Critical Success Factors of the Overseas PPP Infrastructure Project from the Perspective of Korea

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LEE, Daehong

CAPSTONE PROJECT

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

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Professor Lee, Jinsoo, Supervisor

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Executive summary

The Public Private Partnership (PPP) modality is actively utilized around the world as a way to attract private investment instead of government investment that is suffering from financial limitations. However, all PPP projects are not able to guarantee successful results due to the intrinsic characteristics of the PPP project, such as long-term business, the complexity of scope, various stakeholders, and complex contracts. As a result, many efforts have been made to understand what affects a successful PPP project. Moreover, most of the studies identifying factors associated with the successful result of the PPP project have been reviewed in countries other than Korea, so research is needed to verify Critical Success Factors (CSFs) of the PPP project from a Korean perspective.

This study aims to evaluate CSFs for the PPP project from the perspective of Koreans through a questionnaire survey with the respondents who have participated in the PPP project using CSFs identified from the comprehensive literature reviews. A preliminary survey was conducted prior to survey to verify the suitability of questions and derive a valid survey result. The questionnaire was designed to evaluate the importance of individual CFSs from 1 to 7 point Likert scale. Using the collected data, the respondents' demographic information was used for descriptive statistics, and the response results were used to determine the relative ranking for 30 CSFs using IBM SPSS software. Then, reliability test, normality test, and significant test were conducted to determine whether the public and private sectors showed different results in the perception of CSFs.

Overall top five ranked CSFs show mean value ranging from 6.38 to 6.64 are (1) Government willingness, (2) Sufficient profitability of the project to attract, (3) Private sector’s capabilities of fulfilling the contract, (4) Strong and good Private consortium, (5)

Available financial and capital market.

From a general perspective, the ranking of CSFs can be recognized as having a similar opinion on CSFs of PPP projects in the public and private sectors based on the result of non-parametric Mann-Whitney test.

Another important fact confirmed through this study is that the results found in this study were different from those conducted on non-Koreans in the past. This fact is consistent with previous studies that various CSFs may affect the success of PPP project to a varying degree or may have different results depending on the research environment.

Despite some limitations of this study, the results of this study are considered to be of great help in deriving more successful results when carrying out overseas PPP projects, and further research is needed to identify more accurate CSFs for PPP projects.

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I. Introduction

In the past, Korea was actively engaged in government-led investment in the infrastructure sector for economic development in the early stages since the Korean War, which resulted in a remarkable growth in the Korean economy. Jung (2020) notes this fact in his book as " South Korea's economic achievement has been remarkable. In the aftermath of the Korean War(1950-1953), it was one of the poorest countries in the world, with a per capita income of around 64 USD. Aa of 2016, South Korea's economy ranked 15th in terms of its GDP and 11th in terms of exports." Korea's rapid economic development is showing various aspects, and one of the advantages is to secure competitive construction and management capability of Korean enterprises during the short period of rapid economic growth, and based on this, various construction projects are carried out in many countries.

On the other hand, Korea is relatively small compared to other countries, so much investment has been concentrated in the infrastructure sector since the Korean War to provide a foundation for national economic development and help all citizens live a comfortable life. As a result, sufficient investment has already been made in the infrastructure sector, so it is now difficult to expect new investment in the infrastructure sector that requires additional large-scale investment. Due to the securing of competitive construction and management capability of Korean enterprises and the limitation on the development of the domestic infrastructure market, attention was naturally shifted to overseas business in the field of infrastructure.

Investment in infrastructure facilities such as roads, railways, and water resources, which had been invested with government funds in the past, was essential for national economic development due to the effects of job creation and economic growth promotion, but

the Public Private Partnership (PPP) modality is actively utilized as a means to induce private sector investment on behalf of the government's investment. A recent article mentioned that "PPP has been widely applied across the world by governments to provide an important public service since the global financial crisis, owing to the limited funds available for main infrastructure development" (Thomas, N. & Thomas, A.V.,2017). The main drivers of recent change in the infrastructure sector, the expansion of PPPs, can be attributed to the insufficient funds for the essential infrastructure in the public sector, the increasing in demand for various facilities due to aging and social development, and increasing in need for efficient and creative skills and the utilization of funds from the private sectors. Current changes in the investment environment in the infrastructure sector imply that the private sector has more opportunity to participate in the infrastructure sector that was previously considered as the government domain.

While, there are also concern about recent changes in the infrastructure market. According to Zou, Kumaraswamy, Chung & Wong (2013), "the increasing frequency and significance of PPP is accompanied by problems of instability and poor performance"(Zou, Kumaraswamy, Chung & Wong, 2013). Moreover, Jacobson & Choi mentioned that "much caution should be taken by partnership practitioners and researchers because the partnership approach is not guaranteed automatically more successful or efficient than traditional approach"(Jacobson & Choi, 2008).

Along with the importance of the PPP, some problems with PPP are easily identified in practice, and a report conducted by Thomas, N. & Thomas, A.V., mentioned PPP's failure case with several reasons, "Despite more and more successful operations of PPPs, some project failures are still reported in the literature like cost overruns, schedule overruns, and

stakeholder dissatisfaction" (Thomas, N. & Thomas, A.V.,2017). In addition to the above-mentioned causes of failure, due to the intrinsic characteristics of the PPP project, such as long-term business, the complexity of the scope, various stakeholders, and complex contracts, not all PPP projects are not able to guarantee successful results.

