the roles and responsibilities of the project team and sufficient authority of the project manager in managing the project. The top two indicators are critical to the project's success, which ranks 4th in total CSFs.

A successful project manager must demonstrate flexibility and competence in many ways and take responsibility for the project's success. The project manager's work must be supported by project team members who have the appropriate managerial and technical competence capabilities according to the characteristics of the project. A project manager must possess the ability to measure and analyze objectively to provide effective decisions and conflict-handling skills. The project manager must have the authority to determine the strategy for initiating the project, understand the requirements, evaluate the project, and monitor its progress. Therefore, the project manager needs to arrange the order of importance of each work item as a priority of the project and provide clarity of roles and responsibilities to project team members so that the project team can collaborate to work on the project more efficiently.

Factors related to stakeholder management

Ten articles identified the involvement, commitment, and support of top management and stakeholders as the first indicator, followed by the ability of clients to

make effective decisions indicator identified by five articles, and the Project participants' commitment indicator in meeting project objectives identified by four articles. Indicators of top management and stakeholders' engagement, commitment, and support are critical to the project's success, ranking 4th in total CSFs.

Stakeholder involvement in the project planning process should include a variety of actors with different roles and responsibilities to play in the planning phases of the project life cycle. The support and commitment of top management and all stakeholders and clear communication of stakeholder needs can significantly improve overall project performance. Therefore, stakeholder management is an important indicator affecting project success (Amade et al., 2015).

Contractor-related factors

The indicator Allocation and use of all adequate and efficient resources ranks first, identified by ten articles, followed by the indicator Effective project scheduling and control during the project phase identified by seven articles, and the indicator Contractor fulfills legal responsibility for contractual commitments in third place identified by six articles. Indicators: The allocation and use of all adequate and efficient resources are critical to the success of a project that ranks 4th in total CSFs.

The efficiency of a project focuses on how well the resources of various project activities are utilized in the expected results. The results found that contractors were assessed based on performance, ability to manage resources, and improvement of worker ability through training, time management, and ability to work as a team (Osman & Gladys, 2019). Therefore, effective project scheduling and control methods are needed during the project phase

Business-related factors

The Appropriate risk allocation and sharing indicator rank first identified by 13 articles, followed by two indicators: Policy, Government commitment, and support providing assurance and a stable political, social, and economic environment, each identified by 10 articles and appropriate regulatory and legal framework indicators rank third identified by nine articles. These indicators are critical to the project's success, ranking 1st, 4th, and 5th in total CSFs.

The main characteristic of PPP scheme infrastructure projects is the high level of risk due to the long-term concession period and the large number of participants involved in the partnership. Therefore, allocating and sharing risks is one of the fundamental things for PPP arrangements, so it is not surprising that Proper allocation and sharing of risks between parties (public and private sectors) is widely identified by researchers as CSFs that are critical to achieving project success. In addition, government support in the form of guarantees is essential to increase private sector confidence and can make PPP projects financially viable. Government guarantees must be provided to facilitate investment and obtain the necessary funding from financial institutions. Government guarantees have a direct relationship with the political atmosphere of a country. Political instability will allow changes in public policy that can hinder the implementation of PPP projects. Therefore, the willingness of the private sector to participate in PPP projects is highly

dependent on the political and economic environment in which the projects will be operated. A favorable political and economic environment is essential for developing PPP projects, especially in developing countries. To achieve this, a clear and comprehensive legal and regulatory framework is needed that can attract private sector investment in PPP projects.

Sustainability-related factors

The comprehensive and realistic Cost and benefit assessment indicator ranks first identified by five articles, followed by three indicators: consistent environmental Performance Monitoring at various levels, Innovation and Technology Transfer, and The impact of the project on society and the environment identified by three articles each. Overall, sustainability-related factors were identified as unimportant, as the research results by (Kavishe et al., 2019) showed that sustainability is not very important in PPP projects in Tanzania. However, integrating social, economic, and environmental practices into the implementation of toll road projects can realize social justice and environmental sustainability and improve the community's quality of life.

Conclusion

The study results revealed 13 indicators of CSFs significant for project success, classified into eight factors: Indicators related to planning and design factors are clear and realistic project definitions and objectives, as well as comprehensive scope, drawings, and specifications. Indicators related to procurement process factors are effective procurement methods, competitive and transparent procurement processes, cost transparency, and funding adequacy. An indicator related to project management factors is effective communication and coordination among project participants. The HR factors indicators are adequate competence and experience of project managers and project team members. Indicators related to stakeholder management factors are the involvement, commitment, and support of top management and stakeholders. An indicator related to the contractor factor is allocating and using all adequate and efficient resources. Indicators related to business factors are proper allocation and sharing of risks; Government policies, commitments, and support provide assurance; stable political, social, and economic environment; and Appropriate regulations and legal frameworks.

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