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THE CRITICAL SUCCESS FACTORS OF PUBLIC-PRIVATE-PEOPLE PARTNERSHIPS (PPPPs) FOR EFFICIENT AND SUSTAINABLE INFRASTRUCTURE DEVELOPMENT IN THAILAND

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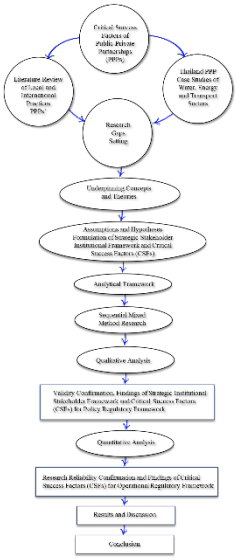
Graphical abstract



Abstract

Public-Private Partnership (PPP) is a commonly used arrangement to develop public infrastructures. Traditional PPP focuses primarily on the public sector as contracting agency and private sector as project company. This research explores a major gap observed in such setup, namely the lack of attention on the people sector who is the end-users or groups impacted by these public infrastructures. Based on literature review, qualitative analysis involving executive interviews, and quantitative analysis involving survey of operational staffs, this study recommends a new Public-Private-People Partnership strategic stakeholder institutional framework along with its components of critical success factors for both policy and operational regulating frameworks to enhance PPP practice, both in Thailand and beyond.

Keywords: Critical success factor, Public-private-people partnership, Strategic stakeholder institutional framework, Sustainable infrastructure development, Thailand

1.0 INTRODUCTION

A Public-Private Partnerships (PPPs) is one method of regulated market-based public infrastructure provisioning mechanisms, which has been widely proven to provide benefits such as efficiency and innovation to public infrastructure service delivery based on private participation. Presently – given the rising concerns related to social, economic, environment, and governance factors – the concept of sustainability is becoming increasingly important and should be taken into account as part of infrastructure development efforts. In addition to new perspectives of public administration such as new public management (NPM) and new public governance (NPG) theories which provides a way to think about what constitutes "good" governance, there is a need for more robust frameworks along with their critical success factors (CSFs) that will guide stakeholder, policy, and operational management to achieve sustainable infrastructure development. The remaining of this section is dedicated to describing the core concepts as well as key contextual items that will form the foundational building blocks of this study.

1.1 The Public-Private-People Partnerships (PPPPs)

Infrastructure development is primarily a public sector issue. The annual public sector investment in infrastructure is higher than that of the private sector. However, public sector investment by itself is unlikely to be sufficient in bridging the infrastructure gap. A public-private partnership (PPP) is an arrangement that allows private sector to contribute to the delivery of public infrastructure services [11]. Under this arrangement, private firms could mobilize additional resources for infrastructure finance and deliver greater efficiency with long-term societal

benefits. Most economists and practitioners also agree that the main benefit of PPPs is in maximizing efficiency gains.

PPP projects typically entail numerous options, solutions, and strategies. Appropriate risk allocation between the public and private partners is required to make these partnerships successful, and governments must manage lenders and create the right framework for PPPs, including legal, regulatory, institutional, and financial programs to provide appropriate and efficient public services [11]. Under a successful PPP setup, the private partner undertakes its business to ensure profits while the public partner improves the delivery of public services by providing specific capacities of state and non-state actors. The most important aspects of PPPs include participation, relationships, resources, sharing, and continuity. The ultimate goal of a PPP arrangement is to optimize cooperation between the public and private sectors to deliver the best possible services to public end-users. Nonetheless, the people sector – which comprises end-users and/or impacted groups – has traditionally been invited to participate in PPP intervention only at the early stages such as during a project's feasibility study, and relatively little attention has been paid to the objective of delivering services with qualified standards and affordable tariff to end-users compared to the concerns related to risk allocation between public and private sectors. Hence, the people sector should be structurally incorporated into the traditional PPP thinking going forward, and this paper proposes a public-private-people partnership (PPPP) mechanism to be the strategic stakeholder institutional framework for PPP success [21,25].

1.2 Sustainability of Infrastructure Development

In 2015, world leaders moved on from the Millennium Development Goals (MDGs), as adopted in September 2000 by the United Nations Development Program (UNDP), to the Sustainable Development Goals (SDGs). The new SDGs were intended to motivate and mobilize global enthusiasm, knowledge, and action. As reflected in the "The Future We Want" declaration, leaders from many countries formed plans that incorporated the 17 SDGs to realize their ambitions of a world without poverty, hunger, and adverse climate change impacts within the next 15 years. These 17 SDGs include: 1) no poverty, 2) zero hunger, 3) good health and well-being, 4) quality education, 5) gender equality, 6) clean water and sanitation, 7) affordable and clean energy, 8) decent work and economic growth, 9) industry innovation and infrastructure, 10) reduced inequalities, 11) sustainable cities and communities, 12) responsible consumption and production, 13) climate action, 14) life below water, 15) life on land, 16) peace and justice strong institutions and 17) partnerships for the goals. Based on these 17 SDGs, some sustainable goals can be achieved through infrastructure development within the water, energy, and transportation sectors, and such efforts would likely require mutual participation and collaboration under PPP. Thus, a selected subset of SDGs is proposed to be the sustainable goals of PPP implementation in this study due to its direct relevance to public physical infrastructure development objectives.

