DOI NUMBER· 10.19255/JMPM01503

KEYWORDS
• Public-Private Partnerships(PPP) • Critical Success Factors(CSFs) • Construction Projects • Project Cognizance
• Project Enhancement • Confirmatory Factor Analysis(CFA).

Critical factors determining the success of

PUBLIC-PRIVATE PARTNERSHIP IN CONSTRUCTION PROJECTS:

An Indian Context

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• ABSTRACT •

The Construction Industry is an exemplary for the opulence of any country.Due to Increase in Demand, there arises the necessity of Private sector participation in Public Projects. PPP projects gaining momentum in this modern era. Certain projects face failures due to incongruous project precedence and lack of knowledge in understanding the Project success. Data were obtained through structured and self-administered surveys from stakeholders having ample experience in Projects. Mean, Factor Analysis, Correlation, Regression and ANOVA were applied to the analyze the data. Timely delivery of project without delay, Effective coordination among parties involved, Project completion within budget allocated, are the three critical factors determining the success of Public-Private Partnership in construction projects.

1. INTRODUCTION

In the early 1990s, Indian Economy was subjected to certain policy swings. After these Shifts, new economic policy model Liberalization, Privatization, and Globalization (LPG) were Adopted. Liberalization is the one in which the government will loosen its regulations and Privatization is the involvement of private parties to create a platform to provide services to the Public. It is the Physical framework through which the infrastructural services can be delivered. The major objective was developing the Indian economy in a rapid manner so as to match up with the global economic standards.A variety of reforms were introduced in the field of business, Industries, production sectors, manufacturing sectors which are considered as the target to lift the economic growth of the country.

In line with the Increase in Demand, there arises the necessity of Private sector participation in doing Public Projects. So this leads to the entry of Private sector involvement and typically called as Public Private Partnerships (PPP). PPP has a significant role in developing the Economic Growth of the country. In the view of achieving the expected economic growth, there occur the alliances among the public bodies and private segment due to the arrival of new techniques and updates in the field of technology.

The Construction industry is one of the important sectors which have a substantial contribution towards the fiscal expansion of any country. The reason why government shows more interest in the construction industry is that, it is an investment gaining segment which enhanced momentum towards monetary outlay year by year. This Construction Industry is exemplary for the opulence of any country. Government contracts with Construction Diligence are intended to develop infrastructure related works are emerging in the day to day life. India is one among the developing countries which require enhanced sustainable development because of its growing population. Owing to this, the facility provisions made alone by the public makes the delayed delivery of Infrastructural services. In order to overcome this, the private bodies are called to provide these Infrastructural services on the behalf of public segment to make the access quick and easy.

Even though it is a Combined activity of Public and Private, yet it suffers from some of the drawbacks and such factors pull downs the success of PPP which leads to delay, problems & even ultimately results in the failure of the project. In order to avoid these the scenarios, a Proper Boundary has to be derived between two entities for the smooth conduct of the Projects which paves way for the success of the projects.

As a base procedure of PPP deals with the concern for managing the outlay and putPrivate sector capital into the services to provide the services under various segments such as maintenance , construction, establishment, management and rehabilitation of the assets under the control and ownership of public segments, which provides opportunity for the private bodies to join hands with public bodies in order to complete the allocated works over stipulated period in the perspective of Shared goals, benefits, resources and also shared risks.

Apart from this, Several Teething troubles have existed to stumble upon in PPPs in the Global Infrastructure Improvement. One and the only major issue is the lack of speed during Project execution.In one side, many projects under various sectors and fields are successfully implemented by PPPs and attained maximum benefits, enhanced worth based on the achieved outputs. On the Other side, when the comparison between savings incurred more in the case of Private Finance Initiate than traditional the Public Procurement (Zhang 2005).

The Procurement for these PPP projects is beneficial and eye-catching to both the public and private sector participants for the reason that the project financing is made easily and possible to get from the projects itself. These projects are well worth enough and capable of deriving their own expected expenditure within the project utilization. There is no necessity of public funds and debts securing with a primary asset worth because in most cases the project ownership will be returned to the public user after the concession period. (Li and Akintoye 2005)

This present research aims to focus on the finding out the factors which plays a major role in PPP implementation which in turn categorizing those factors into two domains such as Optimistic factors and adverse factors. After the categorization of factors, the positive factors are evaluated and considering the overall performance on all the positive factors, the factor which contributes more to the success will be considered as the Critical Success Factor(s). Necessary key measures will be taken to enhance or strengthen those components to attain the Project Success in an effective and efficient manner. The negative factors so found out are subjected to evaluation and the least important factors are ignored. The factors with higher intensity in not achieving the project success are subjected to have the perception variance of Public and private parties and finding solutions to reducing the risk due to those factors and avoiding the same by Combined effort of both parties.

--- 1.1 Overview of PPP ---

As for as the term PPP is concerned, it doesn't have one and only one widely accepted definition. In general, it is a Long term contract between the public bodies and private bodies whose intention is to provide services to the public and for the welfare and infrastructural development of the country. Each country has its own definition which also has a different way, procedure and perspective. However, they have a common approach that all the PPPs Models are intended to have shared benefits, shared goals, shared risks and shared resources.

The partnership between the two governing bodies should be in a such a fashion that it has common objectives and risk sharing or risk transfer to the firms which are best in managing it and also in a position to have a look on the progress of the project within allocated budget without comprising the qualitative terms and thereby increasing the operational performance of the Projects with standard maintenance.

Once the PPP mode is operated, there has a follow the long procedure to formulate it. Because we have to concern about variety and

variability of Participants such as Public Bodies or Government bodies (State/ federal/local), Private bodies, Customers, Executers, Operators, Contractors, Financing Parties, Stakeholders, shareholders, experts, Co-coordinators and also even some more. Since it involves more parties, the perspective of each may differ from other and there requires high precision of cooperation among all the participants. This kind of scenarios will make the projects even more Complex.

In order to have a better solution to these issues, a typical form called Special Purpose Vehicle (SPV) will be formed which is a detached commercial venture which is a key feature in PPP-based Projects. It is a legal body which carries out the Project and the Contractual agreements withal the other parties including the public sector can also be discussed and decisions which are of maximum is proposed. SPV does not concern to any kind of commercial activities which are apart from the project which is a major advantage of it.

The private parties which are about to join hands with the public ventures are selected based on the traditional tendering process with some value add-ons to certain key features such as the experience of the participants, the reputation of the firm, past similar works completed etc. Apart from this, the evaluation is subjected to the Conceptual design, approximate estimate on cost and resources, Proper planning based on the forecasting of performance in line with the proposed schedules throughout the project cycles.

--- 1.2 Indian scenario ---

The Indian Planning Commission has estimated that the infrastructural outlay will almost reach the INR 70 trillion during the Twelfth FYP (2012–2017) which is nearly tripled as compared to INR24 trillion in the Eleventh FYP (2007–2012). From this entire investments, 48% of funds are predictable to arrive through the private segment, which is 36% in case of the Eleventh FYP.Since it requires a higher amount of investments when compared to past investments, the Government of India has taken necessary steps to attract the private investment and promoting various sectors towards these projects, thereby fixing target to improve the current economic position of the country.Today, there are several hundreds of projects are undergoing various stages of execution throughout the entire country.

India has currently having 881 PPP Projects with a worth of INR more than 6 billion which are at different stages of execution upon which 52% of the projects are under the Construction field which has the specialization on the Construction of Roads. Apart from that, there are various sectors such as transmission, power, and distribution, drainage and sewerages which require compulsion of facilities provision due to resources inadequacy. This sectorial development leads to enhancement of welfare and economic development of the country. Infrastructural development is most viable for a nation to compete with others and making the nation technological standard to next step by surpassing the trends techniques of the other developing countries. In India, there are nearly 824 Projects under PPP have made the fiscal end from 1990 according to the statistics of World Bank.

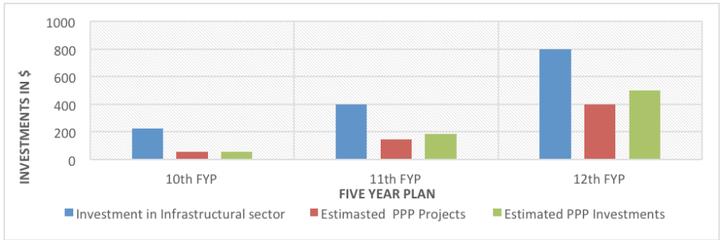

FIGURA 01. Infrastructural PPP investments in ($ billion)

--- 1.3 Significance of the Study ---

The planning commission of Indian Government has projected that the nation requires a development in Infrastructural sectors nearly about 82 the trillion in upcoming half a decade so as to maintain a target growth rate of 8% GDP. We require the facilities has to be enhanced among various critical sectors like Construction, Communications, Traffic Engineering, Services and amenities in the rural and urban areas, Electric sectors and Commercial sectors (Industries, Production) and Institutional Sectors (Schools, Colleges etc. which comes under education). Though we have a wide range of Facilities, it's a herculean task for the government to facilitate these sectors with tax revenue which is one and only source in its hand.

Apart from this, the public bodies such as local, state and federal governments lack in the qualitative and quantitative aspects in providing these kinds of vast infrastructural projects. So government requires a skeletal framework to execute these projects. Nearly 50% of the country's infrastructural requirement of the country for the upcoming 5 years can be achieved only through "PPP", which has the major component in the successful delivery of Projects, said the planning commission of India.

So far, various range of PPP modules has been carrying out in the transportation sector under NHAI. Owing to this, the other allied fields of Construction includes the establishment of airports and bridges, roads, canal distribution channels are also foreseeing the development through PPPs. Since more than half of the PPP Projects are under the domain of Construction and this can be considered as a major component of infrastructural development. So thereby promoting these kinds of Construction based PPP Projects will directly boost up the GDP in which the targeted growth rate can be achieved.

2. LITERATURE REVIEW

GIn the point of view of Sectors involved, Public Private Partnership is a Combined activity of both Public and Private, yet it suffers from some of the drawbacks and certain factors pull downs the success of PPP which leads to delay, problems & even ultimately results in the failure of the project. In order to avoid these scenarios, a Proper Boundary has to be derived between two entities for the smooth conduct of these Projects, which in turn paves way for thePPP Construction projects success.