Therefore, the identification of factors that can lead to the successful result of the PPP project is very essential to ensure viability and sustainability. If otherwise noted, no prior sufficient concern for success factors on the project before embarking on it, not only means that the project is more likely to fail, but also that all every effort involved in the project should be compensated.

Previously, many researchers reviewed several factors for successful PPP project implementation and many meaningful results have been identified as well. Tiong (1996), for example, described "six CSFs for private contractors in BOT contract as entrepreneurship and leadership, right project identification, strength of the consortium, technical solution advantage, financial package differentiation, and differentiation in guarantees". Hardcastle, Edwards, Akintoye & Li (2005) point out prominent "five factor groupings for CSFs for UK construction PPP projects as effective procurement, project implementability, government guarantee, favorable economic conditions and available financial market".

Whereas, there is still a lack of research from the perspective of Korea. Generally, the process of identifying success factors is carried out by reviewing literature that has already been investigated by various researchers, or by interviewing practitioners. The fact that researchers have some room to reflect their views in the process of conducting research and that most of the previous studies were conducted based on foreign cases makes it difficult for Korean enterprises to directly apply these past research cases to business execution. In other

words, it is necessary to find critical factors that have a significant effect among the various factors that can lead to successful result of, because not all factors have the same degree of effect. In support of this fact, Shi, Chong, Liu & Ye. (2016) stated " Various factors influence PPP project success to varying degrees; some factors and their interactions might cause the inefficiency and ineffectiveness of the projects and hinder efficient allocation of limited resources, whereas certain factors are more critical to a project's success than others".

For this reason, identifying the Critical Success Factors(CSFs) of the PPP infrastructure project from a Korean perspective will be addressed in this study. Although the CSFs that will be derived from the study may not be suitable for all businesses, it may at least be of interest to those interested in or participating in overseas PPP projects, and be able to give sufficient insight.

This study begins with a review of the general matters, such as definitions, features, major challenges of the PPP, and a literature review of the various CSFs of the PPP previously studied in various ways. And this paper explains the research structure and research methodology. Finally, it concludes with research findings, interpretation of results, and suggestions for further research.

II. Literature Review

In the economic development of the country, the expansion of infrastructure has a greater impact than anything else. In other words, the expansion of infrastructure has drawn much attention because of the fact that it causes economic development in other areas and creates many job creation effects, and has traditionally been recognized as an area of the public sector. However, the government could not afford enough money for the growing demand for infrastructure expansion, and naturally a new concept of public and private cooperation emerged. According to Bastin (2003), "interest in partnership between the public and private sectors to provide, finance and operate public infrastructure, services and utilities has grown at a steady rate". Another need for public and private cooperation is mentioned by Jacobson, C., & Choi, S. O. (2008) "governmental agencies should collaborate with other governmental agencies, nonprofit organizations or even business organizations in order to provide better services and goods and to save resources". As a result, the PPP was perceived as an alternative to cope with the growing demand for infrastructure and insufficient government finances. According to Chowdhury et al. (2011), "some countries have adopted PPP due to fiscal deficit, budgetary pressure, demand–supply gap, and inefficient public services to infrastructure, while other countries choose PPP for operational efficiency, innovative technological and management skills, and more active involvement of private players in public services (Chowdhury et al., 2011).

In general, PPPs provide public services through the contractual relationship between the public and the private, where the private sector takes various responsibilities that have been held by the public sector and gains profits in return for the concession period. However, since the development of the concept of the PPP, PPP projects have been carried out in

different forms in several countries and industries, and has caused a lot of interest, but there is no clear definition yet, and Jacobson, C., & Choi, S. O. (2008) stated this problem as "literature clearly agrees that PPP appears to have no clear definition or standard implementation methods. A variety of definitions on PPP exist". World Bank (2017) also mentions the PPP as "There is no single, internationally accepted definition of Public-Private-Partnership". Therefore, there are various PPP definitions that different scholars, practitioners, or institutions.

Bastin (2003) defined PPPs as "Public-private partnerships is generally used loosely for any concentrated arrangement that involves co-operation between public and private sectors in all or some of the delivery of public services or provision of infrastructure". According to Fiszbein and Lowden (1999), "PPPs is the pooling of resources (financial, human, technical and intangibles such as information and political support) from public and private sources to achieve a commonly agreed goal". Ibem (2010) stated PPPs as "collaborative effort among public private and third sector organization based on mutual trust, division of labour and a comparative advantage in the sharing of responsibilities, risks and benefits". Leiringer (2006) defined PPPs as " an arrangement between public and private sector investors and businesses which provide a service under a concession for a defined period that would otherwise be provided by the public sector".

According to an international PPP institution World Bank (2017), "a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance". Whereas, OECD (2020) mentions "Public-Private Partnerships (PPPs) are long term agreements between the government and a private partner

whereby the private partner delivers and funds public services using a capital asset, sharing the associated risks. PPPs may deliver public services both with regards to infrastructure assets (such as bridges, roads) and social assets (such as hospitals, utilities, prisons)".