1.3 The New Perspectives of Public Administration

Under the new perspectives of public administration, the main features of new public management (NPM) approach, [30], focus on 5 key areas: 1) improving the government's effectiveness and efficiency; 2) ideas and techniques from the private sector; 3) the use of privatization and contracting out of governmental services to improve effectiveness and efficiency; 4) the creation or use of markets; and 5) the use of performance indicators to specify the desired output of the government. "Good" governance puts emphasis on the dissemination of social, political, and administrative governance models by supranational bodies and places a market-based approach to the allocation and governance of public resources. In-line with this perspective, the new public governance (NPG) concept has also been proposed. NPG is value-centric – it declares that a government's objective is to promote the larger common good. Mark Moore called this "the public value approach" [24,23,34], while Stoker and others named it "the collective preference approach" [35]. NPG is concerned with advancing the value created by all government activities, not just more efficiency, effectiveness, or response in an individual program's operations. Such perspective therefore broadens the goals of performance evaluation and management to include service outputs, satisfaction, peoples' trust, and government legitimacy.

1.4 Strategies for the Success of PPPs

The key benefit of PPP mechanism in practice is their potential to produce both efficient output and effective outcome gains in service delivery. Many case studies have shown that efficiencies gained from PPPs are common, but the magnitude of the gain is project-specific depending on factors such as project type, project size, and governance context.

In brief, the major effects of PPPs have been significant improvements in operational efficiency. However, in terms of public policy making for PPP, the new perspectives of public administration – including the previously mentioned concepts of NPM, NPG, and SDGs – can provide additional direction to inform the key strategies required for a successful PPP.

1.5 Success Criteria (SC) of PPPs

Project success is an abstract concept especially when a project is successful, highly subjective, or very complicated [6]. Project success is complex because any attempts of measurement are inevitably influenced by the method used by an assessor. A typical project is deemed as a success or a failure based on its outputs and outcomes, which are elements of the project's performance management system. While outputs are products and services delivered by a project or a program, outcomes usually also involve conditions arising outside of the program. Measurements related to a project's outputs and outcomes let managers and policymakers determine how policies and projects can be adjusted or changed to best attain their goals, as suggested by Callahan and Kloby [5].

Project cost has often commonly been used as proxy for a project's performance. However, the performance of many PPPs in the domain of infrastructure development may not be comprehensively reflected by "cost" alone and might require other measurements such as those related to project completion period and output quality. The overreliance of the public service comparator (PSC) on cost parameters in the value for money (VfM) assessment has been criticized because such measures do not holistically capture the complexity of a PPP procurement process. As observed by Ng et al. [26], a PPP

project should be considered successful only if the goals and key interests of all stakeholders have been sufficiently fulfilled. A successful PPP scheme can be described as one that result in the delivery of high-quality end products and/or services, which can achieve the intended targets/goals of the government, provide a favorable financial return for the private sector involved, and satisfy the needs of the community. Based on reviews of international literature as well as concepts of resource dependence, structural contingency, and rational choice theories – the SC proposed in this study for a PPP arrangement therefore cover three major areas: good public welfare delivery for the public owner, rational profitability for the private sector and quality of life for the people sector who are the end-users/impacted group.

1.6 Critical Success Factors (CSFs) of PPPs

CSFs are defined by Rockart [32] as key areas of activity which are necessary and require significant attention from managers to ensure that their goals could be achieved. Eight independent CSFs were determined by Qiao et al. [31] in the Build-Operate-Transfer (BOT) projects in China: stable political and economic situation, attractive financial package, acceptable tariff levels, reasonable risk allocation, selection of appropriate subcontractors, management control, and technology transfer. In other studies, the CSFs of a successful PPP procurement project are found to be similarly enabled by existing financing markets [1], strong and good private consortium [39,3], feasibility study/cost-benefit analysis [4], and efficient risk allocation [16, 2].

In addition to these CSFs, “soft” CSFs should also be considered. They mainly focus on the people activities and involvement and include factors such as social support [15], commitment [18,36], and mutual benefit [16]. Arthur Andersen and Enterprise LSE [2] as well as Gentry and Fernandez [15] also put emphasis on transparency and the procurement process.

Altogether, these factors have been synthesized and classified into 19 CSFs: strong private consortium; proper risk allocation and risk sharing; competitive procurement process; commitment/responsibility of public/private sectors; thorough and realistic cost/benefit assessment; project technical feasibility; procurement process transparency; good governance; favorable legal framework; available financial market; political support; multi-benefit objectives; government involvement by providing guarantees; good economic policy; stable macro-economic environment; well-organized public agency; shared power between public and private sectors; social support; and technological transfer.

1.7 International Practice

According to Cheng et al. [7], PPPs were adopted in China in the 1980s and further developed in the mid-1990s. There were four development phases: exploration, stable expansion, development with fluctuations, and new boom. Currently, there is a PPP fever in China which first began in the late 2013 resulting from strong promotion by the central government. Liu, Wang, & Wilkinson [20] conducted a comparative analysis of critical factors which affect the effectiveness and efficiency of PPP tendering in a free market (Australia) and a centrally planned economy (China). The categories of key drivers, CSFs, and preferred risk allocation in PPPs formed in Taiwan, Singapore, China, UK, and Indonesia were compared by Chou and Pramudawardhani [8]. In summary, they determined that Indonesia and Taiwan exhibit certain similar key drivers and that Indonesian CSFs are most similar to those of China. Additionally, Indonesia and Singapore show signs of the highest similarity in terms of risk allocation preferences based on descriptive statistics.

Ke et al. [19] identified the CSFs for PPPs in infrastructure developments in China and Hong Kong relative to the UK. They found that PPP could be considered as a favorable option to meet rapidly rising demand for public works and services. To investigate the potential of PPP adoption in China, Ke et al. [19] explored the CSFs necessary to implement PPP projects. The Chinese experts’ perspectives were collected using an empirical questionnaire survey. The respondents were invited to rate across 18 CSFs contributing to PPP projects’ success. The survey results were analyzed using the factor analysis technique. The findings, as shown in Table 1, indicated that the 18 CSFs could be grouped into the five categories: (1) stable macroeconomic environment; (2) shared responsibility between public and private sectors; (3) transparent and efficient procurement process; (4) stable political and social environment; and (5) judicious government control.