Owing to the higher engrossment of private sectors in infrastructural development projects recommends that the PPPs modules are vital in Industrial and academic aspects. Various modules conducted so far are subjected to proper review of PPP research to find out the Exposure and attentions of the topics related to PPP researches. From this, the PPP membranes such as Research trends in journals, Conceptual Framework for Performance measurement, Stakeholders perspective, Cost considerations, Critical Success Factors, Risks in PPP Projects, Time and delay and other miscellaneous domains.Let us have an overview on the perspective of various literature related to PPP Projects under different aspects..

--- 2.1 Research Trend in Journals ---

The research trends suggested that the number of research articles related to PPP in construction projects were published in reputed journals goes on increasing year by year and there is an eye-opening scenario to the researchers towards the PPP research in recent times. The trends suggested that the research articles published in renowned journals was increased from 1998 to 2008 and they are analyzed based on the number of articles published, Contributions of the researchers and their focus got increased (Wang et al. 2009). Over the span of 20 years, predominant count of literatures was published from 1989 to 2009 and those articles were based on partnering related publications to find out every nook corner of the PPP Projects in which the partnering publications were mostly from United states with some other nations such as UK, Hong Kong, Sweden, Australia, China and Korea. Several topics such as Critical success factors, Conceptual models, partnering development and application, Performance measurement, Construction Resource chain, Quantitative studymethods and some other topics were studied and suggested that the number of partnering related publications in reputed journals count got increased, thus resulting in obtaining wider knowledge towards PPP construction Projects (Hong et al. 2012).Certain aspects of projects such as social, political and legal, economic, financial domains are selected and subjected to analysis. Based on the analysis, some conventions are established along nine different areas like contracts, procurement framework, roles of public and private sector, payment module, project supervision and transfer management along with termination plays vibrant role in PPP Project success (Zhang 2005).

--- 2.2 Performance measurement ---

PPPs are apprehended as a tremendous way for providing public infrastructure by marshaling the resources and funding from private sectors. In certain PPPs, Framework are intended to achieve the desired success measures of the projects so as increase the efficiency and to meet the operational performance. There are certain models and frameworks through which the performance of the projects can be measured. Generally, PPPs are intended to provide economic and infrastructural projects to public and certain factors can contribute to both success and failure of the projects. Conceptual framework for forceful development is anticipated by taking literatures under the topics such as Public sector roles, success factor identification, Management of risk, Time and cost related issues, Selection of concessionaire, finance for the measurement of Performance (Liu et al. 2015).The conceptual framework is known and analyzed related to their successful implementation and how it can be implemented to the project aspects such as managerial role and effects like strategic, synergistic lies with the firm, political, technical, environmental and Social issues.(Lopes and Flavell 1998).In order to evaluate any PPP Project, the positive and negative factors has to be weighed initially and the project has to analyzed with various aspects and finally the decision has to be taken whether the project is selected or not ?.The model so evaluated will help the both public and private sector to acquire some ideas about carrying out the proposed PPP Project.(Cheung and Chan 2011).

--- 2.3 Stakeholders perspective ---

Stakeholders are the group of people who can get affected or affect the organizational objectives and policies. based on their support the organization is exist and they have concern over the organization. They can be Contractors, Customers, Clients, Partners, employees, Directors, Suppliers, Owners, even government agencies. Every group will have their own notion and concepts behind the project success and implementation. Some may better at certain point of view and some may be poor in certain aspects. In order to select best private sector who can take in charge for major and critical risks by handling it in a best way, Best value Source Selection Methodology (BVSS) can be adopted. The critical stage in adopting these technique is that the objectives of the client has to be evaluated, based on the best value contributing factors (Zhang 2006). The major criteria are that the PPP involves various Project participants and their relationship plays major role in project coordination. It's typical to have proper relationship between the parties, Special Purpose Vehicle (SPV) and its bond with client. Trust and Confidence are framed as relationship measure which are plotted versus other thirty dimensions (Smyth and Edkins 2007). In certain cases, the investors disagreement leads to project failure. Initially apprehending and comprehending the inputs of stakeholder may lead to PPP project success. Stakeholders involvement is a multidisciplinary purview which includes multi fields such as Engineering, Psychology, Marketing and Sociology. The key conceptsand model under these fields can be created and evaluated to have better existence of involvement of stakeholders. Definite part of exemplary is implemented to find a particular tool to enhance the involvement, thereby achieving the PPP project success (Gohary et al. 2006). Initially the needs of the stakeholders are not mentioned at starting stage and in the view of attaining the project success the stakeholder's needs have to be known and clear idea has to be established related to that by all the project participants. For that a Specific tool called weighed ranking method is adopted which will weigh the factors related to needs of the stakeholders and it is better than other rating methods. The factors so weighed are grouped, for that exploratory factor analysis is adopted and certain dimensions were extracted. Apart from that those variables are also subjected to t-Test or Anova. Finally, the factors are ranked based on their magnitude and suitable strategic remedies are chosen for enhancing the involvement of stakeholders (Tang and Shen 2013). Intelligent allocation of works and difficulties to the party which are well versed in it leads to project success. Combined effort from both public and private sector is furthermore quintessential in the environment related to economic, political and legal. In order to have a smooth conduct of a particular BOT Model, there

must be clear categorization of the roles and activities that the government has to overtake and procced with (Kumaraswamy and Zhang 2001). The stakeholders from various sectorsand ranges have nearly analogous ideas and concept respective to that how the partners should be pulled by the government for involving in the PPP project implementation and execution (Beyene 2014). Stakeholders perceptions towards project performance indicators for finding the real Key performance indicators to measure the performance of PPP. Apart from this, a detailed KPI Conceptual model consists of 5 package measuring the performance were analyzed. The study suggested that 41 key indicators were considered to be important among 48 project performance indicators (Yuan et al. 2012). Tendering is a major process in Concessionaire selection. Certain factors such as Business case development, Quality of project, Capacity of public sector, governance principles, communication effectiveness, transparency level in tendering process also plays major role in Project success leads to effective and efficacy towards project implementation. (Liu et al. 2016)

--- 2.4 Cost& Time related issues ---

Cost is the one of the major and effective resources which plays typical role in the Construction Projects. Regardless of any Construction works, financial measures occupy predominant place in achieving the Project success. Every Construction project should be expected to completed within the allocated budget. In recent times, there exists a lack of enthusiasm among the Private partners to involve in PPP Bidding. This is due to that the open costs are relatively high equated to bidding probabilities. Empirical study has been done to analyze the PPP operation cost in Pre-contractual phase and there by comparing with the customary public procurement and it is suggested that cost has to be revised by the private sector so as to defend the reasonable setting of PPP current market (Schepper et al. 2015). A questionnaire survey is adopted to find out the time period and budgetassociated construction hazards among the seven PPP Projects in Australia and based on the analysis, the risk elements persuading time, cost and functioning performance of the projects were found out and it has been suggested that localitysurroundings and design complication are influenced by time performance and market dynamics is an aspect which was influenced by both cost and operational performance. Apart from these results, Partners dispute is considered to be a perfect contributing factor of both time and cost performance (Hemanta 2012). Besides cost, time also plays an equivalent role towards the success of PPP Projects since the proposed framework suggested that the completion of Project within the allocated budget is one of the project success measures. PPP Projects will have predetermined boundaries among all the parties in the time aspects from initiation to completion. Agreement and contracts were discussed with the time component which is found to be vital which considered to have a proper fiscal development of the Project. In specific, most of the public construction activities are based on the basic BOT model in PPP execution because of the progress enhancement of project delivery. There occurs a necessity to find out the delay grounds in those specific projects. Based on the analysis, the following stages are found to be key drivers for BOT delay. They are negotiation and signing of concession agreement, improper contract planning, Problems due to debts, political uncertainties. (Yang et al. 2010). In order to have a proper PPP implementation, government should be in a position to adopt two approaches. One approach is based on finance which targets to use private funding so as to fulfill the needs of the infrastructure and another is service based so as to augment the cost and timeefficacy. (Abdel 2007).

--- 2.5 Critical success factors for public - private partnerships recognized in past studies ---

A common perspective in the construction industry is that the success of the project depends on project characteristics, proper coordination, Prior planning& scheduling and clear contractual agreement. Above mentioned are suitable for any construction related projects. But in case of Specialized ones like PPP, apart from the above factors there are certain key drivers which will contribute to a notable level for the Project success. These factors are said to be critical due to that the adequacy of the Project success depends on them. There are various factors which influence the project success or failure. But there is a pressing situation to create a practical and proficient conventions for procurement process. Inline to developing such protocols a suitable Win-Win Principle for both public and private is adopted. In that a CSF set containing five Critical success factors in which each CSF such as Favorable investment environment, Economic viability, Reliable concessionaire consortium with strong technical strength (Hwang et al. 2013), Sound financial package and appropriate risk allocation via reliable contractual agreement (Hwang et al. 2013). These CSFs contains several sub factors. Relative significance among these main and sub factors are studied based on the research questionnaire survey (Zhang 2005). The PPP/PFI projects are apparent to have more momentum because of the factors contributes to success are Superior project technology and low-cost, better public subsidy, savings in transactional cost for public sector and certain factors retards the project success are found to be participant's inexperience, Project over-commercialization and high participation cost and time (Li et al. 2005)and (Hwang et al. 2013).In case of Relational management the critical factors such as Senior executives commitment, Defining the objectives, combining various divisions and presence of interdisciplinary group (Zou et al. 2014). In the scenario of cross country comparisons of the factors determines PPP Project success in few countries such as Singapore, Taiwan, China and UK were found to be favorable legal framework, stable macro-economic condition, transparent procurement process, commitment and responsibility of project participants (Chou et al. 2015). Project success can be explored by considering Quality of the project and project management success. Considering these as a platform, various CSFs under these domains were identified and evaluated. A lifespan CSF structure with customary "Learning mechanisms" is developed (Liu et al. 2015). Besides the financial consideration (Tang et al. 2010) towards PPP project success, there are certain non-financialelements which also contributes to project success either directly or indirectly. They can be listed under macroeconomic, political and legal aspects in which the first consists of economic freedom, competitiveness and rate of unemployment and the legal criteria has quality of regulation and effective rule of law(Mota and Moreira 2015). During the period from 1990 to 2013, the study suggested based on the works carried out so far and critical factors are risk allocation and sharing (Tang et al. 2010), Strong Private consortium, Political and public support and transparency in procurement process. Apart from this, a checklist of various CSFs has been prepared for PPP and used in further pragmatic studies (Kyei and Chan 2015). While referring to Chinese and international journals, issues related to procurement, financial, economic and legal, government regulation and guarantee, management of risk are considered to be major success determinants of PPP Projects (Zhang et al. 2016).

