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Modelling the states of public client participation in public private partnership arrangements

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Modelling the States of Public Client Participation in Public Private Partnership Arrangements

Eisa A. Alsafran, Francis T. Edum-Fotwe, Wayne E. Lord

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***Abstract*—**The degree to which a public client actively participates in Public Private Partnership (PPP) schemes, is seen as a determinant of the success of the arrangement, and in particular, efficiency in the delivery of the assets of any infrastructure development. The asset delivery is often an early barometer for judging the overall performance of the PPP. Currently, there are no defined descriptors for the degree of such participation. The lack of defined descriptors makes the association between the degree of participation and efficiency of asset delivery, difficult to establish. This is particularly so if an optimum effect is desired. In addition, such an association is important for the strategic decision to embark on any PPP initiative. This paper presents a conceptual model of different levels of participation that characterise PPP schemes. The modelling was achieved by a systematic review of reported sources that address essential aspects and structures of PPP schemes, published from 2001 to 2015. As a precursor to the modelling, the common areas of Public Client Participation (PCP) were investigated. Equity and risk emerged as two dominant factors in the common areas of PCP, and were therefore adopted to form the foundation of the modelling. The resultant conceptual model defines the different states of combined PCP. The defined states provide a more rational basis for establishing how the degree of PCP affects the efficiency of asset delivery in PPP schemes.

***Keywords*—**Asset delivery, infrastructure development, public private partnership, public client participation.

I. Introduction

GOVERNMENTS around the world adopt the PPP scheme to deliver national infrastructure projects and services by taking advantage of private sector competences to achieve greater efficiency. As such it can be argued that use of the PPP procurement system enhances the role of the private sector who have specific participation in public facilities and investments [15]. The choice of the Malaysian government shows movement towards private sector involvement and a long-term arrangement in supporting public infrastructure [17]. In the last three decades, PPP has allowed the private sector to take over the financing, design, construction and operation of public infrastructure facilities and services for a long-term concession period [31]. It is a good opportunity for the public sector to employ the private sector to help finance the upgrade of public facilities and services [2], [16], but some challenges and opportunities of public clients have occurred throughout implementation [29]. Although private sector engagement to achieve public infrastructure projects and services is relatively common practise, knowledge of the mechanics of their involvement vis-à-vis that of the public sector is often not clear.

Reference [29] argued that the literature on project delivery, in general, highlights a potential gap in the research and in particular, presents considerable challenges for the public client role and participation in PPP arrangements. [29], [21], [20], [15] Various studies have targeted both public and private engagement and accomplishment, as well as the involvement and achievement of the private sector alone. The evidence to date suggests that very little research effort has been directed at the influence that the PCP in PPP schemes have on their performance. PPP largely depends on the private sector engagement but, the public client has an important and fundamental role to play in bringing about PPP success. Key questions such as the degree to which the public sector should take an active role in the delivery of any scheme, and the effect of any level of participation need to be resolved to provide guidance for the adoption of PPP by the public sector.

The sequential steps of this research are literature review, data collection, data analysis, results, discussion, and conclusion. In order to achieve the purpose of this study, a comprehensive review of PPP infrastructure schemes and PCP is accomplished by employing a systematic review to a number of different sources.

This paper investigates essential aspects and frameworks of PPP infrastructure schemes to build different levels of PCP into the conceptual model. Participation by the public client may well prove beneficial and play a significant role in the efficient delivery of the assets of any infrastructure development.

II. Public Private Partnership

According to [14], Public Private Partnership (PPP) is defined as "a long-term contractual arrangement between the public and the private sector to realize public infrastructure and services more cost effectively and efficiently than under conventional procurement." The relationship between the public and private sector in PPP is demonstrated in Fig. 1 [10], [5].

The focus of PPP procurement is primarily in delivering services, as opposed to building assets, and using the private fund, rather than public finance [35], [19]. Moreover, the public sector gains the advantages of shifting the risk to the private sector and acquiring value for money through a

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maximum 40 years concession agreements, in providing public infrastructure and services [11], [19], [33]. Private investment in delivering services with restricted risk on the public sector is the performance level of PPP contracts [19]. The range of the concession period is usually between 20 to 30 years, yet client request of specific extension may be issued [31], [2]. According to [31], [2], achieving value for money should be paramount for public clients who would expect to be adequately educated and informed. [20] On the other hand, the significant capital of investments and services of PPP projects requires a coordinated effort from both public and private sectors. In this case, tasks and risks of the project are divided between the two parties, whilst ensuring they maintain their own individuality and obligations [20]. Furthermore, [21] mentioned that commitment between public and private sectors leads to efficiency in delivering projects within time and to budget. According to [34] the definition of the public-private partnership project delivery process, with regards to constructing public facilities, is "a long-term performance-based approach to procuring public infrastructure where the private sector assumes a major share of the risks in terms of financing and construction and ensuring effective performance of the infrastructure, from design and planning, to long-term maintenance" as it shown in Fig. 2.