1.8 Thailand Practice

In Thailand, several laws and regulations related to PPPs have been issued under the Private Investment in State Undertaking Acts BE 2535 (1992), 2556 (2013) and 2562 (2019). Figure 1 summarizes Thailand PPP procedures under the Act BE 2562 [37]. According to this Act, value of operation, transparency, and acceptability are included in the PPP goals. Ongipattanakul [27] investigated critical risks in the operation phase of PPP projects in Thailand. Unsolvable dispute over user fees was the major cause for the main stakeholders’ withdrawal from projects. The government’s disapproval of a raise in toll fee, which resulted in poor revenue and insufficient cash flow, led to late payment of the debt.

Various forms of PPP mechanism have been deployed in Thailand for the development of physical infrastructure projects. Most projects are in the transportation, energy, and water sectors. The details of each PPP program are tailored to fill any gaps arising from specific economic, social, legal, political, and institution aspects in Thailand. In the empirical study of PPP practices in Thailand, the following nine public infrastructure projects across transportation, energy, and water sectors have been evaluated:

Table 1 The Structure of Principal Factors Extraction on the 18 CSFs of PPP of Ke et al. (2010)

Item	Factor Loading
Factor I. Stable macroeconomic environment	
Sound economic policy	0.814
Favorable legal framework	0.800
Stable macroeconomic condition	0.765
Proper risk allocation and risk sharing	0.753
Existing financial market	0.735
Multibenefit objectives	0.635
Factor 2. Shared responsibility between public and private sectors	
Shared authority between public and private sectors	0.834
Commitment and responsibility of public and private sectors	0.798
Project technical feasibility	0.757
Thorough and realistic assessment of the cost and benefits	0.601
Factor 3. Transparent and efficient procurement process	
Competitive procurement process	0.897
Transparency procurement process	0.812
Well-organized and committed public agency	0.675
Factor 4. Stable political and social environment	
Political support	0.861
Social support	0.834
Strong and good private consortium	0.671
Good governance	0.612
Factor 5. Judicious government control	
Government involvement by providing guarantee	0.805

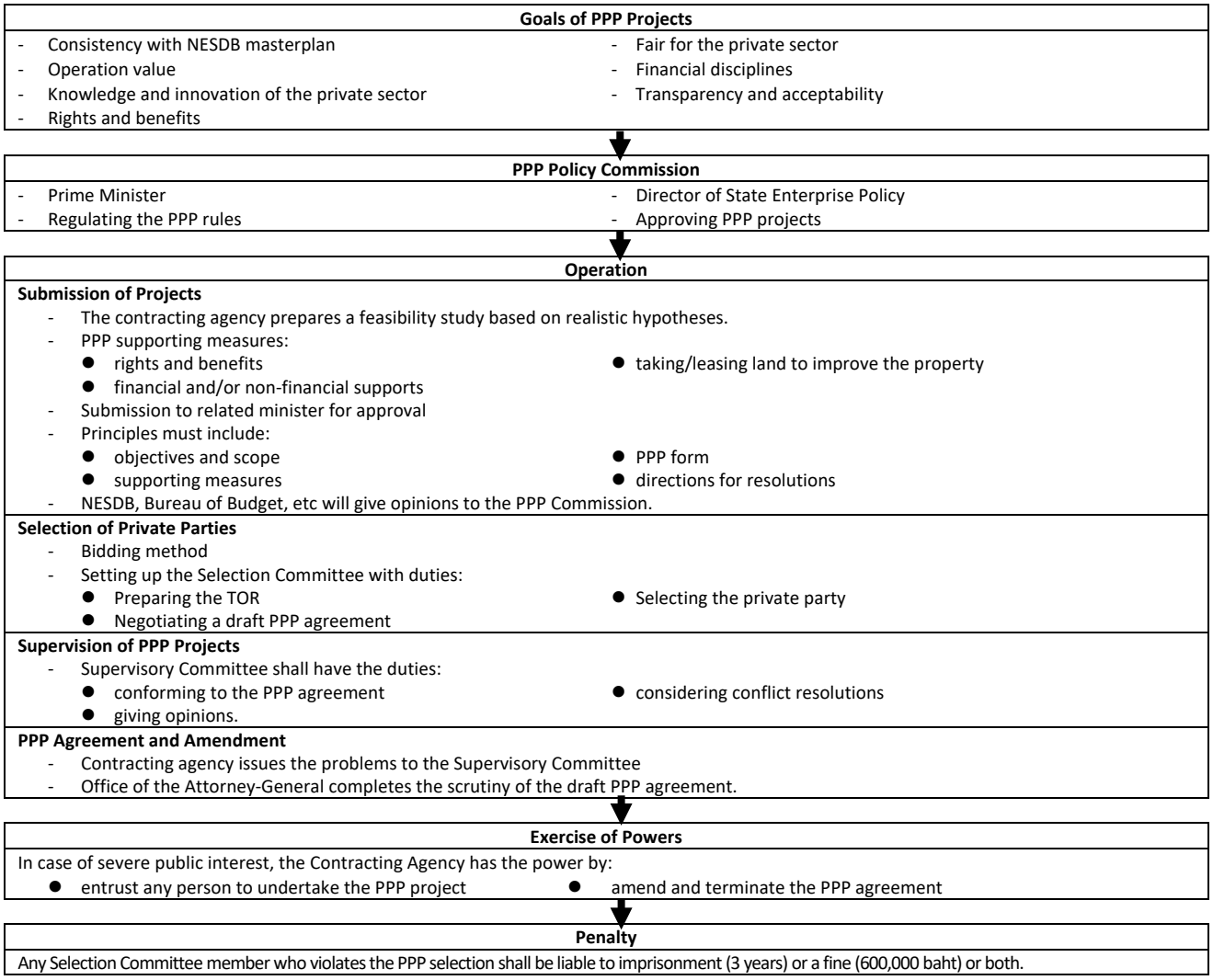


Figure 1 Thailand PPP Procedure Under the Act BE 2562 (2019)

