

EXPLORING POTENTIAL SUCCESS FACTORS FOR PROCUREMENT OF PRIVATELY FINANCED INFRASTRUCTURE

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ABSTRACT: Australia has joined many governments to adopt public-private partnership (PPP) as a major strategy for procuring infrastructure for decades. However, failures have occurred although the market has been considered to be a mature and sophisticated one. Failures have typically been traced back to inappropriate economic evaluation and a lack of value-for-money. In particular, a literature review has identified that there was no holistic consideration on the evaluation of procurement transactions of PPP projects. The transaction costs of PPPs were not handled properly. In this paper, theories of transaction cost economics are proposed for the purpose of such a holistic institutional economic evaluation. These theories are analysed in order to identify potential critical success factors for a strategic infrastructure procurement framework. The potential critical success factors are identified and grouped into a number of categories that match the theories of transaction cost economics. These categories include (1) Asset Specificity, (2) Organizational Capability, (3) Transaction Frequency, (4) Behavioural Uncertainty, and (5) Environmental Uncertainty. These potential critical success factors may be subject to an empirical test in the future. The proposed framework will offer decision makers with an insight into project life cycle economic outcomes needed to successfully deliver PPPs.

Keywords: Success factors; Public-private partnership, Infrastructure procurement, Transaction cost economics

1. INTRODUCTION

An increasingly high demand for investment in infrastructure has been caused by rapid urbanization in many countries [1]. To solve the problems of conventional provision of infrastructure funded by governments, including governmental inefficiencies and shortage of governmental funds, a range of Public-Private Partnership (PPP) arrangements have become the preferred way to provide public services in many countries, including Australia [2; 3].

The core principle for PPPs is *value-for-money* [4]. Risk transfer, whole-of-life costing, innovation, and asset utilisation are usually stated as the *value-for-money* drivers for PPPs [5]. However, the significant levels of investment required, the complexity of the arrangements, and the incomplete contracting nature have led to increased risk exposure for all the parties involved [6]. The recent global financial crisis has further heightened the examination of past PPP performance and promoted the discussion about whether PPP should remain one of the government procurement strategies in the future [2]. The PPP participants and researchers are at a crossroads because many problems still beset this complex procurement strategy although there is significant infrastructure investment about to take place. The critical

question being asked tends to focus on how *value-for-money* will be achieved by adopting PPPs.

Surprisingly few efforts have been made to identify the critical success factors for managing the process of designing a procurement strategy, such as PPP, for public infrastructure projects [2]. Therefore, the research aim of this study is to:

Identify and evaluate the critical success factors that should receive focal attention to ensure the achievement of value-for-money if PPP is the preferred procurement strategy for a public infrastructure project.

Based on the research aim, three research questions are raised as follows:

- How to integrate relevant theories such as the transaction cost economics so that they can be used to holistically identify the critical success factors for managing the process of designing a procurement strategy for a public infrastructure project and logically interpret the mechanism underlying this process?
- What are the factors, based on the relevant theories, which should receive focal attention to ensure the achievement of *value-for-money*, if PPP is the preferred procurement strategy?
- In which conditions do the identified factors lead to the achievement of *value-for-money* in PPP projects?

Corresponding to the research questions, the research objectives of this research include:

- Explore the way in which relevant theories can be used to holistically and logically identify the critical success factors that have impact on designing efficient infrastructure procurement strategies and can ensure the achievement of *value-for-money* when adopting PPP strategies;
- Identify and evaluate the critical success factors drawing upon the relevant theories;
- Evaluate the particular conditions in which the identified factors lead to the achievement of value-for-money in PPP projects

This research project aims to develop the theoretical framework and collect a small amount of empirical data to validate and refine the work. The future research will extend the current project and establish and quantitatively validate a model for designing efficient procurement strategies for infrastructure projects by using large-scale industry-wide survey and adopting artificial intelligence techniques.