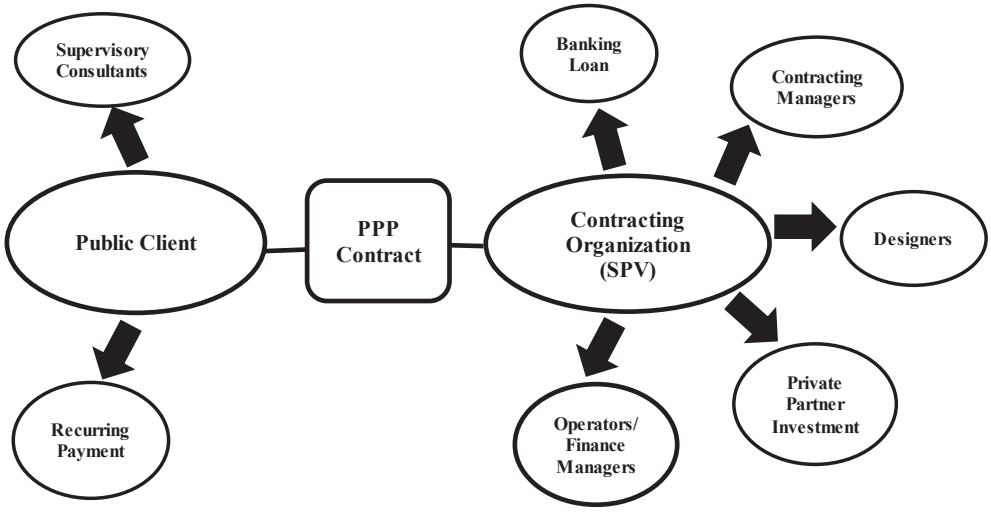

Fig. 1 PPP System

Fig. 2 Timeline of PPP Implementation

III. Process of PPP Procurement

The main initial phases proceeding PPP projects are planning, procurement and contract management [11]. This is a pre-award process in which public high arrangement and consultancy costs are involved due to lengthy and complicated processes [21]. Several phases and interrelations in the process of public-private procurement are demonstrated in Fig. 3 [13], [30], [11]. The public and private sectors are required in this process to understand the existence of certain issues such as high bidding expense, a long process, absence of knowledge and experience in public sector competence, investigating past project lessons, absence of information exchange between projects and affirmation of value for money [13].

IV. Public Client Participation in PPP

Public Client Participation (PCP), assurance and incentive in PPP are essential for the private sector [3]. The necessary assurances of the host government or public sector, such as investment awards, land awards, low interest on loans, specific tax release and environmental issues would remove the uncertainty of the private investor engagements in such projects [3]. [20] Further, government guarantees, through secure investments for the contractors, can be utilized if essential. Reference [26] states that varieties of PPP types have been used by the UK government to supplement extra public sector investment and ensure economic benefits to both public and private sectors. [20] On the other hand, the participation of the government in PPP should be towards direct benefits to the public, as well as to the businesses. [20] Contractors' business intentions should be in consideration of the public sector act. Also, according to [3], the project requirements have to be aligned with private sectors' demands and public client terms and anticipations. [3] However, the public client of any Build Operate Transfer project is of most importance, due to the requirement and transfer of the facility to the public client. According to [3], the public-client or government authoritative, regulatory, administrative and financial support in developing countries, are required for a

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large and complex project. [37] As an example, the Executive Yuan in Taiwan, at the end of 2002, formed a committee of different ministries to help encourage the private sector to take on public infrastructure projects. The main purpose of the ministry efforts is to minimize the investment difficulties and resolve any other issues confronting the private sector during the implementation stage. Nevertheless, delays in Build Operate Transfer (BOT) projects still exist throughout the early phase of a project.