Transportation Sector
- BOT of BTS Sky Train Project (23.5 km Green Line)
- AOT of MRTA Blue Line Subway Project (20 km)
- BTO of EXAT Expressway Project (32 km Northern Extension Route)

Energy Sector
- BOT of Nam Ngum 2 Hydropower Project (615 MW)
- SPP of Kasetthai Biopower Project (60 MW)
- IPP of Global Power Synergy Project (713 MW)

Water Sector
- BOOT of Provincial Water Supply Project in Pathum Thani and Rangsit (488,000 cu.m/day)
- BOO of Provincial Water Supply Project in Nakhon Pathom and Samut Sakhon Provinces (320,000 cu.m/day)
- BTO or Provincial Water Supply Project in Rayong Province (84,600 cu.m/day)

The results from an empirical review of these nine PPP infrastructure projects confirmed that the people end-users' participation in a PPP arrangement in Thailand has typically been limited to only at the project appraisal stage of the feasibility study – relatively little additional attention has been put on the people end-user group in the subsequent stages of PPP selection, operation, monitoring, and evaluation. Therefore, this pain point is proposed as the crucial research gap to be addressed by this study.

1.9 Strengths and Limitations

The previously mentioned literature review and empirical evidence from case studies support the assertion that PPP is an efficient mechanism for public physical infrastructure development due to the private sector's participation which brings in additional capital and managerial expertise and that the participation of the people sector is not embedded into all stages of a typical PPP program. PPP's strengths and limitations can be summarized as follows:

PPP strengths:
- Public sector can financially benefit from delivering public welfare by receiving returned fees from a PPP project as compensation for the investment costs.
- Private sector has an opportunity to invest in project construction, operation, and maintenance with the government partially transferring project costs and risks to the private sector.
- Private sector's expertise and primary business incentive to enhance shareholder value and achieve higher returns (Equity IRR) enhance the effectiveness of project operations and maintenance.
- People sector's quality of life is generally improved since private sector's involvement leads to an increase in project development activities relative to what would be achievable by the public sector working alone without support from private sector.

PPP limitations:
- Public sector could potentially be unable to receive any other forms of direct return from the investment, as shown in some PPP models such as BOO and BOOT, since the rights to project revenues typically remain with the private sector.
- Public sector has limited monitoring access and can only monitor the operation and maintenance as specified in the agreement without visibility into the private sector's overall process and operations.
- Private sector may find various PPP models to be financially unattractive investments as they tend to offer relatively low overall financial return.
- Disputes in project revenue allocation and/or transfer of risks back to the public sector may occur if the PPP set up and agreement is not well-arranged.
- People sector who are the end-users of public services delivered by PPP projects generally have no formal access to participate in any decision-making and monitoring related to PPP implementation.
- Sharing and communication of PPP knowledge to the people sector are normally not embedded into the project delivery process.

1.10 Research Gaps

PPP arrangement provides a mechanism to optimize cooperation between the public and private sectors in delivering services to the public end-users. In practice, however, PPP faces limitations that are subjected to the economic, social, legal, and political environments. The issues observed across various PPP projects include, but not limited to, unstable political support; need for governmental legal guarantee provision(s); uncertain economic situation; inappropriate public organization; conflict in resolution systems; quality and tariff affordability of public services delivered to end-users; and lack of social participation and support. This research aims to develop an effective stakeholder institutional framework and conducive regulatory frameworks along with relevant CSFs to mitigate the aforementioned issues in the context of Thailand's public physical infrastructure development.

To summarize, there are two research gaps that this study intends to address: 1) only the public owners and private investors are included in the decision-making process in every stage of a PPP arrangement and 2) SC and CSFs of public end-users are often not integrated into a PPP arrangement. In addressing these two research gaps, an appropriate PPP stakeholder institutional framework along with its SC and CSFs for the public owners, private investors, and public end-users will be explored and recommended, thus setting up frameworks that guide PPP actions in Thailand at both the policy and operational levels.

1.11 Underpinning Concepts and Theories

Today, the tasks/projects performed by most government institutions have become more challenging with rapidly changing environments, increasing technical complexity, time-based competition, and especially popular demand for better quality and more choices. To expand the PPP application – from one that focuses solely on public authorities as project owners and the private sector as project companies – to one that also takes citizens into account, Denhardt & Denhardt [12] proposed the New Public Service (NPS) concept in 2015. NPS was developed as an approach for running public service

organizations. It is leveraged by government, public service institutions, and agencies at both sub-national and national levels. Under NPS, citizens are viewed as "customers" and public servants are viewed as public managers. In addition, NPS also attempts to realign the relationship between public service managers and their political superiors by creating linkage between the two parties. NPS suggests that public managers should have incentive-based motivation, such as pay for performance, under which clear performance targets could be set and used for performance evaluations.

There are three schools of governance literature for the New Public Governance (NPG) concept: corporate governance, good governance, and public governance. An important characteristic of NPG involves the establishment of government processes, which helps to generate agreements among various stakeholders who may disagree on how to provide maximum public value [40]. NPG also positions the creation of public goods as a process related to the public, private market, and non-profit sectors [29,28,9,17]. Based on this model, the government's role is not only to regulate and distribute public benefits but also to act as an agency that brings together private and non-profit stakeholders to generate benefits from sharing of ownership for the public goods.