2. TRANSACTION COST ECONOMICS

Although the PPP model has been recognized by many governments as an important procurement strategy, a number of PPP projects have been conducted in a problematic and controversial way. One of the major reasons is that some decisions on adopting the PPP model to procure a project turned out to be inappropriate although governments have devised various measures to show the value-for-money to be achieved. As such, there must be some critical factors having been neglected when the PPP procurement strategies were formed. Such factors are so vital that, without taking them into consideration, achieving *value-for-money* for PPP projects would still remain highly problematic. Therefore, the exploration into these critical factors is vital for achieving government procurement efficiency and the resultant value-for-money.

Furthermore, it is without any doubt that infrastructure projects adopting the PPP strategy will incur various transaction costs. Because costs of this type are quite difficult to measure and quantify, it has remained untouched regarding how to dexterously and reliably address the cost issue inherent in a project transaction. Therefore, the search for suitable theories to address the problem is of critical significance to the PPP sector. Without this, efficient procurement and transaction would remain colloquial.

Therefore, it is firmly believed that the means used to evaluate and adjust the PPP model needs to be revisited, revised, and refined, as stated in a recent review of PPP infrastructure projects in Victoria [7]. Succinctly, specific research on the critical factors that should receive focal attention and can ensure the achievement of *value-for-money* if PPP is the preferred procurement strategy is timely, theoretically valid, and practically worthwhile.

Although devising strategies to achieve value-for-money for PPPs is always beneficial, at a certain point the costs of gaining further control over a PPP project will

exceed the extra value that can be created and thereby negative return occurs. Thus the design of the ultimate procurement strategy must be judged on a cost-benefit basis [8]. However, research has been concerned mainly with process and technique [9]. While both process and technique aspects aim at increasing efficacy, neither is successful in understanding which kind of existing governance structures best suits a particular construction project in terms of efficiency and why. Transaction cost economics (TCE) can contribute to this. From a TCE perspective, the process of designing a procurement strategy for a public infrastructure project could actually be viewed as the process of deciding the proportion of responsibility on the project between government and private partners based on a series of characteristics of the transaction in question.

2.1 Background

The TCE approach developed out of the institutional economics of Commons and the analysis of administrative behaviour by the Carnegie school [10]. This approach emerged from the economist Coase's seminal work, in which he advanced his theory of the existence of firms and argued that, in the absence of transaction costs, there is no economic basis for the existence of the firm [11]. TCE recognizes that there are costs of using the pricing system and that such costs give rise to various forms of economic organizations [12]. It represents a major attempt to combine economic and sociological perspectives on industrial organizations [10]. This analysis supersedes neoclassical economic analysis, which assumes that economic activities can be coordinated costlessly by a system of prices and tells nothing about the organizational structure [13].

TCE adopts a contractual approach to the study of economic organization [14]. Modest research objectives of TCE include *'to organize our necessarily incomplete perceptions about the economy, to see connections that the untutored eye would miss, to tell plausible ... causal stories with the help of a few central principles, and to make rough quantitative judgments about the consequences of economic policy and other exogenous events'* [15, p.329]. The basic framework was first presented by Williamson in 1975, and has been elaborated since without losing its initial insight.

The essential insight of TCE is that in order to economize on the total costs of producing a good or providing a service, both (1) production costs, which are the costs of producing a good or providing a service by adopting a certain production technique without governance requirements, and (2) transaction (or governance) costs, which are the costs of governing the transactions inherent in that choice of production technique, must be taken into account [14; 16; 17]. A production technique that has the lowest production costs might not be the economizing choice if transaction costs are also taken into account [18]. While a traditional economic analysis can identify the most efficient choice of production technique, it cannot explain the most effective use of that production technique [17]. The firm

focus on transaction costs in the TCE research is simply a strategy of focusing on its distinctive contribution [17].