As various definitions point out, it is undeniable that the use of the PPP system has many advantages over traditional government-led business practices. PPP utilization can alleviate the government's financial problems that are insufficient to invest in large infrastructure projects, and the free capital generated by private capital utilization can create opportunities to invest in other urgent and necessary projects, and the use of private expertise and operational know-how can enable more efficient and effective public service delivery. However, not all projects in the form of the PPP show successful results due to the absence of a formalized system for project implementation, the possibility of disputes and long-term requirements owing to various stakeholders, such as planning, financing, construction, and operation, and unpredictable conditions as demand and prices over a long contract period. For this reason, many studies have been made on what makes a successful PPP project to achieve a goal for various stakeholders. As the definition of PPP varies, the analysis of success factors also shows various research results.

Many researchers used the Critical Success Factors(CSFs), and its meaning is defined in various ways. Rockart (1980) stated "those few key areas of activity in which favorable results are absolutely necessary for a manager to reach his/her goals". Boynton and Zmud (1984) mentioned "the CSF methodology is a procedure that attempts to make explicit those few key areas that dictate management success". According to Chan et al., (2010) "since 1990, more and more researchers have employed different methodologies or statistical techniques to study the PPP projects' CSFs from different countries or regions".

Hardcastle et al.,(2005) explored 47 CSFs and then, theses CSFs were divided into five groups: Effective procurement; Project implementability; Government guarantee; Favorable economic condition; Available financial market. The CSFs derived from Hardcastle et al.'s research were reused in 2016 by Węgrzyn in Poland to review the relative importance of CSF from a public and private perspective, and showed the public and private sectors showed no common perception.

Zhang (2005) established 28 CSFs and then, theses CSFs were classified into five groups: Favorable investment environment; Economic viability; Reliable concessionaire consortium with strong technical strength; Sound financial package; Appropriate risk allocation via reliable contractual arrangements. A similar study of the relative importance of CSFs from different perspectives was also conducted by Dada & Oladokun (2008) using the same CSFs derived from Zang's research.

Choi et al.,(2008) conducted a risk factors analysis study to strengthen the competitiveness in the overseas urban development projects, and the study identified possible risks in three stages(feasibility study stage, construction stage, maintenance stage), finally the result revealed 30 CSFs.

Chan et al.,(2010) explored the 18 CSFs, and then, theses CSFs were divided into five groups: Stable macroeconomic environment; Shared responsibility between public and private sectors; Transparent and efficient procurement process; Stable political and social environment; Judicious government control. Chou & Pramudawardhani (2015) conducted a comparative study in 2015 on five countries, Taiwan, Singapore, China, Britain, and Indonesia, taking into account their complexity and uniqueness, and the results showed differences in recognition of the importance of CSF among countries. Importantly, this result

shows that there is a difference in perception between countries even if it is the same CSFs, and fits well with the purpose of identifying CSFs from the perspective of Korean companies in this study.

Nam & Lee (2012) studied the importance of risk factors and management measures, focusing on the healthcare PPP project in each stage of business in planning, contract, construction and operation, and explored 35 CSFs.

Shi et al.,(2016) identified the 29 CSFs, and then, theses CSFs were divided into five groups: Government's ability and characteristics; Private sector's characteristics; Public characteristics; Cooperative environment; Process's characteristics.

Jung & Han (2017) explored the 28 CSFs, and then, theses CSFs were divided into four groups: Project execution capability; Commercial condition; Non-Commercial condition; Strategic and public decision.

Recently, a CSFs study of the PPP project in Vietnam was conducted by Nguyen(2020) to derive 22 success factors.

The previous researches on the CSF in PPP projects show various results depending on the country and specific concerns, and are summarized in the Table1 by 30 common factors among the findings.

The results of the previous studies to identify CSFs in PPP project show diversity, and the diversity of results makes it difficult to use all the CSFs identified in the previous study, Thus, in this study, among the CSFs mentioned in the literature review, an analysis was conducted on CSFs mentioned more than three times in the literature review, and in particular item "MDB/ODA participation" was added exceptionally considering the author's past experience in PPP project and recent trends in PPP projects developed by Korean, even

though it was mentioned in one previous research. Overall, 30 CSFs were derived, which are shown in Table 1.