After theoretical review for this study, the theories of resource dependence, structural contingency, and rational choice are proposed as the tools to facilitate PPP mechanism for public owners, private investors, and public end-users.

In conclusion – to successfully execute the goal of sustainable development based on new public administration perspective – 3 underlying concepts (SDGs, NPS, and NPG) along with 3 theories (resource dependance, structural contingency, and rational choice) have been considered and proposed to underpin the success criteria of all relevant stakeholders.

1.12 Analytical Framework

For the stakeholder institutional framework of PPPs proposed in this study to lead to successful collaboration, it must consider and capture all related parties: public owners, private investors, and people who are the end-users and/or impacted group. Initial theoretical assumption and hypotheses of the strategic stakeholder institutional framework for public-private-people partnerships (PPPPs) as well as its success goal, SC, and CSFs were developed (as shown in Figure 2 and Table 2). This initial viewpoint will serve as an analytical framework that will guide the rest of this research study. To actualize the PPPP concept, some scholars have recommended strategies to mitigate the stakeholder negligence issue and promote partnerships in PPP projects. For example, Ng, Wong & Wong [26] proposed a PPPP process framework for managing stakeholders in PPP projects. De Schepper, Dooms & Haezendonck [10] investigated responsibilities of the public and private sector agencies in managing inclusive stakeholders at different stages of PPP projects. Majamaa [21] also proposed the 4P-based urban development process comprising Public-Private-People Partnership (4P) of local government and public landowners ("public"), developers and private landowners ("private"), and end-users ("people") for good living environment and separate customer relationships. In addition, Marana, Labaka & Sarriegi [22] recommended that a framework should be developed to define and describe successful characteristics of 4Ps within the context of city resilience building process.

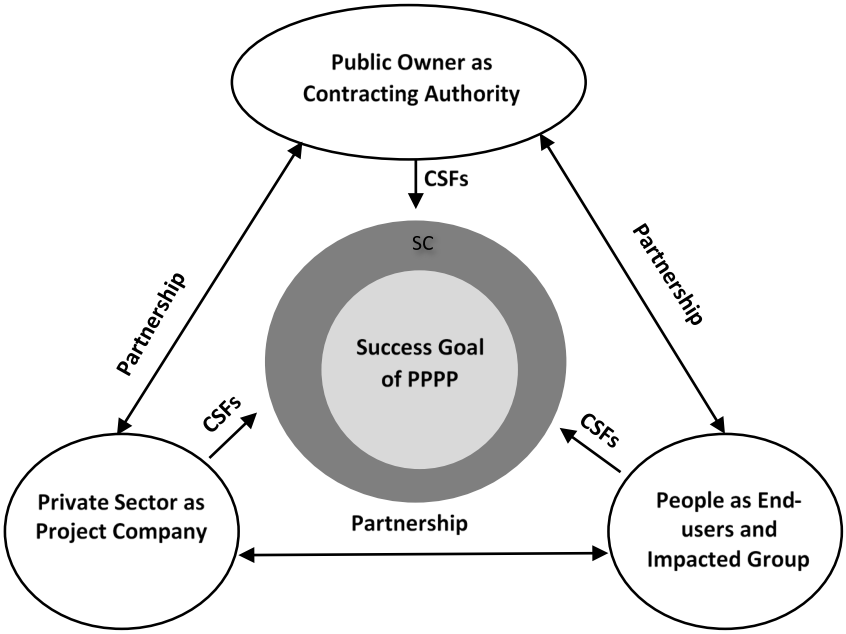


Figure 2 Strategic Stakeholder Institutional Framework of Public-Private-People Partnerships (PPPPs)

Table 2 Proposed Theoretical Framework for Assumptions and Hypotheses of Goal, SC, and Stakeholders' CSFs in PPP Mechanism

Theoretical Framework		PPP Stakeholders: Public Owner as Contracting Authority	PPP Stakeholders: Private Sector as Investor	PPP Stakeholders: People as End-users/ Impacted Group
- PPP success goal (Dependent Variable, Y)		Sustainable development		
- Concepts		New public service and governance		
- Theories		- Resource dependence	- Structural contingency	- Rational choice
- SC		- Good public welfare delivery	- Rational profitability	- Quality of life
Main Independent Variables (Xi)		Sub-Independent Variables (Xii)		
CSFs of PPPP model	- Politics	- Political support	- Business goal	- Social support
	- Legal Framework	- Favorable legal framework - Commitment and responsibility of public and private sectors - Government involvement by providing guarantee	- Clarity of contract conditions	- Service standard (qualitative and quantitative)
	- Finance	- Value for money - Stable economic conditions - Realistic project costs and benefits	- Financial availability - Project revenue/investment budget	- Tariff affordability
	- Project Configurations	- Project feasibility in technical, economic and social aspects - Land acquisition	- Competitive innovations of design, construction and operation/ maintenance - Strong and good private consortium	- Environmental and social impacts
	- Managerial System	- Project management/collaboration of agencies concerned - Competitive procurement process - Well-organized and committed public agency - Monitoring and evaluation systems	- Project efficiency of construction and operation	- Punctual service - Collaboration among project owner/ private investor, and people sector
	- Good Governance	- People participation - Appropriate risk allocation/sharing - Shared authority between public and private sectors - Transparency procurement process - Conflict resolution	- Ethics	- Participation of people in all stages of PPP

2.0 RESEARCH METHODOLOGY

To achieve the objective of this research in identifying an appropriate strategic stakeholder institutional framework and relevant critical success factors (CSFs) at both the policy and operational levels of a PPP arrangement, an overview of the research procedure is illustrated in Figure 3. Sequential mixed method research of both qualitative and quantitative techniques is proposed for this study. Qualitative research, conducted through interviews of executives with PPP experience, is intended to confirm the initial theoretical assumptions and hypotheses while quantitative research, conducted through questionnaire survey of staffs at operational level of PPPs, will reflect the reliability of CSFs findings.