--- 2.6 Risk related issues in PPP's ---

Generally, construction projects are subjected to typical risks and other unexpected issues. If risk prevails, there may or may not be possibility of occurrence of failure. But mostly construction activities include hazardous situations which related to many issues. These risks can capable of generating multidisciplinary issues related to problems like cost, time, lack of resources, safety hazards etc. and it is significant that the public and private sectors have to inaugurate actual risk apportionment strategies to achieve enhanced efficacy and reducing the conflicts among the participants. The preferred risk in china and Hong Kong are mostly related to Political,legal,Social (Ameyaw and Chan 2015) and force majure risks and private sectors are associated with mesotype risks (ke et al. 2010). In operating these PPP Projects, the elements such as Proper planning of project, Appropriate monitoring system, Coordination among participants, effective design and construction methods and accurate legal framework and robust project management (Heravi and Hajihosseini 2012). Initially before starting the project, a set of risk developing factors are find out and are listed so as to form a model. On Cumulating it has Residual risk value (RVR) has to computed and compared with individual risk values. These proposed RVR model are intended for use by public parties to have regulated and well managed PPP implementation. The RVR based 6 risk factors acknowledged are Sustainability failure, Reduction in Operation, profit, problems related to functional and service performance aspects and maintenance worsening (Yuan et al. 2015). Usually PPP projects are more composite. It includes in-built project risks, Exogenous Project risks, Political and operational risks (Rebeiz 2012). One of the PPP Project risk identifications in China suggested that certain factors has to give with utmost preference to enhance the project success. It also suggested that based on these factors future planning regarding risk response has to be considered (Chan et al. 2011). In order to mitigate the risks, proper conceptual model is created to slacken the intensities of various risk enhancing factors. The perceptions and recommendation are created by applyingsuitable Systematic approach because of practical support for defining and solving the problem leads to reduction in project and business risks to have enhanced performance and reduced uncertainties during the project execution. (Yeo and Tiong 2000). Since the PPP Project involves more complexity and elongated procedures, there exists the possibility of unpredictable risks. By the way of reducing this, System thinking is considered as a prospective solution but it is not broadly recognized for practice. There are certain elements such as conflicts, Contractual agreements, resistance to change, time and resources deficiency, Project complexities, unknown legal insinuations. (Loosemore and Cheung 2015). The challenges in PPP implementation in Malaysia is intended to reduce the risk factors there by enhancing the magnitude of project success. The hindering factors are delays due to negotiation, lack of procedures and guidelines given by government, higher charge to direct users, delays due to political issues and finally unclear objectives and evaluation process of the government. These elements are given with serious consideration promote the PPP project to attain desirable success. (Ismail and Harris 2014).

3. STUDY PROGRAM

In general, Public Private Partnerships projects inspiring the evolution and advancement of the country's economic development. Currently, throughout the nation 6960 projects were under PPP infrastructural development along the length and breadth of the country. As for as the Tamilnadu scenario is concern, the state Secures 6th position among all the other states. So there exists some success gaps in proper completion of those projects. But the top 5 states are well-versed in this with lesser intensity of blockades. There are some factors which acts a barrier in promoting the success of these Projects in the state Scenario. So there is a pressing necessity of the state to have doable and well-organized protocol for enhanced practices in upcoming PPP Projects. There are certain key features which acts as disablers which retards the success components of the projects in the purview of both Public and private Agencies. These retarders make the project Ultimately Unsuccessful. So those hindering parameters have to be found out and certain key measures has to be formulated for converting the Unsuccessful Projects into Successful.

--- 3.1 Research framework ---

Since the research is a Descriptive one, the limitations are that the target population of the research will only consists of Contractors, A/E Firms, Project Manager, Project Engineer, Material Suppliers, Private firms, Government bodies, Consultants etc. who worked/working PPP in Construction Projects. The factors studied were:
i) Dependent Variable: Critical Success Factors
ii) Independent Variables: Determinants of PPP are Project environment, Planning & design, Reliability of public sector, Reliable concessionaire consortium, Market dynamics, Economic Viability, Risk elements,Policy Legislation & Regulation and Socio-Demographic Profile of the respondents. The Aim of this Research is to analyze the critical factors of public private partnership and its enhancement for a Success of a Construction project in Tamilnadu Scenario. The objectives of the research are achieved by reviewing the relevant past literature and performing various statistical analysis, factored analysis among the various factors and there by evaluating the same to improve the success of those PPP projects by the different approaches available. The analysis will answer which Critical factors should be the appropriate one which is to be given more importance and consideration for the success of PPP is concerned.

--- 3.2 Research objectives ---

- To know about the Profile of the public and private sectors undergoing Public Private Partnership Projects.
- To identify the Critical factors determining the Success of PPP in Construction Projects.
- To analyze the crucial factors determining the Success of PPP and its impact on Time, Cost, Coordination and operational performance.

The current study sustained to point out the critical factors which determines success of the PPP in Construction Project with respect to the Tamilnadu State scenario and aims at giving unblemished and wide-ranging super vision towards the Project success measures and are directed to discourse the following research questions:
i. What the Project delivered within the allocated time without causing any delay/on time commissioning?
ii. How did the coordination exist among the project participants?
iii. What was the range of the Project Completion with in the budget allocated?
iv. Whether the Operational Performance of the project are being met during project execution?
In order to have a better relationship among the

factors contributing success and project success measures, a hypothesis set has been created and it is analyzed based on the results obtained from correlation analysis to check the relationship between dependent and independent variables. The following hypothesis has been formulated by the researcher:

Ho: There is no significant difference witnessed between the factors contributing the success with that of PPP Project Success measures.

H1: There is a significant difference witnessed between the factors contributing the success with that of PPP Project Success measures.

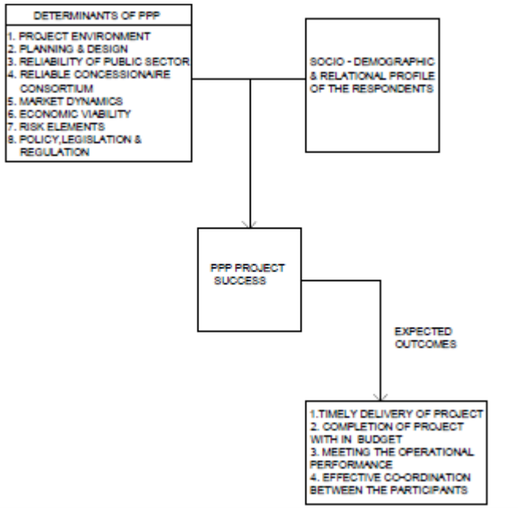

FIGURA 02. Research framework

4. METHODOLOGY

The methodology implemented in this research was DESCRIPTIVE research, since it focuses on specific facets or dimensions of the problem studied. This research targets at pinpointing the several features of problem under study and was based on the survey questionnaire which supported the assessment of Success factors of PPP in Construction projects with special reference to Tamilnadu scenario. In explicit, the respondents subjected to this research were the people worked/working for PPP Construction projects belongs to various parties, sectors and different field of expertise.

--- 4.1 Research instrument ---

In order to achieve the predetermined objectives of this research, a Questionnaire/ survey was used. The research questionnaire consists of two sections with and was created by means of conventional scales. The first section dealt with the Socio-relational and Demographic Profile of the respondents, these section consists of items which are established as proposed by J-S.Chou (2015) and second section is based on LIKERT SCALE consists of success factor components of PPP Projects on a scale of 5-point rating scales which has range starting from 1 to 5 in which the lowest rating scale 1 is considered as “Strongly Disagree” whereas the highest rating scale 5 is “Strongly agree”. The second section consists of various items that are developed for this paradigm based on theoutcomes and findings of various research works. The bundle consists of 9 main domains such as Project environment, Planning & Design, Reliability of Public Sector, Reliability of Concessionaire consortium, Market dynamics, Economic viability, Risk elements, Policy, Legislation & Regulations and Project success measures which are established by referencing various literature related to the problem study.The factors such as Project environment, Economic viability, reliability of concessionaire consortium were taken from Zhang (2005), whereas planning & design, Market dynamics were considered from Doloi (2012) and risk elements, Policy Regulation & Legalization were taken from both (Doloi 2012 ; B-G. Hwang et al. 2013) and finally the factor reliability of Public sector was taken from (X. Zhang 2005;Doloi 2012; B-G. Hwang et al. 2013; Li &Akintoye 2005).These items under 9 domains were assumed to be reliable with the paradigms description, all the items were scrupulously pore over by an expert panel consists of Project director, Project managers and executives who are well-versed in this field to make sure that the items commendably epitomized the description and using their ideas and suggestions in design of questionnaire.Apart from that, some of the industrial experts and academicians were invited to be participants in that panel in order to concise the items included in the preliminary item design. This process was supported with Content validity test for finalizing the research questionnaire. The expert panel was requested to judiciously consider each item and to suggest any alterations/additions to the preliminary research instrument.

The feedback from the expert panel suggested that some additional items can be added under the domains such as Market dynamics, Policy, Legislation and regulation, Project environment, Economic Viability and with fewer items being lay open to negligible phraseology changes. The expert panel review concludes that the research instrument shall be subjected to Pilot study after making the necessary modifications. Subsequently, a pilot study was applied to the research instrument which suggests that four items shall be deleted from reliability of public and private sector, three items from risk elements, and two from economic viability. Finally, 57 items under 9 domains were taken in the final questionnaire surveywhich yields sufficient Cronbach-alphavalue. This ensures that the data collection process shall be started authoritatively to carry out the research work.