Table l. Critical Success Factors(CSFs) of PPP projects from previous literature

CSFs	References Code										
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
	2005	2005	2008	2008	2010	2012	2015	2016	2016	2017	2020
	GBR	CHN	NGA	KOR	CHN	KOR	TWN	POL	CHN	KOR	VNM
Strong and good private consortium	√	√	√		√	√	√	√		√	
Firm's PPP project experience		√	√						√	√	
Firm's financial abilities									√	√	√
Firm's capabilities of fulfilling the contract		√	√						√		
Select suitable subcontractor				√		√				√	√
Government willingness		√	√						√	√	
Government support		√	√		√		√			√	
Social support	√	√	√		√		√	√		√	√
Stable macro-economic condition	√	√	√	√	√		√	√	√	√	√
Sound economic policy	√	√	√	√	√		√	√	√		
Available financial and capital market	√	√	√	√	√		√	√	√		√
Favorable legal framework	√	√	√	√	√	√	√	√	√		√
Stable political system		√	√			√			√		√
Project technical feasibility	√	√	√		√		√	√			√
Long-term demand for the products/services		√	√	√		√					
Realistic assessment of the cost and benefits	√	√	√	√	√		√	√		√	√
Reasonable services price		√	√						√		√
Sufficient profitability of the project to attract		√	√								√
Government financial guarantee	√				√		√	√	√		
MDB/ODA participation										√	
Low environmental impact		√	√			√				√	
Exchange rate risk		√	√	√		√				√	
Interest rate risk		√	√			√					
Permit and license				√		√				√	
Transparency procurement process					√		√	√	√		√
Well-organized and committed public agency					√		√	√			
Appropriate risk allocation				√	√		√	√	√		√
Good governance					√		√	√			√
Shared authority between the public and private					√		√	√			
Commitment and responsibility of public and private					√		√	√			√

Table 2. Detail of References

Code	References
#1	Hardcastle, C., Edwards, P. J., Akintoye, A., & Li, B. (2005)
#2	Zhang, X. (2005)
#3	Dada, M. O., & Oladokun, G. B. (2008)
#4	Choi, S. L., Kim, J. H., Jang, S. J., & Paek, J. H. (2008)
#5	Chan, A. P., Lam, P. T., Chan, D. W., Cheung, E., & Ke, Y. (2010)
#6	Nam Gung, J., & Lee, S. H. (2012)
#7	Chou, J. S., & Pramudawardhani, D. (2015)
#8	Węgrzyn, J. (2016)
#9	Shi, S., Chong, H. Y., Liu, L., & Ye, X. (2016)
#10	Jung, W., & Han, S. (2017)
#11	Nguyen, P. T., Likhitruangsilp, V., & Onishi, M. (2020).

III. Research Methodology

In this study, the CSFs of the PPP project from the perspective of the Korean perspective is derived through a comprehensive review of the primary and secondary data. The study begins with an extensive review of the CSFs for obtaining secondary data. As the literature review show somewhat different results among findings, 30 CSFs that were commonly mentioned in previous studies were identified for the survey, and 30 CSFs are classified into four groups that represent similar characteristics. A primary data were acquired through empirical questionnaire survey results. According to Cheung (2009), “questionnaire survey is an effective method to seek a large sample size for quantitative data analysis”.

A preliminary survey was conducted to validify the suitability of questions and to derive a valid survey result prior to issuing the questionnaires survey using the questionnaires

obtained from the literature review. In the preliminary survey results, it was necessary to expand the question scale to determine the various degree of agreement, because the selected questions are already proven to be important in the literature survey, therefore most respondents are highly likely to choose the most important. This is something to consider in order to secure valid survey results when conducting this type of survey to measure importance using the results of a previous literature survey. Another feedback from the preliminary survey was that some of the 30 questionnaires were not easily understood by the respondent, so additional explanations were needed to help them understand. Considering the recommendations from the preliminary survey, the final questionnaire was designed by correcting some problems or errors.

A. Questionnaire Survey

There are two parts in the questionnaire, Part A is demographic characteristics of respondents, while Part B is assessment of CSFs, as shown in **Table 3**. The questionnaire is designed to assess the importance of individual CFSs identified based on the literature review. Respondents evaluated the importance of CFSs from 1 to 7 point Likert scale. In this scale 1 represents “strongly unimportant”, 2 represents “unimportant”, 3 represents “slightly unimportant”, 4 represents “neutral”, 5 represents “slightly important”, 6 represents “important”, 7 represents “strongly important”.

The target respondents of the survey are all practitioners with rich experience in PPP project in overseas business from the government, public enterprises, lenders and consultants.

Table 3. List of 30 Critical Success Factors(CSFs)

Code	Factor group	CSFs
X01	**Stakeholder (Private Sector)**	Strong and good Private consortium
X02		Private sector's PPP project experience
X03		Private sector's financial abilities
X04		Private sector's capabilities of fulfilling the contract
X05		Select suitable subcontractor
X06		Government willingness
X07	**Host country (Public Sector)**	Government support
X08		Social support
X09		Stable macro-economic condition
X10		Sound economic policy
X11		Available financial and capital market
X12		Favorable legal framework
X13		Stable political system
X14	**Project**	Project technical feasibility
X15		Long-term demand for the products/services
X16		Realistic assessment of the cost and benefits
X17		Reasonable services price
X18		Sufficient profitability of the project to attract investor
X19		Government financial guarantee
X20		MDB/ODA participation
X21		Low environmental impact
X22		Abilities to deal with fluctuations in exchange rates
X23		Abilities to deal with fluctuations in interest rates
X24		Rational business permit and license requirement
X25	**Procedure**	Transparency procurement process
X26		Well-organized and committed public agency
X27		Appropriate risk allocation
X28		Good governance
X29		Shared authority between the public and private
X30		Commitment and responsibility of public and private

B. Data collection

The collected data were analyzed by descriptive statistics on respondents' demographic information using IBM SPSS software. The 30CSFs selected in the literature review was sent to those who had experience in carrying out overseas projects. As can be seen Table 4, respondents are from Central government(6%), Public enterprise(40%), Public institute(6%), and Private consultants account for the largest number in this survey with 47%. In addition, the survey respondents are divided into two groups to analyze the difference in CSFs recognition between public and private sectors.