2.1 Sequential Mixed Method Research

A mixed method research approach, which is consisted of both qualitative and quantitative research, is more suitable for answering certain types of research questions subjected to the purposes of exploration, description, and explanation. The mixed method research approach is superior to single-approach designs because it could address a range of confirmatory and exploratory questions while also providing better (stronger) inferences and opportunity for different perspectives to be explored.

2.2 Qualitative Analysis

The qualitative research portion of this study aims to confirm the validity of the proposed analytical framework for both the PPPP strategic stakeholder institutional framework and its CSFs as shown in Figure 2 and Table 2. In-depth interviews with selected executives from 22 agencies across public, private, and end-user sectors (as shown in Table 3) who are directly involved in PPP practice in Thailand were conducted face-to-face.

The interviews with the executive level of the target groups were conducted using semi-structured questionnaires designed based on the proposed hypotheses derived from literature review results. The following principles were leveraged to guide the interviews:

- Flexibility of qualitative interviewing
- Questions cover background/demographic, experience/behavior, opinion/values, knowledge, and sensory questions.
- Building of rapport
- Leading, over-complex, multiple questions have been avoided.
- Avoiding judgmental responses.
- Probing for obtaining real in-depth data.
- Human conduct morality.
- Respect, beneficence, and fairness to participants.

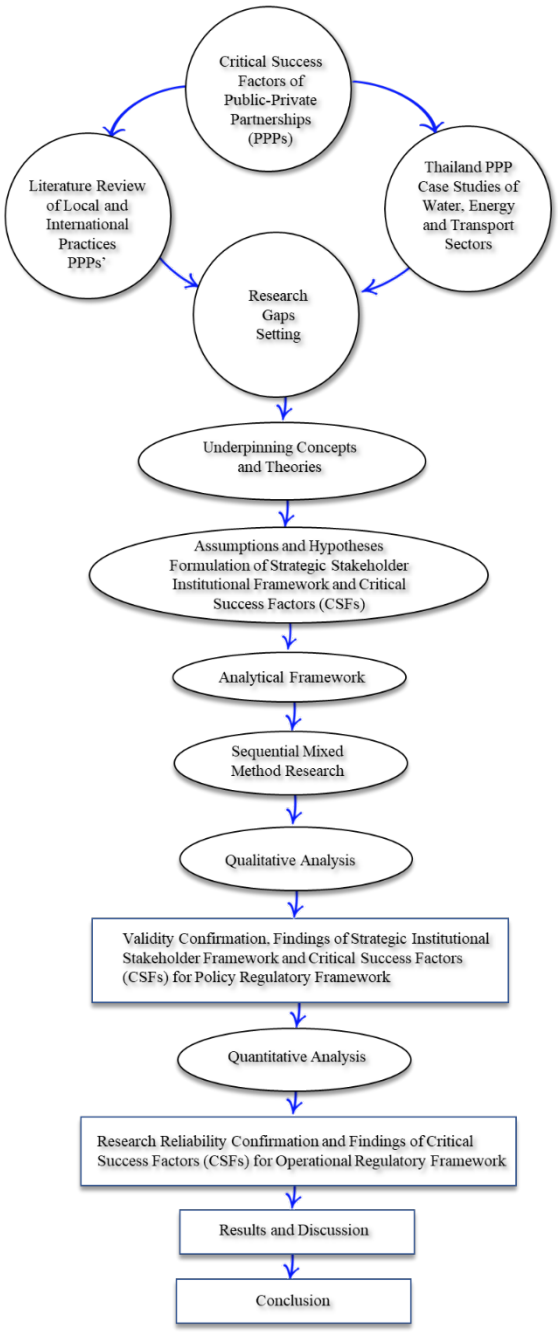


Figure 3 Research Procedure Overview

- Professional codes of ethical practice comprise inform consent, no deception, right to withdraw, debriefing, confidentiality and anonymity.

Based on the thematic method of qualitative analysis, the results confirm the study's initially proposed strategic stakeholder institutional framework, success criteria (SC), and critical success factors (CSFs) for PPPs in Thailand.

Table 3 List of Interviewees in Qualitative Research

Target Group of Stakeholders	No.	Name of Interviewed Agencies
1. Public Owner Sector	1	Traffic and Transportation Department, Bangkok Metropolitan Administration (BMA)
	2	Electricity Generating of Thailand (EGAT)
	3	Provincial Waterworks Authority
	4	Expressway Authority of Thailand
	5	State Railway of Thailand
	6	Office of the Energy Regulatory Commission
	7	Mass Rapid Transit Authority of Thailand
	8	State Enterprise Policy Office (SEPO)
	9	Eastern Economic Corridor Office of Thailand
2. Private Sector	10	TTW Public Company limited
	11	The Bangkok Expressway and Metro Public Company Limited (Expressway)
	12	The Bangkok Expressway and Metro Public Company Limited (Metro)
	13	Global Power Synergy Public Company Limited
	14	CH.Khanchang Public Company Limited
	15	Glow Group
3. People Sector	16	Association for Consumer Protection
	17	Consumer Protection Association
4. Professionals	18	The Consulting Engineers Association of Thailand
	19	Weerawong Chinnavat & Partners Ltd. (Weerawong C&P)
	20	Baker & McKenzie Ltd. (Thailand)
5. International Agencies	21	World Bank (WB)
	22	Asian Development Bank (ADB)

2.3 Quantitative Analysis

The quantitative portion of this study observes as research population various PPP projects implemented in Thailand for public physical infrastructure development across the water, transportation, and energy sectors. The unit of analysis is on an individual basis, and the samplings are the individuals who worked in PPP projects for the public owners or private investors as well as those who are the end-user groups. The number of sampling respondents is 65 individuals from 15 PPP executing agencies.