The TCE approach is suitable to the study on PM (including RM) because TCE integrates economics, organization theory, contract law and behavioural assumptions in an interdisciplinary study of organizational phenomena [19]. The comparative institutional approach adopted in TCE facilitates analysis in which the absolute amount of costs is difficult to collect [16]. Making a transaction as the basic unit of analysis and using the 'governance structure' to include the organizational approaches required to regulate and control activities, Williamson [19] generalized that the governance structures that have better transaction cost economizing properties displace those having worse properties in the long run.

2.2 Transaction Costs

Dahlman [20] grouped transaction costs into search and information costs, bargaining and decision costs, and policing and enforcing costs and boiled the three categories down to one: resource losses due to lack of information. Williamson [16] described transaction costs as drafting and negotiating agreements, setup and running costs of the governance structure which monitors and settles disputes, haggling costs, and bonding costs of effecting secure commitments.

Regarding risk allocation, if a risk is improperly allocated, possible resultant transaction costs may include, among others, (1) the extra costs for clients of a higher contingency (or premium) included in the bid price from contractors; (2) the extra costs for clients of more resources for monitoring the RM work; (3) the extra costs for clients and/or contractors of recovering lower quality work (i.e. the materialized or deteriorated risk) for a given price; (4) the extra costs for contractors of increasing safeguards (both *ex ante* and *ex post*) against any opportunistic exploitation of one's own RMS-specific assets by other parties; (5) the extra costs for contractors of the resources dedicated to lodging claims related to the misallocated risk; (6) the extra costs for both parties of dealing with the disputes or litigation related to the misallocated risk.

2.3 Behavioural Assumptions

Behavioural assumptions often constitute the foundation of the mechanistic explanations of a theory, and thus play a pivotal role in theory development [21]. *Bounded rationality* and *opportunism* are the two behavioural assumptions that support the TCE approach and represent '*human nature as we know it*' and supplant '*the fiction of economic man*' [19]. In a situation where the environment is too complex or uncertain for all alternatives to be fully specified, the ability to take rational decisions is bounded. Similarly, in a situation where completion is limited to a small number of entities, there is likely to be opportunistic exploitation of the situation. Both situations would generate transaction costs [10].

'Human agents are subject to bounded rationality, whence behaviour is 'intendedly rational, but only

limitedly so [22, p.xxiv]" [16, p.30]. Bounded rationality is '*the cognitive assumption on which transaction cost economics relies* [16, p.45]'. It implies a limit on rationality, not in terms of being 'partly irrational', but in contrast to the traditional assumptions of economics of the perfectly rational being in that people act rationally but are limited by their analytical and data-processing capabilities [16]. A recognition of the role of a longer-term strategy or farsightedness in a decision-making context has emerged over the years [23]. Williamson [14] further proposed that TCE is a semistrong form of rational spirits, the analysis of which joins bounded rationality with farsighted contracting. This submission holds that '*limited but intended rationality is translated into incomplete but farsighted contracting*' [14, p.9] and thereby modified some of his previous assertions. Regarding risk management, this is usually reflected in partner's not selecting the optimal risk allocation method due to a failure to consider the full range of factors that may change their choice. This is less likely to be the case for partners who manage a particular risk regularly.

The second behavioural assumption of TCE is 'Opportunism', which is '*self-interest seeking with guile*' [16, p.47]. According to Williamson [16; 24], transaction costs are principally associated with guarding against opportunism. If bounded-rational parties to an asset-specific contract do not engage in opportunistic behaviour, they simply promise at the beginning to execute the contract efficiently so that joint profit is maximized [16]. However, when bounded rationality and asset specificity are joined with opportunism, planning becomes incomplete, promises break down, and parties' continuing interests are closely joined. In such circumstances, the organization is compelled to '*organize transactions so as to economize on bounded rationality while simultaneously safeguarding them against the hazards of opportunism*' [16, p.32]. Opportunism thus makes incomplete relational contracting harmful and in turn leads to the need for internal mechanisms such as administrative governance and ordering forces. The establishment and implementation of these mechanisms incur transaction costs [16], which include the costs of coordinating internal and external activities, monitoring strategic interdependence between parties, and governing structural and social exchanges [25].