Table 4. List of respondents

Sector	Group	Frequency	Percentage
	Central government	6	7
	Public enterprise	32	40
	Public institute	5	6
Public	Sub sum	43	53
	Private consultant	38	47
Private	Sub sum	38	47
	Total sum	81	100

More detailed survey respondents background information is shown in Table 5. In terms of education level, 52% of the respondents have master's degrees, 37% of master's degrees, 11% of doctor's degrees, and regarding overseas business experiences were 41% under 5 years, 27% under 10 years, 20% under 15 years, and 12% over 16 years.

Table 5. Details of Respondents

Information	Groups	Frequency	Percentage
Education level	Bachelor’s degree	42	52
	Master’s degree	30	37
	Ph.D.	9	11
Organization nature	Government	6	7
	Public Enterprise	32	40
	Public institute	5	6
	Consultant	38	47
Experience	≤5 years	33	41
	6~10 years	22	27
	11~15 years	16	20
	≥16years	10	12

IV. Results

A. Reliability Test

In order to assess the reliability of this research through the survey, the Cronbach's reliability test was conducted using IBM SPSS software. The result shows that Cronbach's alpha value is 0.906. Thus this research through the survey can be regarded reasonably reliable according to the suggestions by George and Mallery (2003), " > 0.9 : Excellent, > 0.8 : Good, > 0.7 : Acceptable, > 0.6 : Questionable, > 0.5 : Poor, > 0.4 : Unacceptable"

B. Mean value and Rank of CSF

Data collected were analyzed by mean value to determine relative ranking for 30 CSFs using IBM SPSS software. Table 6 shows the overall relative importance mean values and rankings for the 30 CSFs, while Table 7 shows the results of the public sector and Table 8 shows the results of the private sector. As shown in Table 6, the analysis of the survey response data reveals mean value for 30 CSFs ranging from 5.25 to 6.64, which means that most of all CSFs are considered as crucial for success of overseas business. Moreover overall top five ranked CSFs show mean value ranging from 6.38 to 6.64 are (1) Government willingness, (2) Sufficient profitability of the project to attract, (3) Private sector's capabilities of fulfilling the contract, (4) Strong and good Private consortium, (5) Available financial and capital market.

Except for "Available financial and capital market" which ranked sixth in the private sector and "Government support" which ranked third in the private sector, the overall top five CSFs are equally among the top five in the public and private sectors, although the respective

rankings of the public and private sectors differ slightly. Regarding Government support, the private sector recognized that government support for business success is more important than the Available financial and capital market, which can be assessed as fundamentally different views of the two groups.

However, from a general perspective, the CSFs priorities perceived by the public and private sectors show similar results.

Table 6. Summary of All Respondents

Group	CSFs	N	Mean	S. D	Rank
Stakeholder	Strong and good Private consortium	81	6.42	0.70	4
	Private sector's PPP project experience	81	6.25	0.81	7
	Private sector's financial abilities	81	6.19	0.76	9
	Private sector's capabilities of fulfilling the contract	81	6.43	0.69	3
	Select suitable subcontractor	81	5.70	0.90	21
Host country	Government willingness	81	6.64	0.55	1
	Government support	81	6.35	0.74	6
	Social support	81	5.53	0.98	26
	Stable macro-economic condition	81	5.67	0.85	23
	Sound economic policy	81	5.52	0.96	27
	Available financial and capital market	81	6.38	0.75	5
	Favorable legal framework	81	6.06	0.84	14
	Stable political system	81	5.89	0.85	17
Project	Project technical feasibility	81	6.06	0.71	13
	Long-term demand for the products/services	81	6.21	0.77	8
	Realistic assessment of the cost and benefits	81	5.93	0.86	16
	Reasonable services price	81	6.05	0.88	15
	Sufficient profitability of project to attract investor	81	6.49	0.63	2
	Government financial guarantee	81	6.19	0.82	10
	MDB/ODA participation	81	5.42	1.09	29
	Low environmental impact	81	5.25	1.01	30

	Exchange rate risk	81	5.72	0.96	19
	Interest rate risk	81	5.54	1.05	25
	Permit and license	81	6.16	0.86	11
Procedure	Transparency procurement process	81	5.69	1.04	22
	Well-organized and committed public agency	81	5.63	0.98	24
	Appropriate risk allocation	81	6.10	0.86	12
	Good governance	81	5.73	0.84	18
	Shared authority between the public and private	81	5.44	1.04	28
	Commitment & responsibility of public and private	81	5.72	0.98	20