All variable indicators relevant to politics, legal, finance, project configurations, managerial system, and good governance for public, private, and end-user stakeholders along with their Likert scales are proposed. Questionnaires were designed to avoid prejudicial language, imprecision, leading and double questions, as well as assumptive and hypothetical questioning. All questions were put within the context of the research objectives, with each question classified to provide the basis for additional analyses of relationships between variables.

Quantitative data analyses of collected questionnaire responses were conducted to confirm the research findings. The proposed methods of analyses include Descriptive Statistics, Factor Analysis (FA) Technique, Kaiser-Meyer-Olkin (KMO) Measure, and Barllet's Test of inferential statistical model. Exploratory factor analysis, principal component analysis with Promax rotation, and the decision-making criteria with Eigen value of more than 1 were applied in the analyses. The selected variables were confirmed by the following criteria: Factor Loading > 0.4, KMO > 0.5, and Barlett's Test of Sphericity < 0.05. General analysis results of the quantitative research are shown in Table 4.

Table 4 Quantitative Analysis Results for General Information, Opinions and SC of PPPPs

	Details	Mean	Frequency	%
Part 1	**General information of respondents**			
1.1	Average age	41		
1.2	Average Years of experience	16		
1.3	Average Years of work experience in public private partnership (PPP) investment program	8		
Part 2	**Opinions toward people sector's participation in all stages of PPP process**			
2.1	Your opinion on the people sector (end-users or/and impacted group) participates in all stages of PPP			
	1) Agree		52	80.00
	2) Disagree		13	20.00
	Total		**65**	**100.00**
2.2	The appropriate method of people sector's participation in PPP process			
	1) Direct participation by themselves		15	23.08
	2) Through academic or professional agency		23	35.38
	3) Through the people organization/foundation		11	16.92
	4) 1) - 3)		16	24.62
	Total		**65**	**100.00**
Part 3	**PPP's Success Criteria (SC) and Critical Success Factors (CSFs)**			
3.1	**Public Owner as Contracting Agency/Government Sector**			
3.1.1	The opinion on the PPP's Success Criteria (SC) of Public Owner as Contracting Agency/Government Sector is **good public welfare delivery**			
	1) Agree		42	64.62
	2) Disagree		18	27.69
	Total		**60**	**92.31**
3.2	**Private Investor**			
3.2.1	The opinion on the PPP's Success Criteria (SC) of Private Sector as Investor/Project Company is **rational/ reasonable business profitability?**			
	1) Agree		46	90.20
	2) Disagree		5	9.80
	Total		**51**	**100.00**
3.3	**People Sector as End-users or Impacted Groups**			
3.3.1	The opinion on the PPP's Success Criteria (SC) of people/end-users is **the good quality of life?**			
	1) Agree		32	88.89
	2) Disagree		4	11.11
	Total		**36**	**100.00**

3.0 RESULTS AND DISCUSSION

The qualitative analysis results based on thematic method are shown in Table 5. Based on in-depth interviews with PPP executives, the results of this study related to PPPP strategic stakeholder institutional framework, goals, success criteria, and 70 sub-critical success factors ("SCSFs", as shown in Figure 2 and Table 5) are recommended to be the policy regulating framework to guide PPPP arrangements for delivering sustainable infrastructure development in Thailand.

The CSFs findings from quantitative analysis results based on factor loading technique are shown in Table 6. These 41 sub-CSFs are recommended to be the operational regulating framework to guide PPPP arrangements for sustainable infrastructure development projects. The key results of this study are discussed in more details below.

Firstly, the results explored the strategic stakeholder institutional framework of PPPPs as shown in Figure 2. They are validated by mixed method research and are applicable to the investments related to physical public infrastructure development in Thailand. The findings can also be used as policy and operational regulating frameworks to guide PPP arrangements, providing clarity and direction to various project aspects such as planning, operation, and management of any goods and/or service deliveries.

Secondly, the results suggest that that the explored strategic stakeholder institutional framework of PPPPs will be more efficient and effective relative to traditional public procurement approach based on the qualitative analysis results obtained from interviews with 22 executives with PPP background. The qualitative research results confirmed that the people sector's participation, previously not well-integrated into typical PPP arrangements, could result in more successful PPP projects – especially when the 70 sub-critical success factors (SCSFs) for the public (29), private (25), and people sectors (16) identified are taken into account. These 70 SCSFs, shown in Table 5, are proposed to be the policy regulating framework for sustainable infrastructure development. While the quantitative research involving 65 respondents from 15 agencies further illustrates that the idea that public or people participation should be included in each stage of the PPP procedure is strongly agreed upon and that the preferred participation method would be through academic or professional agency. The success criteria (SC) of PPPPs across the three sectors are mostly accepted as follows: good public welfare delivery for public owner as contracting agency, rational/reasonable business profitability for private investor, and good quality of life for the people/end-user groups. As shown in Table 6, the quantitative research identified the 41 sub-critical success factors for the public (17), private (13), and people sectors (11). These SCSFs are proposed to be the operational regulating framework for PPP arrangements. The results also suggest that the public sector is most concerned

Table 5 Findings of Qualitative Analysis Results of PPPP's Strategic Stakeholder Institutional Framework and CSFs and Proposed for a PPPP Policy Regulatory Framework