--- 4.2 Data collection ---

The research Questionnaire/Survey tools can be used for Primary and secondary data collection.The targeted population of the research was consisting of Contractors, A/E Firms, Project Manager,Project Engineer, Material Suppliers, Private firms, Governmentbodies, Consultants etc. who worked/working PPP in ConstructionProjects. Since the respondents are subdivided into various homogenous groups/stratum, a Stratified Random Sampling was adopted. This sampling technique was vital in order to enhance the sample statistical efficacy, to provide suitable data for analyzing several sub-stratums which was necessary in this study. These data were collected in certain modes such as Interviews, self-administered questionnaire, online through emails and Google forms from the respondents who worked/working PPP Projects in certain developed and developing districts such as Chennai, Madurai, Coimbatore, Trichy, Tirunelveli, Tanjore, Salem, Karur, Erode, Perambalur, Ariyalur, Namakkal, Sivagangai and Pudukkottai. The collection of data ensues athwart four and half weeks which Consists ofweekdays only.

--- 4.3 Sample Profile ---

The sample is designed to have a self-administered questionnaire/survey in Tamilnadu. A total of 163 Questionnaires were collected in which 84 are self-administered questionnaire and remaining from Online google forms. All the responses were considered and fed into SPSS 16 version for analysis. The data analysis is performed by several statistical paraphernalia such as Friedman’s test, Mean value analysis, Factor analysis, One-way ANOVA, Multiple Regression and Correlation analysis.

5. DETAILED EVALUATION AND RESULTS

--- 5.1 Respondents profile ---

The **table 1** is intended to know about the Socio-Demographic and relational Profile of the respondents, Percentage analysis is done to have a clear respondents profile. It is found that that the majority of the sample are male respondents with 60.7 Per cent, with female respondentscontributes 39.3 Per cent. The majority age group of the sample is under 30-40 having 30.1 Per cent with the frequency of 49 whereas the minority age group is Above 60 with 10.4 Per cent. In the aspects of qualification of respondents, majority are graduate with 44.2 per cent and minority respondents are qualified with diploma having 4.9 Per cent. In the view of number of project handle, less than 10 dominates the overall profile with 36.2 Percent and only 16.6 Per cent of the respondents handled 30 Above projects.Engineers tops the respondents profile with 44.2 Per cent and only 2 responses are under central government unit which listed as Minority. 48.5 Per cent respondents are in medium size projects and 83.4 Per cent with location in Urban whereas 4.3 Per cent projects are Located in rural side. 55.8 Per cent of the respondents has the field of expertise as Engineering.42.3 Per cent of the survey respondents handled project with budget less than 50 crores.

Sl. No	Demographic Variables	Categories	Frequency	Percentage
1	AGE	21 to 30	48	29.4
		31 to 40	49	30.1
		41 to 50	27	16.6
		51 to 60	22	13.5
		Above 60	17	10.4
2	GENDER	Male	99	60.7
		Female	64	39.3
3	EDUCATION QUALIFICATION	Diploma	8	4.9
		Graduate	72	44.2
		Post Graduate	55	33.7
		Doctoral	28	17.2
		Others	-	-
4	NUMBER OF PPP PROJECTS HANDLE	Less than 10	59	36.2
		10 to 20	45	27.6
		21 to 30	32	19.6
		Above 30	27	16.6
5	WORKING EXPERIENCE: (IN YEARS)	Less than 5	36	22.1
		5 to 10	26	16
		11 to 20	42	25.7
		21 to 30	33	20.2
		Above 30	26	16
6	WORKING UNIT	Contactor	20	12.3
		Engineer	72	44.2
		Consultant	27	16.6
		Industrial	6	3.7
		Financier	15	9.2
		State Government	21	12.9
		Central Government	2	1.2
7	SIZE OF THE PROJECT	Small	24	14.7
		Medium	79	48.5
		Large	60	36.8
8	LOCATION	Urban	136	83.4
		Semi Urban	20	12.3
		Rural	7	4.3
9	FIELD OF EXPERTISE	Engineering	91	55.8
		Financial	31	19
		Transportation	4	2.5
		Public Administration	10	6.1
		Urban Planning	13	8
		Facility Management	10	6.1
		Others	4	2.5
10	TURNOVER/ BUDGET (IN CRORES)	Less than 50	69	42.3
		51 to 100	16	9.8
		101 to 250	24	14.7
		251 to 500	34	20.9
		Above 500	20	12.3

TABLE 01. Socio-Demographic and Relational Profile of the respondents

--- 5.2 Results of descriptive statistics ---

Friedman test and chi-square test are adopted in this research and it is shown in the **Table 3**. Friedman test explains how the sub factors adopted in this research are important in achieving the project success and it ranks those factors based on their mean values. It has been found that from **table 3**, the variables such as “Positive attitude towards PPP project implementation is needed” has been ranked as One which has mean value of 3.45, rank second is “Commitment / responsibility of public/private sector is desirable” has value of 3.17, “General knowledge about existence and working of PPPs is required” has mean value of 3.08 which as ranked as Third, Fourth rank has value of 2.78 for “Willingness to support and freely participate in PPP project implementation is needed” and finally “Favorable environment for local private construction” is ranked as Five which has a mean value of 2.52 for the “PROJECT ENVIRONMENT” domain. Similarly, all the other major domain and its corresponding sub factors are ranked based on the Friedman mean values respectively.

Chi square test has been formulated to check whether the elements responsible for PPP Project success are related and it depicts the affiliation between two unconditional variables. From the table, it is reliant that the chi-square values for the main factors are 49.907 for Project environment,31.361 for Planning & design, 32.855 for Reliability of public sector, 31.363 for Reliability of concession consortium,22.396 for Market dynamics, 39.526 for economic viability, 8.927 for Risk elements. These main factors are found to be significant have p-values (p=0.000) which is less than 0.05 and they are interconnected to one another. Hence null hypothesis is rejected and whereas alternate hypothesis is accepted. Therefore, it is evident that there occurs a relationship between PPP Project success variables and expected success measures among the PPP Project participants. In addition to that the major factor “Policy, regulation and legalization” has chi square value of 14.791 and p- value as 0.097, so the null hypothesis is accepted and it is evident that the variables under policy, legalization and regulation are independent among the PPP Project participants since p-value is not significant.

FACTORS DETERMINING SUCCESS	FRIEDMAN TEST MEAN	MEAN RANK	TEST STATISTICS
PROJECT ENVIRONMENT			
General knowledge about existence and working of PPPs is required	3.08	3	Chi - Square: 49.907 Degrees of freedom: 4 Asymp. Sig.: 0.000
Willingness to support and freely participate in PPP project implementation is needed	2.78	4	
A favorable environment for local private construction companies to compete favorably and expand compared to internationals and multinationals is essential	2.52	5	
Positive attitude towards PPP project implementation is needed	3.45	1	
Commitment /responsibility of public/private sector is desirable	3.17	2	
PLANNING & DESIGN			
Project technical feasibility plays major role in execution	4.04	3	Chi - Square: 21.361 Degrees of freedom: 6 Asymp. Sig.: 0.002
procurement process is Competitive	4.04	3	
Planning will facilitate creative and innovative approaches	4.46	1	
Accelerate project development	3.95	5	
Time can be saved in delivering the project	3.85	6	
Competent personnel to participate in PPP project implementation are available.	3.61	7	
Involvement of all of the key parties during project planning is essential.	4.05	2	
RELAIBILTY OF PUBLIC SECTOR			
Government involvement by providing guarantees	3.31	1	Chi - Square: 32.855 Degrees of freedom: 4 Asymp. Sig.: 0.000
Well organized public agency is needed	3.27	2	
Government decision for provision of loan is satisfactory	2.90	4	
PPP dedicated public agency is existed	2.58	5	
Protocols and Regulations of Public sector are slackened	2.94	3	
RELAIBAILTY OF CONCESSION CONSORTIUM			
Strong private consortium is mandatory	3.21	2	Chi - Square: 31.363 Degrees of freedom: 4 Asymp. Sig.: 0.000
Well-organized private sector pattern is essential	3.05	3	
Proper recording, archiving and referencing of the works by the private sector	3.33	1	
Procurement process in the resources procurement is transparent.	2.67	5	
Private sector Solves the problem of public sector's budget restraint	2.75	4	
MARKET DYNAMICS			
Political support is highly recommended	2.60	5	Chi - Square: 22.396 Degrees of freedom: 4 Asymp. Sig.: 0.000
Stable macro-economic environment is vital	3.06	3	
Social support is needed	3.21	1	
Technology transfer plays typical role in project	2.99	4	
Government guarantee is a major criteria	3.14	2	
ECONOMIC VIABILITY			
Sound economic policy is mandatory	4.20	7	Chi - Square: 39.526 Degrees of freedom: 7 Asymp. Sig.: 0.000
Project financial feasibility plays major role.	5.15	1	
Presence of a pro-investment culture among the population is vital	4.87	2	
Non-recourse or limited recourse to public funding	4.26	6	
Financial capacity/ ability of the parties is amicable	4.43	4	
Reduction of public sector administration costs are realized	4.42	5	
Benefit to the local economic development is achieved	4.65	3	
Reduction of the total project cost is accomplished	4.02	8	
RISK ELEMENTS			
Parties have knowledge on Appropriate risk allocation and risk sharing	4.27	1	Chi - Square: 8.927 Degrees of freedom: 6 Asymp. Sig.: 0.000
Transfer risk to the private sector	4.11	2	
Reduction of public money tied up in capital investment is essential	4.11	2	
Government is willing to share risk	3.98	4	
Force majure situation is inevitable	3.85	6	
Realistic cost/benefit assessment is desirable	3.86	5	
Shared risks between public and private sectors are well predetermined	3.83	7	
POLICY, LEGISLATION & REGULATION			
Good governance is vital	5.60	2	Chi - Square: 14.791 Degrees of freedom: 9 Asymp. Sig.: 0.097
Favorable legal framework is suitable for PPP Projects	5.52	4	
A streamlined, transparent and clear project appraisal policy is required	5.45	7	
Available financial market is satisfactory	5.47	5	
Tax exemption or reduction is advisable	5.32	8	
Existence of specific PPP law is sufficient	5.24	10	
Provide an integrated solution (for public infrastructure/service)	5.47	5	
Stakeholders' acceptance is mandatory	5.55	3	
Commitment of all of the parties is utmost needed	6.12	1	
Favorable policies with respect to lending for PPP construction projects are available.	5.26	9	