Table 7. Summary of Respondents from Public Sector

Group	CSFs	N	Mean	S. D	Rank
Stakeholder	Strong and good Private consortium	43	6.44	0.67	4
	Private sector's PPP project experience	43	6.37	0.76	6
	Private sector's financial abilities	43	6.16	0.78	12
	Private sector's capabilities of fulfilling the contract	43	6.49	0.63	2
	Select suitable subcontractor	43	5.70	0.91	24
Host country	Government willingness	43	6.51	0.59	1
	Government support	43	6.30	0.74	8
	Social support	43	5.58	0.96	26
	Stable macro-economic condition	43	5.65	0.87	25
	Sound economic policy	43	5.53	0.91	27
	Available financial and capital market	43	6.49	0.70	2
	Favorable legal framework	43	6.16	0.84	12
	Stable political system	43	5.98	0.89	17
Project	Project technical feasibility	43	6.14	0.71	14
	Long-term demand for the products/services	43	6.30	0.67	8
	Realistic assessment of the cost and benefits	43	6.12	0.82	15
	Reasonable services price	43	6.05	0.79	16
	Sufficient profitability of the project to attract investor	43	6.42	0.66	5
	Government financial guarantee	43	6.23	0.92	10
	MDB/ODA participation	43	5.53	1.12	27

	Low environmental impact	43	5.47	0.96	29
	Exchange rate risk	43	5.88	0.91	19
	Interest rate risk	43	5.72	1.05	23
	Permit and license	43	6.23	0.78	10
Procedure	Transparency procurement process	43	5.95	0.95	18
	Well-organized and committed public agency	43	5.79	0.97	21
	Appropriate risk allocation	43	6.33	0.75	7
	Good governance	43	5.84	0.87	20
	Shared authority between the public and private	43	5.37	1.11	30
	Commitment & responsibility of public and private	43	5.77	0.92	22

Table 8. Summary of Respondents from Private Sector

Group	CSFs	N	Mean	S. D	Rank
Stakeholder	Strong and good Private consortium	38	6.39	0.75	3
	Private sector's PPP project experience	38	6.11	0.86	9
	Private sector's financial abilities	38	6.21	0.74	7
	Private sector's capabilities of fulfilling the contract	38	6.37	0.75	5
	Select suitable subcontractor	38	5.71	0.90	17
Host country	Government willingness	38	6.79	0.47	1
	Government support	38	6.39	0.75	3
	Social support	38	5.47	1.01	25
	Stable macro-economic condition	38	5.68	0.84	19
	Sound economic policy	38	5.50	1.03	24
	Available financial and capital market	38	6.26	0.79	6
	Favorable legal framework	38	5.95	0.84	14
	Stable political system	38	5.79	0.81	16
Project	Project technical feasibility	38	5.97	0.72	13
	Long-term demand for the products/services	38	6.11	0.86	9
	Realistic assessment of the cost and benefits	38	5.71	0.87	17
	Reasonable services price	38	6.05	0.98	12
	Sufficient profitability of the project to attract investor	38	6.58	0.60	2
	Government financial guarantee	38	6.13	0.70	8

	MDB/ODA participation	38	5.29	1.06	29
	Low environmental impact	38	5.00	1.01	30
	Exchange rate risk	38	5.53	1.01	22
	Interest rate risk	38	5.34	1.02	28
	Permit and license	38	6.08	0.94	11
Procedure	Transparency procurement process	38	5.39	1.08	27
	Well-organized and committed public agency	38	5.45	0.98	26
	Appropriate risk allocation	38	5.84	0.92	15
	Good governance	38	5.61	0.79	21
	Shared authority between the public and private	38	5.53	0.95	22
	Commitment & responsibility of public and private	38	5.66	1.05	20

Another important thing that can be recognized through this study is that the results of this survey show different results compared to those of previous studies. In other words, most CSFs mentioned in previous studies, which were considered important, ranked relatively low in this survey. For example, “Stable macro-economic condition”, which was mentioned 10 times in the previous studies, was ranked 23rd in this survey, which most Koreans recognized it as relatively unimportant, and the “Favorable legal framework” that was mentioned 10 times in the previous studies was ranked 14th in this survey, as shown in Table 9. This may be because Koreans tend to pursue projects in countries with stable macro-economic environment and well-equipped legal systems from the beginning of development, or they still lack experience in implementing PPP projects in countries with these conditions compared to other countries.

“Private sector’s capabilities of fulfilling the contract” and “Sufficient profitability of the project to attract investor” show different results compared to previous studies. Both CSFs have been mentioned only three times in previous research, but “Private sector’s

capabilities of fulfilling the contract" was ranked third in this survey, and "Sufficient profitability of the project to attract investor" was ranked second, as shown in Table 10. Moreover, regarding for "Government willingness", it was mentioned just four times in previous research, but was considered the most important CSF among 30 CSFs in this survey, as shown in Table 10.

It is not easy to clearly explain why these differences occur, and if more previous researches are reviewed, these differences are likely to change, but it can be seen that Koreans have a clear difference in the perception of CSFs compared to non-Koreans.