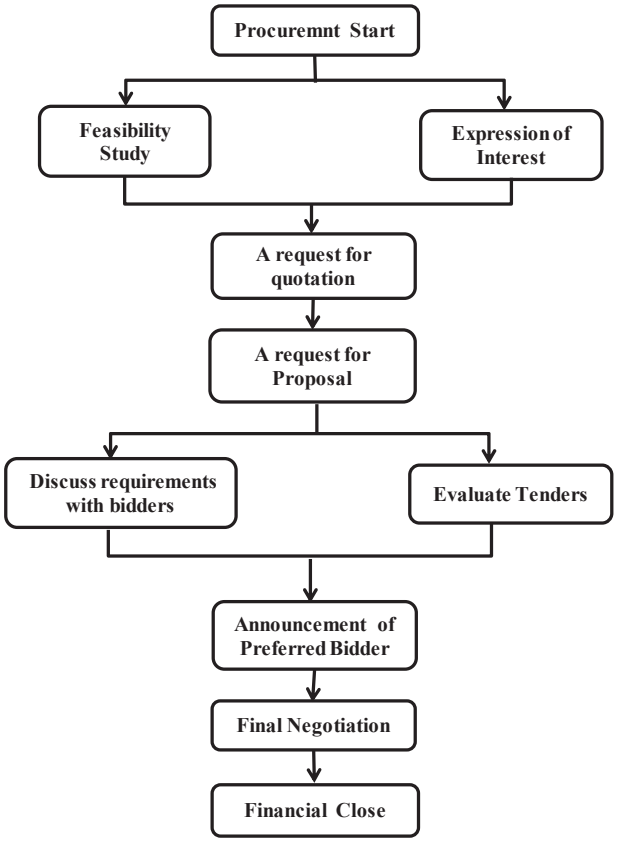

Fig. 3 Process of PPP Procurement

The public sector is not able to have full control, resulting in a well-designed performance and a complete attractive structure. This method of procurement systems involves less control than other methods of procurement systems. In this case, a contracting organization is responsible for the overall project. Furthermore, the client has to clearly express his or her needs to the contracting organization, so that the proposal and tender process does not face complications. Also, a bill of quantities in this method is not available which makes clients unable to change the design during the contract [27]. However, the most critical variables related to "PPP/PFI" are time taken for arrangement and administration, extended delays in the negotiation stage and high costs in the participation phase [11].

In the late 1980s, public sectors in the United States noticed an increase of disputes and claims on construction contracts. In this case, a public sector arrangement was emphasized to regulate the increase of large major project cost and time [27]. Along with a negative impact on the projects and an absence of certainty and expanding disagreements between contractual parties, lawful and contractual matters were raised [4]. Therefore, any proposed laws for PPP application should be obviously eradicated to avoid uncertainly or confusion in PPP law [34]. On the other hand, [29] mentioned that the United States public authority adopts varieties of procurement methods in obtaining construction, operation and maintenance of public infrastructure facilities, depending on technological advance, economic development and social circumstances. Further, according to [29], successful completion and operation of a major part of the United States' past infrastructure system was based on private investments but some selected projects were based solely on public financing. [29] However, favoured a legislative remedy, which was provided by the United States public authority to the public financing and separated procurement of the design and construction of a public facility. Moreover, the Design Build construction market, over the last 10 years, has gradually developed in the private sector and has been implemented to a greater extent in the public sector [15]. Similarly, the PPP model has great flexibility in the project design stage, where a separated method of the procurement system has a firm specification provided by clients.

The separated procurement system was the most favourable system until 1998 but Design and Build was increasingly attractive in the same year. From 1998 onwards, separated procurement system and Design and Build were comparatively close to each other in percentage of construction procurement worth [27], [6]. The argument of these variations was based on client approaches, financial condition, and procurement anticipation results. [6] Cited [27], claimed that variations of procurement system from 1945 onwards were based on alteration of client approaches and requirements, more than any other determinants. Integration of design and construction was specifically emphasized due to the client's expectancy achievement [6].

The private sector generally requires a longer concession duration to gain profit; however, it is not in the interest of the public client to extend the concession period. On the contrary, the private sector will refuse the offer of insufficient concession period or increase the service fees throughout the operation stage to gain profit. In this case, the risk burden will be transferred to the end user [9], [32]. The BOT concession period allows the private sector to invest in employing private funds as well as the public sector to build infrastructure facilities and services without any extra public funds [32], [7]. Throughout the last 20 years, in developing and developed countries, BOT has been a successful scheme in funding public infrastructure facilities and services [32], [7]. [37] A statistical report regarding PPP projects in Taiwan, (updated to 31 July 2009), shows 44% of all projects (39 of 88 projects) select the BOT scheme as a delivery method. [16] Moreover, BOT has been progressively used by Southeast Asia governments to construct railroads, expressways, tunnels, ports, bridges, reservoirs, power plants and hydraulic facilities. This is an indication of the popularity of BOT among all. Nevertheless, BOT projects consist of some problems and

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risks for the concession organization. These problems and risks are a significant part of BOT activities, due to involvement of such a long concession period with interrelated parties and large amounts of investment, but these issues would be problems for the contractors, suppliers and private investors to confront [9], [16], [28].