2.4 Dimension of Transaction

A transaction occurs whenever '*a good or service is transferred across a technologically separable interface*' and '*one stage of activity terminates and another begins*' [19, p.552]. This interface is not constrained by the nature of the production technology. That is to say, the production technology chosen does not exclude the possibility of allocating two different parts of the production process to different parts of the organization, or to separate organizations [18]. Thus the theory focuses on the question of whether or not to purchase rather than on purchasing alone.

Assessing the technology of transacting is facilitated by making the transaction the basic unit of analysis [26]. The principal dimensions on which TCE presently relies

for purposes of describing transactions are (1) the frequency with which they occur, (2) the degree and type of uncertainty to which they are subject, and (3) the condition of asset specificity.

The appropriate choice of transaction governance mode occupies a three-dimensional space as a function of the three features [24]. These features are only troublesome in interaction with each other [18]. Without asset specificity, for example, any negotiations to handle unforeseen events can be made when they occur. Without uncertainty, complete contracts can be written in advance to foreclose opportunistic behaviour that arises from asset specificity. Without frequency, it would be difficult to determine whether or not there is any return on investing in transaction-specific governance modes.

2.4.1 Asset Specificity

Asset specificity refers to ‘the degree to which an asset can be redeployed to alternative uses and by alternative users without sacrifice of productive value’ [14, p. 59]. This has a relationship to the notion of sunk cost. The full implications of asset specificity however become evident only in the context of incomplete contracting [24]. TCE argues that asset specificity can take many forms because it not only elicits complex *ex ante* incentive responses but causes complex *ex post* governance structure responses [14]. Williamson [14] described six kinds of asset specificity and argued that the organizational ramifications of each type of specificity differ. The six kinds of asset specificity are (1) site specificity, (2) physical asset specificity, (3) human asset specificity, (4) dedicated assets, (5) brand name capital, and (6) temporal specificity. In construction projects, the physical and human asset specificities bear the most relevant and influential ramifications, although the other types of specificity may exist in a more general and common sense [10].

Regarding physical asset specificity, problems arise post-contract through the ‘*fundamental transformation*’ [16, p.61], especially during post-contract negotiations over variations and claims [18]. In PPP projects, the necessity to make huge capital investments of limited alternative usage rapidly leads to a small numbers situation where a supplier cannot withdraw due to such transaction specific investments. However, once a supplier has started work, typically the costs of replacing that supplier are quite high, both in straight financial terms and perhaps more so in terms of project progress [10]. A particular problem on construction projects is ‘temporal specificity’, i.e. the ability of suppliers to hold up the project program and hence disrupt the production [27]. Thus clients are exposed to the costs of opportunistic behaviour up to the full replacement cost of the supplier or, conversely, suppliers may risk writing off their transaction-specific investments if they abandoned the project [28].

In comparison, human asset specificity is more widely relevant to construction projects because detailed knowledge is held in a firm, usually by a relatively small number of people [9; 29]. From the viewpoint of risk management in PPP projects, the human asset,

particularly the behaviour patterns developed and constantly refined at the margin by firms in the course of their ordinary productive activities [30], should be treated as the most relevant and important assets [6].

2.4.2 Transaction Frequency

TCE insists that the study of contracting include *ex post* features [14]. A full assessment on both contract execution and *ex post* competition at the contract renewal interval is thus required. TCE holds that whether *ex post* competition is fully efficacious or not depends on whether the good or service in question is supported by durable investments in transaction specific assets [14]. Rivals cannot be presumed to operate on a parity once substantial investments in transaction specific assets are put in place. This is because economic values would be sacrificed if the ongoing supply relationship was to be terminated. Accordingly, the condition at the outset is effectively transformed into one of bilateral supply thereafter.