TABLE 02. Ranking of factors determining success based on Friedman& chi- square test 2/2

--- 5.3 Factor analysis ---

Factor analysis which is an explorative analysis was used to categorize the hidden variables and it also clusters the like variables into well-defined dimensions. Factor analysis can be adopted only when the data samples are suitable. In order to check the suitability and appropriateness of the data samples, Kaiser-Meyer-Olkin (KMO) test and bartlett's test were done. The Kaiser-Meyer-Olkinis applied to measure the adequacy of the sampling which scrutinizes whether the partial correlations between variables are lesser. The KMO values ranges from 0 to 1 in which the values range between 0.7 to 0.8 denotes noble and from 0.8 to 0.9 are abundant and above 0.9 are outstanding. The value obtained from KMO test should be more than 0.5 to carry on the factor analysis in a satisfactory manner. Bartlett's test of sphericity were conducted to check whether the sample size is adequate. The results obtained from KMO and Bartlett's test for this research work is exemplified below.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**0.823**
Bartlett's Test of Sphericity	Approx. Chi-Square	2582.060
	Df	378
	Sig.	.000
Cronbach's Alpha: 0.955		

TABLE 03. KMO and Bartlett's test

Reliability analysis is adopted to find the internal dependability of the factors replicated in the hypothesis. From the table, 3 it is obvious that, the over-all Cronbach alpha is (0.955) which revealsthe reliability of the collected data under nine major domain of PPP projects from the perspective of participants working on it and it is also used to investigate any unpredictability because of unforeseen random error. The alphas coefficient is farther than 0.60 which indicates that the data deliberated for the research has finest internal dependability of the factors. From the above table it is inferred that the value of KMO test is 0.823 which is above the base value 0.50 and hence the sample size is adequate enough for the research work and having the values above the expected cut-off limit whereas the significance value obtained from barrtlett's test of sphericity value (0.000) is satisfactorily small. From the results obtained from the above tests, it is evident that the factor analysis can be applied to the data samples. The wide and variety range of variables influencing are contracted under the principle that the factors which has significant role in promoting the success component of the PPP Project alone are retained by factor analysis. While factor analysis

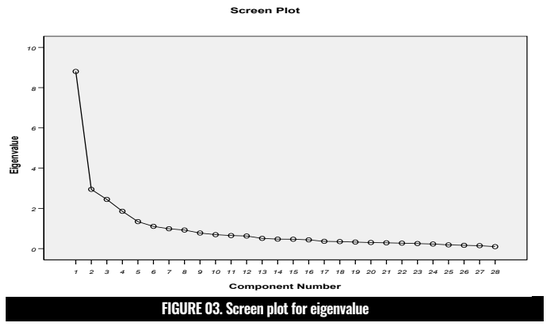

FIGURE 03. Screen plot for eigenvalue

is in progress, a distinctive solution is provided by Principal component analysis in which the initial data has been renovated based on the results. The solution so obtained will have clear indication that why the particular variable has been retained.

Fig.2 denotes the screen plot in which the Eigenvalues are in Y axis and the components so extracted are numbered and are denoted as component number in X axis. From the graph, it is recognizable that only six factors which present initially have Eigen values greater than unity which can be illustrated in screen plot. Screen plot performance depicts that the variable influences were comparatively low beyond the sixth component. There are six dimensions obtained in this research and were named based on the sub factors depiction so obtained after extraction and are described as Six factors (shown in **Table 6**). Those six factors are Legal &Risk criterion, Project precedence, Project expertise, Project Enhancement, Economic aspects, Project Cognizance.

The first factor is named as "RISK CRITERION" consists of following factors (displayed using their factor loadings): Available financial market is satisfactory (0.836), Favorable legal framework is suitable for PPP Projects (0.809), Realistic cost/benefit assessment is desirable (0.746), Government is willing to share risk (0.743), Force majure situation is inevitable (0.736), A streamlined, transparent and clear project appraisal policy is required (0.462).The above mentioned factors are related with risk criterion. Since it has the components that deals with the financial market, cost involved, and force majeure situations. These domains of PPP Projects are subjected to sudden fluctuations. Hence the first factor is labelled as "Risk Criterion".

The second factor is named as "PROJECT PRECEDENCE" consists of following factors (displayed using their factor loadings): Project technical feasibility plays major role in execution (0.746) Proper recording, archiving and referencing of the works by the private sector (0.710), Positive attitude towards PPP project implementation is needed (0.709), Strong private consortium is mandatory (0.696),Planning will facilitate creative and innovative approaches(0.628), Presence of a pro-investment culture among the population is vital(0.515).The above mentioned factors are related with project precedence. Since it has the components that deals with the project implementation and variables related to project suitability. These domains of PPP Projects are subjected to superiority and precedency of project in the aspects of designing, planning and execution of works. Hence this factor is labelled as "Project precedence".

The third factor is labelled as "PROJECT EXPERTISE" because the key aspects dealt in the component are Proficiency and capability of the projects .It consists of following factors (displayed using their factor loadings): PPP dedicated public agency is existed (0.805) Sound economic policy is mandatory (0.734), A favorable environment for local private construction companies to compete favorably and expand compared to internationals and multinationals is essential (0.696), Technology transfer plays typical role in project (0.684), General knowledge about existence and working of PPPs is required (0.514).The above mentioned factors are related with project expertise. Since it has the constituents that compacts with the project favorable environment and the technology applied to the works and variables related to project proficiency.

The fourth factor is named as "PROJECT ENHANCEMENT" consists of following factors (displayed using their factor loadings): procurement process is Competitive (0.761), Competent personnel to participate in PPP project implementation are available. (0.754), Accelerate project development (0.734), Government involvement by providing guarantees (0.714).The above mentioned factors are related with Project enhancement. Since it has the components that deals with the procurement, project development and competency in various PPP Project aspects. These domains of PPP Projects form the base of the project with proper and progress improvement with augmented features. Hence this factor is labelled as "Risk Criterion".

The penultimate factor is named as "ECONOMIC ASPECTS" consists of following factors (displayed using their factor loadings): Benefit to the local economic development is achieved (0.722),Financial capacity/ ability of the parties is amicable (0.677), Parties have knowledge on Appropriate risk allocation and risk sharing (0.671), Reduction of the total project cost is accomplished(0.525). The above mentioned factors are related with Cost consideration. Since it has the components that deals with the project financial and project risk allocation in monetary aspects and sharing them related to project costs. Hence this factor is labelled as "Economic Aspects".

The eventual factor is labelled as "PROJECT COGNIZANCE" because the key aspects dealt in the component are awareness and acquaintances of the projects. It consists of following factors (displayed using their factor loadings): Involvement of all of the key parties during project planning is essential. (0.710), Reduction of public money tied up in capital investment is essential (0.679), Stable macro-economic environment is vital (0.630). The above mentioned factors are related with project knowledge. Since it has the constituents that compacts with the project planning essentiality and its perception among the participants and stability of economic environment around the project and variables related to project adeptness. Reliability study is conceded out to measure the consistency of the elements determining the success of PPP construction projects after the six factors were being extracted. The mostly well renowned reliability tool is Cronbach's alpha which is found to be 0.918 for the extracted 28 variables. The alpha must be applied distinctly to each variable when some elements be existent. The internal dependability reliability value for every individual variable ranged from 0.8 to 0.9 which gives a confirmation of pleasing level of paradigm reliability. The communalities list for very items obtained after extraction will explains the variance accounted for the corresponding variable by the factors extracted. Based on the communalities values in the table, 77.2% of variance is for "Favorable legal framework is suitable for PPP Projects" and 74.6% of variance for "Reduction of public money tied up in capital investment is essential"and 74.2% of the variance for "Government involvement by providing guarantees"and similarly for all the retained variables certain percentage of variance are obtained by the components in factor solution. The above discussed six elements are rotated and cumulative% refers to percent of variance accounted collectively by preceding factor and current factor. The six sub factors which are present initially has cumulative variance value of 66.052%, which describes the general features of the elements before and after rotation. Eigen value is the ratio of the expounding significance of the elements with respect to the sub factors which is also referred to as characteristics roots. The sub factors which has low Eigen value are considered to be unimportant since its influence concerning the description of variable is little. On the other hand, the values of communalities have represented the sum of variance

Extracted factors	Factors determining success	Component						Communalities
		1	2	3	4	5	6	
LEGAL & RISK CRITERION (EF)	Available financial market is satisfactory	.836						0.690
	Favorable legal framework is suitable for PPP Projects	.809						0.772
	Realistic cost/benefit assessment is desirable	.746						0.617
	Government is willing to share risk	.743						0.653
	Force majure situation is inevitable	.736						0.723
	A streamlined, transparent and clear project appraisal policy is required	.462						0.610
PROJECT PRECEDENCE (EF 2)	Project technical feasibility plays major role in execution		.746					0.698
	Proper recording, archiving and referencing of the works by the private sector		.710					0.583
	Positive attitude towards PPP project implementation is needed		.709					0.579
	Strong private consortium is mandatory		.696					0.614
	Planning will facilitate creative and innovative approaches		.628					0.539
	Presence of a pro-investment culture among the population is vital		.515					0.629
PROJECT EXPERTISE (EF 3)	PPP dedicated public agency is existed			.805				0.730
	Sound economic policy is mandatory			.734				0.691
	A favorable environment for local private construction companies to compete favorably and expand compared to internationals and multinationals is essential			.696				0.612
	Technology transfer plays typical role in project			.684				0.592
	General knowledge about existence and working of PPPs is required			.514				0.631
PROJECT ENHANCEMENT (EF 4)	Procurement process is competitive				.761			0.680
	Competent personnel to participate in PPP project implementation are available.				.754			0.606
	Accelerate project development				.734			0.742
	Government involvement by providing guarantees				.714			0.689
ECONOMIC ASPECTS (EF 5)	Benefit to the local economic development is achieved					.722		0.721
	Financial capacity/ ability of the parties is amicable					.677		0.699
	Parties have knowledge on Appropriate risk allocation and risk sharing					.671		0.700
	Reduction of the total project cost is accomplished					.525		0.688
PROJECT COGNIZANCE (EF 6)	Involvement of all of the key parties during project planning is essential.						.710	0.746
	Reduction of public money tied up in capital investment is essential						.679	0.645
	Stable macro economic environment is vital						.630	
	Eigen Value	8.804	2.943	2.445	1.855	1.341	1.106	
	% of Variance	31.44	10.51	8.73	6.63	4.79	3.95	
	Cronbach Alpha	0.861	0.823	0.807	0.792	0.811	0.736	
	Number of items	6	6	5	4	4	3	

TABLE 05. Pattern matrix

for each variable which can be described by the elements retained after extraction.