V. Advantages and Disadvantages of Public Sector

The public sector has more advantages than disadvantages due to less involvement in PPP. The advantages include, high level services or facilities, economic growth, secured long-term payment, innovation, reduced risk, efficiency and quicker completion and reduction of public capital investment [10], [18]. In addition, the risks are shifted to the private sector and construction issues are maintained at a strategic distance by the public client [36], [18]. Convenient risk transfer to the private party, throughout the project would extract long-term value for money [18]. Moreover, private sector knowledge and innovation develops operational effectiveness in supplying better public services [18]. Also, the public sector budget limitation of the project can be solved through Special Purpose Vehicle (SPV) fund [19].

Public administration eliminates or reduces public expenses on the concession period of infrastructure public facilities and uses it instead for alternative purposes. Moreover, engaging the public sector with the private sector is expected to lead to cost reduction, quality improvement and a competent delivery process of the overall project. Furthermore, BOT competitors through the tendering process increase design creativity, construction approaches and management procedures. Integrated procurement models also generate large timely project delivery such as Build Operate Transfer and Design Build Operate more than separated models such as Design Bid Build and Design Build, provided that they are properly scheduled, packaged and granted [29]. [23] In contrast, mentioned that the best outcome for the public sector is to fulfil the client's needs in employing public funds and achieving a quality product. Hence, the public sector is considered to have extensive involvement in dealing with stakeholders than the private sector. According to [12], public clients have to follow the law agreements of a government, openly and honestly to achieve a quality product that meets public standards. However, the disadvantages are long-term contract, risk involvement, an absence of expertise, deficient legislative cover and an absence of regulations cover [10], [16].

VI. Risk Aspect of PPP Schemes

There are two major avenues of risk which are external and internal risk in construction. External risks involve environmental issues, but internal risks involve uncertainties within the project [15]. Construction risks mainly comprise of cost and time overrun to the overall project, possibly due to technical problems, ineffective management or a combination of both. A project which overruns may lead to unachievable revenue of a completed project. Similarly, investment in the project may not be profitable due to cost overrun [3]. Moreover, less experience in dealing with environmental and construction issues would lead to high risk in overseas construction projects. Mitigating risks in construction projects is critical because it requires previous experience in dealing with particular risks. [15] An action or choice of risks generates a result or significance which is uncertain. [18] The nature of long-term projects and interrelated parties in PPP/PFI may maximize the ability and expectancy of identifying associated risks. Some risks related to the exchange rate and existing assets are possibly uncontrollable by private companies, so accepting these risks may lead to an increase in service rates. [28] Being able to efficiently identify risks is important, otherwise neglected and unidentified risks may become major issues. [15] However, defined risk as "The probability that a particular adverse event occurs during a stated period of time or results from a particular challenge." [15]. In Private Finance Initiative (PFI) risks any of the principle parties or both should carry the responsibility of the risks. [8] Argues that, according to PFI law, the private sector is fully responsible for any financial risks which occur during the project execution, though the public authority stance is that either the public or private party is able to manage or evaluate the risks and should deal with them [22], [11], [24]. [15] On the other hand, any principle parties have enough data about the risks or work activities to be in a position to manage them. It is not enough to know risks, but rather knowing how to control risks during the contacting and construction period.

VII. Funds/Equity Aspect of PPP Schemes

[15] The universal PPP market funding in 2007 peaked at $68.6 billion, and showed continued firm funding until 2008. [15] However, it stated that the effect of financial crisis on the PPP, market pulled it down to $55.5 billion by the end of 2009. Recently, [21] highlighted that the aim of the UK government is to guarantee quicker and less expensive Private Finance 2 (PF2) procurement than PFI procurement, without compromising on quality and competitiveness. PF2 projects will be engaged to other sources, rather than the extended period of the bank obligation market. Furthermore, it is intended to boost longer period financiers and enlarge the sources of equity funding.