Contracting in which pair-wise identity of the parties matters thus displaces faceless contracting. This is because the buyer must persuade potential suppliers to make similar specialized investments should the buyer seek least-cost supply from an outsider and the supplier would be unable to realize equivalent value should the specialized assets be redeployed to other uses [14]. Those incentives have pervasive consequences for the organization of economic activity.

Nooteboom *et al.* [31] asserted that where transactions are made under high uncertainty, trust is essential for their effective governance. In fact, the generation of trust is largely a function of transaction frequency [32]. According to Lyons and Mehta [32], there are two types of trust, which are (1) self-interested trust, which essentially is future-orientated and expecting that one’s transaction partner is trustworthy and will not behave opportunistically in future transactions, and (2) socially orientated trust, which is past-orientated in that it is generated through obligations established through social and family networks. Self-interested trust predominates in business transactions because only through repeated transactions can parties come to know each other, and only when there is the outlook of further transactions does enlightened self-interest prohibit opportunism [18].

Typically, transaction frequency is low in construction, often effectively unity for most client-supplier dyads [28]. However, this is one of the areas in which many clients are making changes with the aim of achieving learning benefits. Barnes [33], for example, noticed that clients who are habitually commissioning construction work tend to act in the long-term interests of the construction industry by allocating a smaller amount of risk to contractors than those who occasionally commission work. In particular, PPP *per se* indicates a higher level of transaction frequency due to its long-term commitment [6]. Therefore, the difference in transaction frequency, though probably not great and clustering within the low range, is expected to influence the governance over RMS transaction.

2.4.3 Uncertainty

Among the reasons for bounded rationality are uncertainties [23]. Thus, the core problem of the economic organization of society is that of facing and dealing with uncertainty [34]. In particular, it is the level of uncertainty that the parties involved in the construction industry face and their need for flexibility that most clearly distinguishes the construction industry from others [35]. In many industries, including the construction industry, the project process is basically a process of the progressive reduction of uncertainty through time [36; 37]. Typically, a project starts with very high level of uncertainty at inception, which is reduced until all the information required for the project is embodied in the constructed product [28]. Though no exception, PPP projects usually bear the feature of much prolonged uncertainty due to their decades of lifecycle and the difficulty in foreseeing future uncertainties, especially those inherent in later stages. Therefore, even at the later stages such as operation and maintenance, the level of uncertainty remains high.

Uncertainties may arise from 'state of nature' or changes in the external environment affecting a system [23; 38]. According to Koopmans [34], uncertainty can be distinguished between primary and secondary categories. Whereas the former is of a state-contingent kind, the latter arises from lack of communication. However, strategic features such as nondisclosure, disguise, or distortion of information are unavoidably presented when parties are joined in a condition of bilateral dependency. Thus, behavioural uncertainty refers to the strategic uncertainty that is attributable to opportunism [16]. It arises when incomplete contracting and asset specificity are joined and contributes to compounded uncertainty effects and supports bounded rationality by posing impediments [23]. That the mitigation of such hazards can be the source of mutual gain is particularly important to the economics of organization. Behavioural (or binary) uncertainty has been usefully recognized in TCE and is of special importance to an understanding of TCE issues [14; 16].

Environmental Uncertainty, often synonymous with volatility or dynamism, is a multidimensional concept and its effects on organizations are context-specific [39-41]. Generally, environmental uncertainty is the rate of change or the degree of instability of factors within an environment [42; 43]. Its dimensions include changeability, unpredictability, unverifiability, or variability of a group of segments that comprise both micro and macro business environments [40; 44]. If transactions were free from exogenous environmental uncertainties, behavioural uncertainties would not pose contractual problems in that there would be no occasion to adapt and unilateral efforts to alter contracts could be voided by a third party such as a court [16].