The factor loadings of the 28 variables which are obtained from 57 variables are clubbed under the six factors as shown in the **Table 6**. Each facet contains certain set of factors. If the consummate value of the loading is higher, then more the elements contribute to the variable. The loadings which has the value less than 0.5 are obstructed so as to have good adequacy of sample measure and these loading should surpass 0.5 for categorizing substantial loading in this research. The loadings for all 27 variables exceeded 0.500 in which certain loading value are 0.836,0.809,0.805 which sounds worthy and expect for one factor which has the loading value 0.462. This factor is anyhow counted in the research ever since it is measured as a tad remarkable in an exploratory study (Hair et al., 1998).

The hypothesis so formed are subjected to test by Pearson correlation analysis. This exploration is adopted to find the relationship among the elements involved in this research. The analysis is carried out by considering the combination of both dependent variables (Project success measures) such as Cost, Time, Coordination and Operational performance related aspects to that of the independent variables which are extracted as six factor domains which contains combined Success contributing variables. The main objective of this analysis is to elucidate the association between the dependent and independent variables considered for this research. Based on the results obtained from the above **Table 9**, it is observed that there exists a statistically major relationship among the factors contributing success and the PPP Project success measure which ranging from 0.161 to 0.680. Among the attributes in **table 9**, Project Cognizance and Project expertise are most effective with statistically significant relationship among the success measures.The results suggest that higher the importance to Project cognizance will have more additional weightage to success enhancement which has the high degree of positive correlation (r = 0.616) at the level of correlation significant p=0.01 towards the Success measure 4, meeting the operational performance and also Project expertise having positive correlation of 0.664 at the level of correlation significant p=0.01 headed for the success measure 3, Completion of project with in allocated budget timely delivery of project with in allocated budget. and the same has the value of 0.477 at the level of correlation significant p=0.01 in the direction of Success measure 1, contributes on the way to success.Project precedence and risk criteria has positive correlation but these values are lesser in magnitude when compared to other facets having the correlation value of 0.161 and 0.182 towardsproject completion within budget and meeting the operational performance at the level of correlation significant p=0.05 in two-tailed. Apart from the major results the component such as Economic aspects has good degree of correlation towards meeting the operational performance.Project enhancement will also influence the effective coordination among the project participants there by promotes the project towards the direction of successhaving a relative correlation value of 0.492 at the level of correlation significant

FACTORS	PSM 1	PSM 2	PSM 3	PSM 4	EF 1	EF 2	EF 3	EF 4	EF 5	EF 6
Timely delivery of project without delay	1	0.526**	0.426**	0.577**	0.430**	0.372**	0.477**	0.228**	0.240**	0.431**
Effective coordination among project participants	0.526**	1	0.593**	0.680**	0.346**	0.295**	0.564**	0.492**	0.448**	0.605**
Completion of project within budget	0.426**	0.593**	1	0.597**	**0.182***	**0.161***	0.664**	0.475**	0.427**	0.580**
Meeting the operational performance	0.577**	0.680**	0.597**	1	0.243**	0.377**	0.557**	0.366**	0.490**	0.616**
Legal & risk criterion	0.430**	0.346**	**0.182***	0.243**	1	0.297**	0.323**	0.271**	0.481**	0.357**
Project precedence	0.372**	0.295**	**0.161***	0.377**	0.297**	1	0.383**	0.407**	0.505**	0.471**
Project expertise	0.477**	0.564**	0.664**	0.557**	0.323**	0.383**	1	0.415**	0.531**	0.590**
Project enhancement	0.228**	0.492**	0.475**	0.366**	0.271**	0.407**	0.415**	1	0.540**	0.423**
Economic aspects	0.240**	0.448**	0.427**	0.490**	0.481**	0.505**	0.531**	0.540**	1	0.527**
Project cognizance	0.431**	0.605**	0.580**	0.616**	0.357**	0.471**	0.590**	0.423**	0.527**	1

** depicts correlation significant at the 0.01 level (Two-tailed)
* indicates correlation significant at the 0.05 level (Two-tailed)

TABLE 06. The Pearson correlation analysis between factors influencing project success factors and its effect on success measures of PPP projects (N=163)

(p=0.01) in two-tailed among the various elements promoting success measures. Out of all the six project success traits, the variables sheltered under Project cognizance and Project expertise are illuminating higher grade of positive connotation among the other success enhancing variables and hence these two facets are given with much more consideration than others.

--- 5.4 Results of Regression analysis ---

The analysis done so far were envisioned to find the critical aspects for the project success. But there is no clear cut view on the point that, how these elements are linked to overall PPP Project success. The project success definition is equivocal in factor analysis. In order to overcome these difficulties, Multiple regression analysis is adopted to scrutinize the association between the variables which influences success and success measures in the aspects of cost, time, coordination and performance. Multiple regression analysis for shaping the elements responsible for the Project Success factors and variances observed between the success factorsequivocal in factor analysis.

While creating the regression model, the project success measures such as Cost, time, Coordination and operational performance are taken as dependent variables and the variables promoting success from factor analysis such as Project environment, Planning & design, Reliability of Public sector, Reliable of concessionaire consortium, Market dynamics, Economic viability, Risk elements, Policy Legalization and regulation consists of 28 variables are taken as independent variables. The dependent variables are deliberated as direct arrangement of expounding or descriptive variables which is shown in **Table 7**. The models so obtained are measured by the coefficient of determination R^2 and adjusted R^2 for Goodness of fit. The optimum models are selected based on the values obtained from ^{R2} and adjusted R^2. There may be fluctuation in the values of R^2 briskly due to the addition new aspects into the model whereas there may be generality in fitness of the model into consideration for the values of adjusted R^2. Based on the values so obtained by multiple regression analysis as shown in the **Table 7**, all the four models so derived are recognized unconditionally. PPP Project success is defined by four aspects as mentioned earlier such as Cost, Time, Coordination, Operational performance towards the variables/attributes which reflects these aspects in different domains have been clarified with greater statistical implication in the model. So we can conclude that the model obtained from regression analysis is both statistical and substantial in the way of prophesying the success measures through various attributes contributing success which in turn implies that the data is also having good fit. Beta coefficients affords required information to regulate the project success from success attributes under several domains. Hypothesis test is adopted at 95% level for the entire hypothesis.

From **table 7**, it is also contingent that the value of F is significantly much more for Project Expertise (126.68) and Project cognizance (92.966). Hence these two facets are given much more importance in obtaining success. From this inference, we can conclude that the regression model is statistical and significant towards envisaging the consequences that appreciates success through success measures which clinches a decent fit for data.

Based on the regression model obtained from **Table 8**, model fit can be developed by using B values in Unstandardized coefficients. From the above table, four regression models can be generated based on the values of B corresponding to respective factors. In order to achieve the success measures the factors has sound B values are taken and model fit is developed.In case of the all the four models, Project success measure can be illustrated by the regression model fit equation as shown below which can be developed from the extracted variables.

(a) TIMELY DELIVERY OF PROJECT WITHOUT DELAY:

Y_1 = -0.029 + (0.069) Legal & Risk Criterion +(0.056) Project Precedence + (0.092) Project expertise – (0.001) Project Enhancement – (0.098) Economic Aspects + (0.069) Project Cognizance.

In the first regression model, to deliver the project within time the attributes such as Project cognizance (0.069), Project expertise (0.092), Legal and risk criterion (0.069), Project precedence (0.056) are given priority to enhance the success and the attributes Project enhancement (0.001) and Economic aspects (0.098) has to be slackened to reduce the adverse effect on success.

Dependent Variable	Independent Variables	R	R^2	Adjusted R Square	Std. Error of Estimate	F	Sig.
Timely delivery of Project without delay	Legal & Risk criterion	0.430	0.185	0.180	0.78740	36.529	0.000
	Project Precedence	0.372	0.138	0.133	0.80968	25.807	0.000
	Project expertise	0.477	0.227	0.223	0.76662	47.379	0.000
	Project Enhancement	0.228	0.052	0.046	0.84925	8.802	0.003
	Economic Aspects	0.240	0.058	0.052	0.84659	9.870	0.002
	Project Cognizance	0.431	0.186	0.181	0.78679	36.832	0.000
	Over all	0.624	0.390	0.366	0.69207	16.615	0.000
Effective coordination among project participants	Legal & Risk criterion	0.346	0.120	0.115	0.68629	21.958	0.000
	Project Precedence	0.295	0.087	0.082	0.69898	15.376	0.000
	Project expertise	0.564	0.318	0.314	0.60421	75.041	0.000
	Project Enhancement	0.492	0.242	0.238	0.63685	51.464	0.000
	Economic Aspects	0.448	0.200	0.195	0.65424	40.320	0.000
	Project Cognizance	0.605	0.366	0.362	0.58250	92.966	0.000
	Over all	0.699	0.489	0.469	0.53122	24.894	0.000
Completion Of project With in Allocated budget	Legal & Risk criterion	0.182	0.033	0.027	1.06237	5.488	0.020
	Project Precedence	0.161	0.026	0.020	1.06622	4.286	0.040
	Project expertise	0.664	0.440	0.437	0.80819	126.68	0.000
	Project Enhancement	0.475	0.226	0.221	0.95071	46.892	0.000
	Economic Aspects	0.427	0.183	0.178	0.97664	35.977	0.000
	Project Cognizance	0.580	0.337	0.333	0.87989	81.700	0.000
	Over all	0.765	0.586	0.570	0.70629	36.778	0.000
Meeting the operational performance	Legal & Risk criterion	0.243	0.059	0.053	0.71634	10.085	0.002
	Project Precedence	0.377	0.142	0.137	0.68392	26.691	0.000
	Project expertise	0.557	0.310	0.306	0.61317	72.499	0.000
	Project Enhancement	0.366	0.134	0.129	0.68722	24.889	0.000
	Economic Aspects	0.490	0.240	0.235	0.64378	50.825	0.000
	Project Cognizance	0.616	0.379	0.375	0.58180	98.365	0.000
	Over all	0.676	0.457	0.436	0.55296	21.853	0.000

TABLE 07. Model summary for regression analysis

(b) EFFECTIVE COORDINATION AMONG PROJECT PARTICIPANTS:

Y_2 = 0.587 + (0.017) Legal & Risk Criterion - (0.022) Project Precedence + (0.057) Project expertise + (0.074) Project Enhancement – (0.005) Economic Aspects + (0.131) Project Cognizance. In the second regression model, to achieve coordination among the parties the aspects such as Project cognizance (0.131), Project enhancement (0.074), Project expertise (0.057), Legal and risk criterion (0.017), Project precedence (0.056) are prioritized to promote success and the attributes Project precedence (0.022) & Economic aspects (0.005) are to be reduced which affects success.