Regulating Framework		PPP Stakeholders		
		Public Owner	Private Investor	People End-user
Goal		Sustainable development		
Concepts		New public service and governance		
Theories		Resource dependence	Structural contingency	Rational choice
Success Criteria (SC)		Good public welfare delivery	Rational profitability	Quality of life
Main CSFs		Sub-CSFs		
CSFs Categories	Politics	Political support *Policy continuity*	Business goal *Political stability* *Real investor*	Social support *PPP procedures clarity*
	Legal Framework	Legal conditions Commitment/responsibility between public and private sectors Government involvement *Contract detail*	Contract terms/conditions Risk sharing between public and private sectors	Service standard *Good/rational regulations*
	Finance	Value for money Stable economic conditions Realistic costs/benefits *Project subsidy* *Budget availability/bankability* *Efficient financial management*	Financial availability Project revenue *Business revenue/profit* *Service tariff* *Creditable fund source* *Financial source wealth*	Tariff affordability
	Project Configurations	Project feasibility Land acquisition *Appropriate investment model* *Realistic demands* *Social benefits*	Competitive innovations *Good responding to real need* *Professional capability*	Environmental/social impacts *Land/property compensation* *Projects reflecting end-users' real need* *Knowledge sharing*
	Managerial System	Project management Competitive procurement Well-organized and committed public agency Monitoring and evaluation *PPP knowledge*	Project efficiency *Government agencies cooperation* *Competent consortium* *Risk management* *Cost controls* *Monitoring and evaluation*	Punctual service Collaboration among all sectors *PPP knowledge sharing*
	Good Governance	Appropriate risk allocation Shared authority between public and private sectors *Treats private investors as partner* Procurement process transparency Conflict resolution *Justice/fairness toward all stakeholders* *Ethics*	Ethics *Fairness to end-users* *Transparency of doing business* *Social benefit sharing* *Project end- user participation*	Public participation *Checks and balances system* *Performance/evaluation reporting* *Information accessibility*

Notes: Roman font indicates sub-independent variables from literature review, while Italic font indicates those from qualitative research.

Table 6 Findings of Quantitative Analysis Results of PPP's CSFs and Proposed for a PPPP Operational Regulatory Framework

Stakeholders	Main Critical Success Factors	Sub-Critical Success Factors (SCSFs)
1. Public sector as project owner/contracting agency	Good Governance	Transparency in procurement process Ethics Justice and fairness to all stakeholders Conflict resolution Treat private investors as a partner
	Managerial System	Project management and collaboration of agencies concerned Well organized and committed public agency Monitoring and evaluation systems
	Legal Framework	Appropriate risk allocation and risk sharing Legal conditions Commitment and responsibility between public and private sectors
	Finance	Efficient financial management Appropriate investment model Budget availability/bankability Project subsidy
	Politics	Policy and plan continuity Political support
2. Private sector as investor	Good Governance	Transparency of doing business Fairness to end-users Ethics Good project to respond to the real need Social benefit sharing Project end-user participation (directly or indirectly)

	Managerial System	Monitoring and evaluation system Risk management Cost controls
	Finance	Business revenue and profit Service tariff
	Business Policy	Political stability Business goal/objective
3. People sector as end-users/ impacted group	Project Configurations	Projects that reflect the real needs of end-users Land/property compensation Tariff affordability Environmental and social impacts Project information accessibility
	Legal Framework	Social support toward the project Good and rational regulations
	Good Governance	Clarity of PPP plans, steps and procedures Knowledge sharing and transferring of project technology and innovation Sharing of PPP knowledge among public, private and people sectors Participation of people in all stages of PPP program

with good governance, followed by managerial system, legal framework, finance, and politics, respectively. The private sector is also similarly most concerned with good governance, followed by managerial system, finance, and business policy, respectively. The people sector, on the other hand, is most concerned with project configurations, followed by legal framework and good governance, respectively.

Finally – leveraging the proposed strategic stakeholder institutional, policy, and operational regulating frameworks – PPPPs can elevate PPP arrangement to become more effective and valuable mechanism in driving public administration for policy making, regulating, and implementing purposes. While the results from this study focus mainly on the context and locality of Thailand, given that the detailed empirical review was conducted for projects across the transportation, water, and energy in the country, the proposed frameworks should be able to serve as overall guiding principles for development of appropriate PPP mechanisms in other countries, with details tailored to their specific socio-economic, legal, and political environments.

4.0 CONCLUSION

The results from this study suggest that the proposed collaborative PPPP strategic stakeholder institutional framework, SC, and CSFs should be incorporated into the PPP practice in Thailand. Doing so would enable Thai government's public policy makers to put more emphasis on the end-user or people sector at both policy and operational levels as well as to increase the likelihood of delivering desirable outputs and outcomes in the context of large-scale public physical infrastructure development projects. The people sector, with its key role as end-users or impacted groups, must be included as an important stakeholder group in PPPs in addition to the public and private sectors, who are the usual stakeholders considered under traditional PPP approach. The proposed CSFs in this research could ensure benefits with regards to resource allocation and efficiency gains, while also responding to all stakeholders' needs. Using this study as a starting point, more research is recommended to be undertaken to further explore the risk management aspect of the proposed PPPP framework and its CSFs, especially with regards to the practical challenges relevant to development management under the sustainable development goal and new public administration perspectives. Such studies should be conducted under specific economic, social, political, legal, and institutional environments and context.

In conclusion, this study recommends that the reform of PPP mechanism in Thailand should be considered and pursued as such actions would likely lead to more sustainable benefits derived from large-scale public physical infrastructure development. The PPPP strategic stakeholder institutional framework and its critical success factors discussed in this study could serve to help guide this pursuit. Some sub-CSFs such as mutual partnership between government and private investors with fair risk allocation and strengthened PPP knowledge among all parties concerned are recommended for further study. Practice of PPPPs under the proposed policy and operational regulating frameworks would continue to progressively evolve the implementation of sustainable public infrastructure development projects that ultimately contribute to the well-being of public end-users.

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