Table 9. Top and bottom 5 ranked CSFs from the previous study

CSFs	Previous study		Survey	
	Rank	No of mentioned	Rank	Mean Value
Stable macro-economic condition	1	10	23	5.67
Favorable legal framework	1	10	14	6.06
Realistic assessment of the cost and benefits	3	9	16	5.93
Available financial and capital market	3	9	5	6.38
Strong and good private consortium	5	8	4	6.42
Social support	5	8	26	5.53
Sound economic policy	5	8	27	5.52
Private sector's financial abilities	25	3	9	6.19
Private sector's capabilities of fulfilling project	25	3	3	6.43
Sufficient profitability of the project to attract investor	25	3	2	6.49
Abilities to deal with fluctuations in interest rates	25	3	25	5.54
Rational business permit and license requirement	25	3	11	6.16
MDB/ODA participation	30	1	29	5.42

Table 10. Top and bottom 5 ranked CSFs from the survey

CSFs	Survey		Previous study	
	Rank	Mean Value	Rank	No of mentioned
Government willingness	1	6.64	17	4
Sufficient profitability of the project to attract investor	2	6.49	25	3
Private sector's capabilities of fulfilling the contract	3	6.43	25	3
Strong and good Private consortium	4	6.42	5	8
Available financial and capital market	5	6.38	3	9
Social support	26	5.53	5	8
Sound economic policy	27	5.52	5	8
Shared authority between the public and private	28	5.44	17	4
MDB/ODA participation	29	5.42	30	1
Low environmental impact	30	5.25	17	4

C. Significance Test

As we have seen earlier, there is not much difference between public and private perception of CSFs, but it is necessary to investigate in more detail whether there is a difference between public and private perception. In order to determine a significance test method, a normality test between the two groups was conducted at a significance level of 5% using IBM SPSS software. The results of normality test indicated that the significance probability values of Kolmogorov-Smirnova and Shapiro-Wilk tests are both less than the significance level of 0.05, so the null hypothesis can be rejected which means that the data do not follow normal distribution, as shown in Table 11.

- ✓ Null hypothesis (Ho) : Data follow a normal distribution
- ✓ Alternative hypothesis (H1) : Data do not follow a normal distribution

Therefore, the non-parametric method, Mann-Whitney test is used at a significance level of 5% using IBM SPSS software to compare differences between two independent groups when the data is not normally distributed.

As shown Table 12, the results of the Mann-Whitney test indicated that except for 4 out of 30, there is no statistically significant difference in the perception of two group, public sector and private sector regarding the importance of the 30 CSFs. 26 out of 30 CSFs have significance probability values greater than 0.05 which means that there was no significant difference.

- ✓ Null hypothesis (Ho) : There is no significant difference in the perception of public and private regarding CSFs
- ✓ Alternative hypothesis (H1) : There is significant difference in the perception of public and private regarding CSFs

Regarding the four CSFs that differ in the perception of CSFs between the public and private sectors, the public sector is more concerned on Realistic assessment of the cost and benefits, Transparency procurement process and Appropriate risk allocation, while the private sector places more weight on Government willingness.

Table 11. Result of Normality test

CSFs		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Q1_1	Public	.334	43	.000	.737	43	.000
	Private	.315	38	.000	.747	38	.000
Q1_2	Public	.308	43	.000	.759	43	.000
	Private	.245	38	.000	.826	38	.000
Q1_3	Public	.232	43	.000	.821	43	.000
	Private	.251	38	.000	.795	38	.000
Q1_4	Public	.349	43	.000	.720	43	.000
	Private	.326	38	.000	.747	38	.000
Q1_5	Public	.243	43	.000	.861	43	.000
	Private	.258	38	.000	.871	38	.000
Q2_1	Public	.353	43	.000	.710	43	.000
	Private	.487	38	.000	.495	38	.000
Q2_2	Public	.292	43	.000	.773	43	.000
	Private	.315	38	.000	.747	38	.000
Q2_3	Public	.217	43	.000	.886	43	.000
	Private	.226	38	.000	.875	38	.001
Q2_4	Public	.238	43	.000	.867	43	.000
	Private	.239	38	.000	.862	38	.000
Q2_5	Public	.280	43	.000	.854	43	.000
	Private	.238	38	.000	.899	38	.002
Q2_6	Public	.371	43	.000	.701	43	.000
	Private	.297	38	.000	.768	38	.000
Q2_7	Public	.237	43	.000	.814	43	.000
	Private	.209	38	.000	.849	38	.000
Q2_8	Public	.225	43	.000	.827	43	.000
	Private	.260	38	.000	.862	38	.000
Q3_1	Public	.252	43	.000	.803	43	.000
	Private	.251	38	.000	.809	38	.000
Q3_2	Public	.268	43	.000	.777	43	.000
	Private	.245	38	.000	.826	38	.000
Q3_3	Public	.231	43	.000	.830	43	.000
	Private	.241	38	.000	.860	38	.000
Q3_4	Public	.290	43	.000	.820	43	.000
	Private	.279	38	.000	.805	38	.000

Q3_5	Public	.298	43	.000	.714	43	.000
	Private	.391	38	.000	.677	38	.000
Q3_6	Public	.309	43	.000	.778	43	.000
	Private	.258	38	.000	.803	38	.000
Q3_7	Public	.195	43	.000	.891	43	.001
	Private	.213	38	.000	.906	38	.004
Q3_8	Public	.223	43	.000	.879	43	.000
	Private	.237	38	.000	.836	38	.000
Q3_9	Public	.249	43	.000	.852	43	.000
	Private	.286	38	.000	.820	38	.000
Q3_10	Public	.279	43	.000	.844	43	.000
	Private	.237	38	.000	.872	38	.000
Q3_11	Public	.255	43	.000	.805	43	.000
	Private	.231	38	.000	.823	38	.000
Q4_1	Public	.217	43	.000	.847	43	.000
	Private	.186	38	.002	.909	38	.005
Q4_2	Public	.260	43	.000	.870	43	.000
	Private	.218	38	.000	.877	38	.001
Q4_3	Public	.282	43	.000	.775	43	.000
	Private	.226	38	.000	.868	38	.000
Q4_4	Public	.204	43	.000	.861	43	.000
	Private	.270	38	.000	.859	38	.000
Q4_5	Public	.189	43	.001	.910	43	.003
	Private	.270	38	.000	.851	38	.000
Q4_6	Public	.274	43	.000	.859	43	.000
	Private	.260	38	.000	.882	38	.001