Environmental uncertainty hinders exchanges via increased opportunism [16; 24; 45]. Opportunism is thus a function of environmental uncertainty [24; 43]. Environmental uncertainty curtails a party's expected risk-adjusted net return from the transaction and reduces its anticipated income stream stability [46]. When a party

anticipates sustained or prolonged uncertainty of gains or income, it tends to behave more opportunistically [47]. Each party must spend more time and resources to monitor the other party and determine if it is abiding by the contractual agreements [48]. These effects indicate that environmental uncertainty propels opportunism, which may in turn hamper partnership performance [49; 50]. In a nutshell, when a partnership operates in a complex and uncertain environment, such an environment impedes inter-party collaborations, attachment building, resource sharing, and collective commitments, and thereby increases the transaction costs over the project lifecycle [10; 43; 51; 52].

According to the logic of comparative governance, partnership is potentially among better governance forms when external or environmental uncertainty is high [53]. Compared to other forms, partnership is superior in exploring and exploiting opportunities in a highly uncertain context because of risk-sharing and resource-sharing effects. In current PPP, though non-recourse financing mode and public sector's risk-averse attitude inhibit a risk-sharing structure, complementary resources pooled from all parties solidifies a partnership's collaborative competitive advantages in a volatile market [54-56].

However, partnerships may suffer a greater *behavioural* (or internal) *uncertainty* due to increased opportunistic acts by individual parties [16]. Inter-party differences in strategic objective, corporate culture, and managerial style, and inter-party asymmetries in bargaining power, equity ownership, and parent control, all helps explain why opportunism occurs [43]. Moreover, it is often impossible to fully specify a partnership contract due to unanticipated contingencies and environmental changes [57]. Economic agents rarely write a complete contract for a long-term cooperative relationship because boundedly rational parties can neither recognize all contingencies nor realize the need to specify all dimensions of contractual performance [58]. An incomplete contract creates leeway for opportunism and generates moral hazards for a cooperative relationship [43]. Consequently, opportunism may hold back collaborative incentives and unilateral commitment and undermine confidence development and trust building [31; 48; 59; 60].

2.5 Efficient Transaction Governance

TCE maintains that contractual variety is mainly explained by underlying differences in the attributes of transactions. '*Efficiency purposes are served by matching governance structures to the attributes of transactions in a discriminating way*' [16, p. 68]. Market, hybrid and hierarchy are the three governance structures considered in TCE. Governance structures differ in their capacities to respond effectively to disturbances when confronted by the need to tackle both bounded rationality and opportunism. Therefore, '*comparative institutional assessments of the adaptive attributes of alternative governance structures*' are necessary [16, p.57].

One of the key differences is in contract law respects. Williamson has continuously examined and refined the

mapping of contract law onto economic organization [14; 16; 61; 62]. Classical contract law applies to the ideal transaction where there is no dependency relationship between buyers and sellers [63]. Neoclassical contract law is available for contracts in which the trading parties maintain autonomy but are bilaterally dependent to such a nontrivial degree that premature termination or persistent maladaptation would adversely influence one or both parties [14]. The adaptability of neoclassical contracts is however not indefinite. When a situation is highly uncertain, forbearance law supports internal organization or hierarchy, which is also a contractual instrument and is more elastic and adaptive [14].

Besides the differences in contract law respects, the differences in adaptability and in the use of incentive and control instruments are also crucial. Adaptability is the central problem of economic organization [64; 65]. According to Williamson [14], adaptations can be categorized into A and C types. The A type adaptations, with A denoting 'autonomy', are the neoclassical ideal in which parties respond independently and efficiently to parametric price changes. However, because some disturbances require coordinated investments and realignments, adaptations of the coordinated kinds are needed, which are referred to as the C type adaptations, with C denoting 'cooperation'. While market is a 'marvel' in the A type adaptations, hierarchy has the C type adaptive advantages over autonomy for bilaterally dependent transactions. However, the gains from the C type adaptations come at a cost, i.e. internal organization degrades incentive intensity and incurs added bureaucratic costs [16; 66]. Thus, hierarchy is supported by the deliberately suppressed incentive intensity and the efficacy of internal administrative controls [14].