(c) COMPLETION OF PROJECT WITH IN ALLOCATED BUDGET:

Y_3= -0.596 - (0.026) Legal & Risk Criterion - (0.090) Project Precedence + (0.154) Project expertise + (0.107) Project Enhancement + (0.022) Economic Aspects + (0.176) Project Cognizance. In the penultimate regression model, to deliver the project within time the attributes such as Project cognizance (0.176), Project expertise (0.154), Economic aspects (0.022) and Project enhancement (0.107) are given priority to increase the success and the attributes legal and risk criterion (0.026), Project precedence (0.09) has to be loosened to shrink the adverse outcome on the PPP's project success.

(d) MEETING THE OPERATIONAL PERFORMANCE:

Y_4 = 0.813 - (0.011) Legal & Risk Criterion +(0.007) Project Precedence + (0.054) Project expertise + (0.005) Project Enhancement + (0.045) Economic Aspects + (0.140) Project Cognizance.

In the eventual regression model, to deliver the project within time the attributes such as Project enhancement (0.005), Economic aspects (0.045) Project cognizance (0.140), Project expertise (0.054), Project precedence (0.007) are given priority to boost the success and the element legal and risk criterion (0.011) has to be relaxed to lessen the contrary effect on success.

--- 5.5 Scope for further research ---

This research work is intended to identifying and analyzing the critical factors which are more predominant in PPP Projects to attain success in an enlarged manner. While attempting to ascertaining the critical factors, there exists future scope in this research. They are

(i) The research was carried out in the one of the states (Tamilnadu) of India in which the state occupies 6th position in the national level. It comprises of various regions around the state in which the PPP Projects are ongoing or at the operation level. As outcomes of this research are hemmed in to Tamilnadu circumstances, the same survey tool must be directed to all the other states which are best in handling these projects. Upon integrating them, will leads to the national level scenario of PPP in Construction Projects.

(ii) The current study involves the combined perspective of the respondents who were the participants of the PPP Construction Projects. This study has been further continued with same research instrument to obtain the perspective of the similar respondents of particular field. For example, the data sample may be consisting of project engineers alone or private directors and managers alone etc.

6. CONCLUSION

The Construction diligence getting more fame and eminence day by day. In order to secure an aspiring position among the competitive nations of same level, infrastructural development has to be enhanced in the country. So the amendments, plans, initiative schemes and improvements

Model	Dependent variable	Predictors	Unstandardized Coefficients		Standardized coefficients	T	Sig.
			B	Std. Error	Beta		
1	Y_1 = timely delivery of Project without delay	Constant	-0.029	0.513	-	-0.56	0.955
		Legal & Risk criterion	0.069	0.015	0.341	4.729	0.000
		Project Precedence	0.056	0.020	0.213	2.795	0.006
		Project Expertise	0.092	0.022	0.350	4.250	0.000
		Project Enhancement	-0.001	0.027	-0.003	-0.036	0.971
		Economic Aspects	-0.098	0.030	-0.301	-3.316	0.001
		Project Cognizance	0.069	0.036	0.163	1.917	0.057
2	Y_2 = effective coordination among project participants	Constant	0.587	0.394	-	1.492	0.138
		Legal & Risk criterion	0.017	0.011	0.102	1.540	0.126
		Project Precedence	-0.022	0.015	-0.100	-1.437	0.153
		Project Expertise	0.057	0.017	0.257	3.414	0.001
		Project Enhancement	0.074	0.021	0.253	3.593	0.000
		Economic Aspects	-0.005	0.023	-0.017	-0.200	0.842
		Project Cognizance	0.131	0.028	0.366	4.719	0.000
3	Y_3= completion Of project With in Allocated budget	Constant	-0.0596	0.523	-	-1.139	0.257
		Legal & Risk criterion	-0.026	0.015	-0.103	-1.729	0.086
		Project Precedence	-0.090	0.020	-0.275	-4.383	0.000
		Project Expertise	0.154	0.022	0.473	6.977	0.000
		Project Enhancement	0.107	0.027	0.247	3.903	0.000
		Economic Aspects	0.022	0.030	0.055	0.741	0.460
		Project Cognizance	0.176	0.037	0.334	4.778	0.000
4	Y_4= meeting the operational performance	Constant	0.813	0.410	-	1.984	0.049
		Legal & Risk criterion	-0.011	0.012	-0.067	-0.985	0.326
		Project Precedence	0.007	0.016	0.031	0.435	0.664
		Project Expertise	0.054	0.017	0.245	3.147	0.002
		Project Enhancement	0.005	0.021	0.018	0.253	0.801
		Economic Aspects	0.045	0.024	0.163	1.897	0.060
		Project Cognizance	0.140	0.029	0.387	4.842	0.000

TABLE 09. Regression analysis forPPP success measures and its outcome

were developed by the government of the country. It is difficult for the government to initiate, to plan and execute these kind of typical works from initial stage to the final level. To overcome this position, there occur a pressing necessity for the government to divide and share some of its worksto the private sectors. The projects or works that are carried by the combined activity of both Government (Public) and private sector participation leads to the establishment of Public-Private Partnership (PPP) projects and there is no exemption for construction industry from PPP.

PPP Projects are broadly adopted in most of the construction related activities not only in the case of country's scenario but all around the globe. This research aims at enhancing the success component of these distinctive infrastructural PPP projects by analyzing and ascertaining the most critical factors to promote success. Based on the questionnaire survey data's, various statistical tools were applied to this research. Reliability analysis depicts that the questionnaire is trustworthy and internal dependability among factor with a Cronbach alpha's value of 0.955. Before that content validity was also adopted so as to shape the questionnaire and make it effective for survey process. KMO and Bartlett's test suggests that sample is adequate enough with necessary vital factors and hence it's a gate pass for factor analysis to proceed. Based on the above tests, the value obtained are higher than Cut off value.

The items so constructed for questionnaire are subjected to factor analysis and the items so created initially are condensed by Promax factor analysis. The construct has 57 items which are ultimately shrunken into 28 items. Nearly half of the initial constructs were emaciated since they contribute only a feeble amount to PPP Project success. The 28 variables so obtained are clubbed into the six key factors are ae named as "LEGAL & RISK CRITERION"," PROJECT PRECEDENCE"," PROJECT EXPERTISE"," PROEJCT ENHANCEMENT"," ECONOMIC ASPECTS"," PROJECT COGNIZANCE". The 28 attributes were comfortable under these six domains. They are backbone of the Project success. Enhancing and paying consideration towards these variables will definitely help to achieve success in a rigorous manner. With the factors so separated from the crowd of variables, they are subjected to certain tools such as One-way anova, Regression and correlation analysis. Correlation plays major role in giving interrelationship among the factors with proper significant level. Results so obtained inferred that there exists high degree of positive correlation among the factors promoting success of PPP.From the research, it is evident that the project success measures form the basic outcome at the aspects of Time, Cost, Coordination and Performance. As for the factor time is concerned, significant important among success rely on this since increase in cost will leads to spilling of allocated budget which increase in direct and indirect cost, there happens to be the reduction in the performance of the projects at the operational level and hence project has to be delivered on time. From the one of the measures, coordination also found to be important. since it is a combined activity of both public and private, there occur lot of misunderstanding and different in perceptions on certain issues and change in point of view can

happen which may lead to serious conflicts among the parties and affects the project execution finally leads to failure. Having the intention to tackle these situations, proper boundary has to derived between both the sectors about the works to be carried out by them, handling risk by the party which is best in handling it and prior to that proper interpretation of contract at the common perspectives of all the project participants in a meaning way.

Time and cost are interrelated to each other. Increase in time or delay in progress leads to cost escalation by promoting both direct and indirect costs. In case of smaller projects, it is easy to digest these scenarios. Since PPPs are mega projects, proper adherence to schedule and progress is vital towards success. The stages at which the unexpected delays can be listed and given with utmost care to avoid that. However, in worst case to provide key remedies to tackle it. So project has to completed within the allocated schedule and after the execution and completion of work, the project should be at an operatinglevel which should be frequent and accessible so as to reverse the investment without compromising the performance. Hence a versatile attention and importance has to be associated with these kind of special infrastructural projects from the initial stage to final stage, that is from the point of starting to the point of completion to attain and achieve success of the PPP construction Projects in an efficient and effective manner.

Based on the participant's perspective the success measures were found to be as follows: Timely delivery of project without delay, Effective coordination among parties involved, Project completion within budget allocated, Meeting the operational performance. Prior to this the Six domains contains the 28 extracted variables are also considered for the PPP Construction projects to improve the success of the component there by decreasing or diminishing the success retarders which are ignored at the initial and execution stage. This research helps the people by affording bountiful statistics to achieve success by enhancing the components promoting it, supporting them to understand about the Success factors, Promoting investments towards PPP Projects.