Table 12. Result of Mann-Whitney test

CSFs	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Q1_1	804.000	1545.000	-.138	.891
Q1_2	676.500	1417.500	-1.438	.150
Q1_3	797.500	1743.500	-.199	.842
Q1_4	761.000	1502.000	-.594	.553
Q1_5	796.500	1742.500	-.204	.838
Q2_1	609.000	1555.000	-2.415	**.016**
Q2_2	753.500	1699.500	-.661	.509
Q2_3	771.000	1512.000	-.455	.649
Q2_4	800.500	1746.500	-.166	.868
Q2_5	805.500	1751.500	-.114	.909
Q2_6	692.000	1433.000	-1.315	.189
Q2_7	690.500	1431.500	-1.275	.202
Q2_8	724.500	1465.500	-.926	.355
Q3_1	715.500	1456.500	-1.044	.296
Q3_2	727.500	1468.500	-.913	.361
Q3_3	604.000	1345.000	-2.128	**.033**
Q3_4	792.000	1738.000	-.251	.802
Q3_5	707.000	1653.000	-1.189	.235
Q3_6	720.500	1461.500	-.980	.327
Q3_7	714.500	1455.500	-1.006	.315
Q3_8	637.000	1378.000	-1.790	.073
Q3_9	663.000	1404.000	-1.562	.118
Q3_10	627.000	1368.000	-1.897	.058
Q3_11	759.500	1500.500	-.584	.559
Q4_1	574.000	1315.000	-2.401	**.016**
Q4_2	645.500	1386.500	-1.712	.087
Q4_3	571.500	1312.500	-2.482	**.013**
Q4_4	702.000	1443.000	-1.158	.247
Q4_5	736.000	1682.000	-.802	.422
Q4_6	780.500	1521.500	-.366	.715

V. Conclusion and limitations

After the Korean War, a lot of investment in the infrastructure area was made in Korea to contribute to economic development. With the limitations of the market due to the continuous expansion of investment in the infrastructure sector, and competitive technology, Korea's attention was naturally shifted to the overseas business in the field of the infrastructure sector. And the Public Private Partnership (PPP) modality is actively utilized around the world as a way to attract private investment instead of government investment that is suffering from financial limitations. However, all PPP projects are not able to guarantee successful results due to the intrinsic characteristics of the PPP project, such as long-term business, the complexity of scope, various stakeholders, and complex contracts. As a result, many efforts have been made to understand what affects successful PPP project

However, there is still a lack of research from the perspective of Korean. Therefore identifying the Critical Success Factors(CSFs) of the PPP infrastructure project from the perspective of Korean was identified in this study.

The research began an extensive research on CSFs that was conducted in the past, and finally reviewed 11 previous domestic and international researches to identify 30 CSFs for the survey. A preliminary survey was conducted prior to survey to verify the suitability of questions and derive a valid survey result. The questionnaire was designed to assess the importance of individual CFSs based on 7 point Likert scale, and the survey of this study was conducted on those involved with extensive experience in the overseas PPP project.

The collected data were analyzed by descriptive statistics on respondents' demographic information and by mean value to determine a relative ranking for 30 CSFs using IBM SPSS software. Then, reliability test, normality test and significant test were conducted to determine whether the public and private sectors showed different results in the perception of CSFs.

Overall top five ranked CSFs show mean value ranging from 6.38 to 6.64 are (1) Government willingness, (2) Sufficient profitability of the project to attract, (3) Private sector's capabilities of fulfilling the contract, (4) Strong and good Private consortium, (5) Available financial and capital market. From a general perspective, the ranking of CSFs can be recognized as having a similar opinion on CSFs of PPP projects in the public and private sectors based on the result of non-parametric Mann-Whitney test. Another important finding that can be recognized through this study is that there is a clear difference between the results of this survey and those of previous research. This fact is consistent with previous studies that various CSFs may affect the success of PPP project to a varying degree or may have different results depending on the research environment.

This study also showed some limitations. First of all, sufficient large size respondents are needed to represent each group, more respondents are more likely to have more accurate results. In addition, the author's subjective judgement might exist in the process of selection of CSFs for this survey, so sufficient comprehensive literature reviews are needed to identify objective CSFs for the survey. Another limitation is that there is a need to identify a clear reason for differences between public and private sector and differences between Korea and non-Korean perspectives in the perception of CSFs.

However, despite some limitations of this study, the results of this study are considered

to be of great help to increase the probability of success in overseas PPP projects, and further research is needed to identify more accurate CSFs for PPP projects.

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