Markets and hierarchies are polar modes. Regarding the hybrid mode, which is more elastic than the former and more legalistic than the latter, it displays intermediate values in all the governance features discussed above [14]. By preserving ownership autonomy, the hybrid governance promotes stronger incentives than hierarchy and encourages the A type adaptations. By added contractual safeguards and administrative apparatus, the hybrid mode facilitates the C type adaptations, though decreasing incentives compared to markets.

3. RESEARCH SIGNIFICANCE

It is anticipated that the findings of this study shall serve as a decision aid for decision-makers involved in PPP projects to overcome the shortcomings in current decision-making process, which include the lack of clarity in critical success factors and the lack of a link between the critical success factors and economic contextual responsiveness. These shortcomings may baffle the decision-makers in choosing an appropriate procurement strategy. This study is expected to make the following contributions to the knowledge body of construction management and economics:

- The transaction cost economics (TCE) is used to holistically and logically identify the critical success factors that can ensure the achievement of *value-for-*

money if PPP is the preferred procurement strategy. In particular, by adopting the institutional comparative way of the TCE theory, the puzzle of how to address the 'cost minimization' problem without quantitatively measuring the associated costs can be solved.

- The theoretical components of the TCE theories will be operationalized into measurable variables/factors that have practical meanings.
- The critical success factors that can ensure the achievement of *value-for-money* in PPP projects will be identified.

Meanwhile, the findings and achievements of this study are expected to be of interest to decision-makers involved in PPP projects from both public and private sectors. The guidelines to be established in this study will make it much easier for decision-makers to understand why some factors deserve their attention of the first priority to the others in order to ensure an efficient procurement and transaction.

This research aims to develop frontier technologies for building and transforming Australian building and construction industry and to identify and understand the factors that lead to highly efficient PPP procurement strategy through a creative and innovative combination of contemporary management theories. The findings of the research project will provide Australia with the momentum to continually play the leading role in the research area of PPP projects. The established guidelines will lead Australia to be one of the most efficient and innovative nations in dealing with public infrastructure development.

4. RESEARCH METHODOLOGY

Research can be *exploratory*, *descriptive*, or *explanatory*. The purpose of this study is a combination of exploration, description, and explanation. The TCE theories will be identified as suitable theories to holistically and logically identify the critical factors that should receive focal attention and can ensure the achievement of *value-for-money* if PPP is the preferred procurement strategy. The detailed characteristics of the identified critical factors will be explored and described for further enquiry. By using data collected, the impact of these critical factors on the achievement of *value-for-money* will be established and explained.

Theory and research are linked through methodological strategies of deductive and inductive reasoning [67]. The deductive and inductive approaches can be used in combination in a research project [68]. In this study, both deductive and inductive reasoning will be used. The TCE theories will be validated using empirical data to see if the real world works as these theories predict. This study will also generate new ways in which efficient procurement and transaction strategies can be formed.

The entire study will be carried out in two phases. Phase One mainly involves identifying candidate factors through an extensive literature review on transaction management in PPP projects and the theories of TCE. These factors are expected to be able to ensure the

achievement of value-for-money in PPP projects. Accordingly, the identified factors and their hypothetical impacts will be proposed for validation. Research questions 1 and 2 are thus addressed and research aims 1 and 2 fulfilled in Phase One.

Phase Two seeks to verify the hypothetical impacts of the identified factors. Required data will be collected in a questionnaire survey in Australia. By using the collected data, the critical success factors will finally be established. Findings generated through the verification process will be subject to detailed analysis and discussion. Guidelines will be established based on the findings. Accordingly, research question 3 is addressed and research aim 3 fulfilled in Phase Two.