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The author's exceptional thanks go to the anonymous reviewers for their esteemed suggestions and Constructive Comments. We would like to extend our sincere thanks to Dr.T.R.Neelakantan (Associate Dean, Research) SASTRA University, India for giving proper guidance and support towards progress of this research work from initial level to final level and Special gratitude to Mrs. Theresa & Mrs. Anjali Daisy, Ph.D. Research Scholars, School of Management, SASTRA University for their regular assistance during this research and we also want to thank all the survey respondents, Kumarappan, ShahulHameed for helping in data collection for this research work.

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• REFERENCES •

Abdel Azziz, A. M. (2007). "Successful delivery of public-private partnershipsfor infrastructure development." J. Constr. Eng. Manage.,133(12), 918–931.

Akintoye, A., Hardcastle, C., Beck, M., Chinyio, E., and Asenova, D. (2003). "Achieving best value in private finance initiative project procurement." Constr. Manage. Econ., 21(5), 461–470.

Akhmestshina, E.R., and Mustafin, A.N. (2015). "Public-Private Partnership as a tool for development of innovative economy." Procedia Economics and Finance., 24, 35-40.

Buiten, M.V., and Hartmann, A. (2015). "Asset management perspective on the duration of Public-Private Partnership Contracts: Cost-Control Trade-off?J. Constr. Eng. Manage., 141(3), 35–43.

Chan, A. P. C., Chan, D. W. M., Chiang, Y. H., Tang, B. S., Chan, E. H. W.,andHo, K. S. K. (2004). "Exploring critical success factors for partnering in construction projects." J. Constr. Eng. Manage., 130(2), 188–198.

Chan, A. P. C., Yeung, J. F. Y., Yu, C. C. P., Wang, S. Q., and Ke, Y. (2011). "Empirical study of risk assessment and allocation of public-private partnership projects in China." J. Manage. Eng.,27(3), 136–148.

Chen, W. T. and Chen, T. T. (2007). "Critical success factors for construction partnering in Taiwan." Int. J. Proj. Manage., 25(5),475–484.

Cheng, E. W. L., and Li, H. (2001). "Development of a conceptual model of construction partnering." Eng., Constr., Archit. Manage., 8(4),292–303.

Cheng, E. W. L. and Li, H. (2004). "Development of a practical model of partnering for construction projects." J. Constr. Eng. Manage., 130(6),790–798.

Cheung, E., and Chan, A.P.C. (2011)." Evaluation model for assessing the suitability of Public-Private Partnership Projects." J. Manage. Eng., 27(2), 80–89.

Chou, J.-S., and Lin, C. (2013). "Predicting disputes in public-private partnership projects: Classification and ensemble models" J. Comput. Civ. Eng., 27(1), 51–60.

Chou, J.-S., Pramudawardhini, D. (2015). "Cross-country comparisons of key drivers, critical success factors and risk allocation of public-private partnership projects" Int. J. Proj. Manage., 33,1136–1150.

Doloi, H. (2012). "Understanding impacts of time and cost related construction risks on Operational performance of PPP Projects" Int. J. Strategic Property Manage., 16(3), 316-337.

El-Gohary, N.M., Osman, H., and El-Diraby, T.E. (2006). "Stakeholder management for Public-Private Partnerships" Int. J. Proj. Manage., 24,595–604.

Grimsey, D., and Lewis, M. K. (2002). "Evaluating the risks of public private partnerships for infrastructure projects." Int. J. Proj. Manage.,20(2), 107–118.

Gurgun, A.P., and Touran, A. (2014)." Public-Private Partnership Experience in the International Arena: Case of Turkey." J. Manage. Eng., 30(6).

Heravi, G., and Hajihosseini, Z.(2012). "Risk allocation in Public-Private Partnership Infrastructure projects in developing Countries: Case study of the Tehran-Chalus Toll Road." J. Infrastruct. Syst., 18(3), 210-217.

Hong, Y., Chan, D.W.M., Chan, A.P.C., and Yeung, J.F.Y. (2012). "Critical analysis of partnering research trend in construction journals."J. Manage. Eng., 28(2), 82–95.

Hwang, B. G., Zhao,X., and Gay, M.J.S. (2013). "Public private partnership projects in Singapore: Factors, Critical risks and preferred risk allocation from the perspective of contractors." Int. J.Proj. Manage., 31, 424-433.

Ismail, S., and Harris, F.A. (2014)." Challenges in implementing Public Private Partnership (PPP) in Malaysia." Procedia-Social and behavioural Sciences." 164, 5-10.

Ke, Y. J., Wang, S. Q., Chan, A. P. C., and Cheung, E. (2009). "Research trend of public-private-partnership (PPP) in construction journals." J. Constr. Eng. Manage., 135(10), 1076–1086.

Ke, Y., Wang, S., Chan, A.P. (2010). Risk allocation in public–privatepartnership infrastructure projects: comparative study. J. Infrastruct. Syst., 16(4), 343-351.

Kumaraswamy, M. M., and Zhang, X. Q. (2001). "Governmental role in BOT-led infrastructure development." Int. J. Proj. Manage., 19(4),195–205.

Kyei, R.O.,Chan, A.P.C.(2015). "Review of studies on the critical success factors for public–private partnership (PPP) projects." Int. J. Proj. Manag., 33, 1335–1346.

Li, B., Akintoye, A., Edwards, P. J., and Hardcastle, C. (2005a). "Theallocation of risk in PPP/PFI construction projects in the UK." Int.J. Proj. Manage., 23(1), 25–35.

Li, B., Akintoye, A., Edwards, P. J., and Hardcastle, C. (2005). "Perceptions of positive and negative factors attractive factors influencing the attractiveness of PPP/PFI procurement for construction projects in the U.K." Eng., Constr., Archit. Manage., 12(2), 125–148.

Liu, T., Wang, Y., and Wilkinson, S. (2016) "Identifying critical factors affecting the effectiveness and efficiency of tendering processes in Public-Private Partnerships (PPPs): A comparative analysis of Australia and China" Int. J. Proj. Manag. 34, 701–706.

Liu, J., Love, P. E. D., Davis, P. R., Smith, J., and Regan, M. (2015a). "Conceptual Framework for the Performance measurement of Public-Private Partnerships projects." J. Infrastruct. Syst., 21(1),

Liu, J., Love, P. E. D., Smith, J., Regan, M., and Davis, P. R. (2015b). "Life cycle Critical Success factors for Public-Private Partnership Infrastructure Projects."J. Infrastruct. Syst., 31(5).

Lo**pes, M.D.S., and Flavel, R.** (1998). "Project Appraisal – a framework to assess non-financial aspects of projects during the project life cycle" Int.J. Proj. Manage., 16(4), 223–233.

Loosemore, M., and Cheung, E. (2015). "Implementing systems thinking to manage risk in public private partnership projects." Int.J. Proj. Manage., 33, 1325–1334.

Moto, J., Moreira, A.C. (2015)." The importance of non-financial determinants on Public-Private Partnerships in Europe"Int.J.Proj. Manage., 33, 1563–1575.

Qiao, L., Wang, S.Q., Tiong, R.L.K. and Chan, T.S. (2001). "Framework for critical success factors of BOT projects in China". Journal of Project Finance, 7(1),53–61.

Rebiz, K.S. (2012). "Public-Private Partnership risk factors in emerging countries: BOOT illustrative case study" J. Manage. Eng., 28(4), 421-428.

Regan, M., Smith, J., and Love, P. E. D. (2011a). "Impact of the capital market collapse on public-private partnership infrastructure projects." J. Constr. Eng. Manage.,137(1), 6–16.

Robert, O-K., Danosh, A., and Kuragu, J.K.O. (2014). "Reasons for adopting Public-Private Partnership for construction projects in Ghana." Int. J. Constr. Manage., 14(4), 227-238

Schepper, S.D., Haezendonck, E. and Dooms, M. (2015). "Understanding pre-contractual transaction costs for Public-Private Partnerships infrastructure Projects." Int.J. Proj. Manage., 33, 932–946.

Smyth, H. and Edkins, A. (2007). "Relationship management in the management of PFI/PPP Projects in the UK" Int.J. Proj. Manage., 25(4), 232–240.

Tang, L.Y.N., Shen, Q.P., Cheng, E.W.L., (2010). "A review of studies on public–private partnership projects in the construction industry." Int. J. Proj. Manage., 28,683–694.

Tang, L.Y.N., Shen, Q.P., Cheng, E.W.L., (2010). "Factors affecting effectiveness and efficiency of analysing stakeholders' needs at the briefing stage of Public-Private Partnership projects." Int. J. Proj. Manage., 31,513–521.

Yang, J-B., Yang, C-C., Kao, C-K., (2010). "Evaluating Schedule delay causes for private participating public construction works under the Build-Operate-Transfer model." Int. J. Proj. Manage., 28,569–579.

Yeo, K.T., and Tiong, R. L. K. (2000). "Positive management of differences for risk reduction in BOT Projects." Int. J. Proj. Manage., 18,257–265.

Yuan, J. F., Wang, Y. J., Skibniewski, M. J., and Li, Q. M. (2009). "Developing Key Performance Indicators for Public-Private Partnership Projects: Questionnaire Survey and Analysis." J.Manage. Eng., 28(3), 252–264.

Yuan, J. F., Chan, A.P.C.,Xiong, W., Skibniewski, M. J., and Li, Q. M. (2015). "Perception of residual value risk in Public private partnership Projects : Critical review." J. Manage. Eng., 31(3).

Zhang, X.Q. (2005a). "Critical success factors for public-private partnerships in infrastructure development." J. Constr. Eng. Manage., 131(1), 3–14.

Zhang, X.Q. (2005b). "Critical success factors for public-private partnerships in infrastructure development." J. Constr. Eng. Manage., 131(1),71–80.

Zhang, X.Q. (2006). "Paving the way for Public-Private Partnerships in infrastructure development."J.Constr.Eng. Manage.,132(2), 107–114.

Zhang, S., Chan, A.P.C., Feng, Y., Duan. H., and Ke, Y. (2016) "Critical review on PPP Research – A search from the Chinese and International journals" Int. J. Proj. Manage., 34,593–612.

Zou, W.W., Kumaraswamy, M.M., Chung, J., Wong, J., (2014). "Identifying the critical success factor for relational ship management in PPP Projects" Int. J. Proj. Manage., 32,265–274