Based on the factors that are identified in the literature review, a two-section questionnaire will be designed in this study. Section 1 is designed to gather the respondents' personal and institutional profile. Questions are asked about their experience in the construction industry and in PPP projects, their job level within their institution, the role of their institution, and their institution's involvement in PPP projects. These questions are specifically designed to double-check whether the respondents have appropriate knowledge and experience in PPP projects in Australia, and whether they hold appropriate position as decision-makers, which would give credence to collected data [69; 70].

Section 2 of the questionnaire is project-based and is designed to gather the information about PPP projects that is required for establishing the critical success factors from the identified factors. Firstly, respondents are

requested to provide general information about the project they specified, such as project value, construction duration, concession duration, infrastructure sector that the project is categorized in, and partners' cooperation history. Secondly, respondents will be requested to assess the criticality/importance level of a number of identified factors. Description of the factor is presented in the questionnaire, followed by a list of 'Strongly Disagree', 'Disagree', 'Neutral', 'Agree', 'Strongly Agree', and 'Not Applicable'. The first five items correspond to 1, 2, 3, 4, and 5 on a five-point Likert scale, respectively.

The questions are of 'closed' type where typical features are identified and listed for respondents to evaluate. According to Nkado [71], the 'closed' type question is easier to respond to. Moreover, the terminologies used to describe the issues are limited, which greatly simplifies subsequent analysis of the response. Nonetheless, due to the nature of this research, 'open' type questions will also be created, which require interviewees to enumerate and subsequently evaluate the features.

5. POTENTIAL SUCCESS FACTORS

Currently, the first phase of the research project has been completed and the second phase started. The following table lists potential success factors that have been identified during Phase One. They are grouped as different characteristics of a typical transaction according to the TCE theories.

Table 1. Potential Success Factors for PPP Projects

TCE perspective	Critical success factor	Source
Organizational Capability	Strong private consortium	[72]; [73]; [74]; [75]; [76]; [2]
Organizational Capability	Appropriate risk allocation and risk sharing	[77]; [75]; [76]; [2]
Organizational Capability	Thorough and realistic cost/benefit assessment	[77]; [75]
Organizational Capability	Project technical feasibility	[77]; [73]; [75]
Organizational Capability	Good governance	[77]; [75]
Organizational Capability	Well-organized public agency	[75]
Asset Specificity	Competitive procurement process	[72]
Asset Specificity	Transparency in the procurement process	[72]; [75]
Asset Specificity	Government involvement by providing guarantees	[77]; [78]; [76]
Transaction Frequency	Good relationship between partners	[76]; [2]
Behavioural Uncertainty	Commitment/responsibility of public/private sectors	[75]
Behavioural Uncertainty	Shared authority between public and private sectors	[2]
Environmental Uncertainty	Favourable legal framework	[75]; [2]
Environmental Uncertainty	Available financial market	[77]; [72]; [75]
Environmental Uncertainty	Political support	[77]; [78]; [76]
Environmental Uncertainty	Sound economic policy	[2]
Environmental Uncertainty	Stable macro-economic environment	[77]; [76]
Environmental Uncertainty	Social support	[76]; [2]

6. CONCLUSIONS

This paper proposed an innovative conceptual framework for efficient transactions in Public-Private Partnership projects. By using the transaction cost economics view of business environment, this framework

has identified potential success factors for PPP projects. The next stage of the research involves further testing and validating the framework using questionnaire survey. The expected non-linearity and complexity of the framework would be well addressed using techniques such as artificial intelligence and fuzzy logic.

The proposed framework provides a logical and complete understanding of the transaction process of PPP projects. The inevitable trade-offs among major characteristics of transactions in PPP projects are explained. Moreover, the framework provides all stakeholders with a richer framework than previously existing ones to guide their decision-making process. The framework helps answer a question that project managers, whether in public or private sector, must answer on a regular basis, i.e. 'What aspects should I pay close attention to in order to achieve value-for-money in my PPP projects?'

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