Although the UK government has a good number of successful PPP projects, the PFI is more widely used with over 700 PFI projects and a total capital cost of £54.7 billion in the UK [18]. [21] Revealed that funding contracts has been signed by the European Investment Bank since 2000, with a value of over £6 billion for UK PPP and project investment projects. [18] The private sector has estimated that the capital spending for UK PFI projects in the transport sector in 2010-2011 was £749 million (20.12% of all PFI expenses) and in 2011-2012 was £838 million (35.46% of all PFI expenses). The HM Treasury estimation of more or less £200 billion is for the total obligations on existing PFI contracts for the following 25 years in the UK. [21] However, claimed that the PFI procurement method, with regards to the public and private sector, has been costly and tardy which leads to growing

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expenses and condensed monetary value for the citizen. As a result of a long PFI journey between the UK government and the private sector, the government expanded private sector collaboration by handing over services of the public sector [18]. [6] Noted that expanding the public-client equity and giving back particular services, were the new modifications in the (PF2) range. Further expansions revealed that the UK government had established a new type of PPP to enlarge the market for private funds. The expansion of the market was to engage joint venture participation in agreement between a public control and a long-term private sector [15].

In Germany, an effective market of PPP is evolving. A total of 51 life process properties of PPP projects have been executed, with an investment of around €1.55 billion from 2002 to the beginning of 2007. This figure is expected to soon exceed 140 projects. However, PPP does not have a definitive description of its approach and instead it has different methods of application, some realistic, others unrealistic [14]. As [14] argues, private funding is obtaining constant ability of the SPV to capital markets. As a result, limited funding of the public infrastructure would be financially supported by the private sector. This is the reason why the delivery of PPP public infrastructure projects is more adjustable and adaptable, in comparison to the traditional method of the procurement system.

In the early1990s, the BOT internationally expanded its popularity, when more public projects were privatized by developed countries. A large portion of public infrastructure projects were constructed using the system of BOT, particularly in Hong Kong. Also, the effectiveness of BOT has been confirmed in China as it attracted overseas investments [32]. Moreover, the World Bank has led a study to find that around 1994 and 1999 the infrastructure in Indonesia was over USD 20 billion of the total private investment with the highest number of construction projects in participation with the private sector being in the transport sector, which made up 20 infrastructure projects (13 toll road projects and 7 seaport projects). A total construction of 570km of toll roads was managed from 1978 to 1997 which is around 30km yearly [1]. Furthermore, a large number of public authorities in Taiwan have urged the private sector to invest in public infrastructure projects immediately following the declaration of the PPP Act on February 9, 2000.

The total of private investment by the end of 2008 was approximately USD 11.5 billion [37].

VIII. Research Method

A systematic review method was carried out to investigate a number of sources for the purpose of this study. As shown in Fig. 4, a comprehensive review of the infrastructure developments and construction developments was reported in 345 selected published sources from journals, proceeding, conference papers, books, and governmental websites, from 1982-2015.

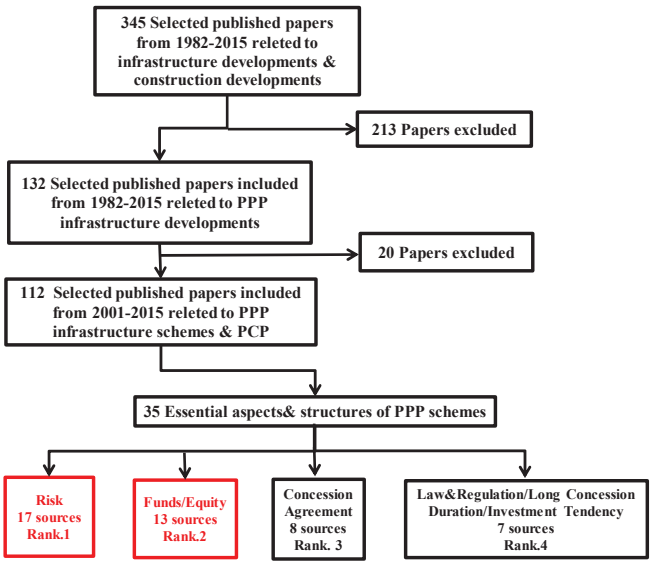

Fig. 4 Flow Chart of Included &Excluded Samples

The review was limited to 132 selected published sources for PPP Infrastructure developments from 1990 to 2015. Following this, selected published sources of the review were narrowed down to 112 papers relevant to PPP infrastructure schemes and PCP from 2001 to 2015. These papers were used to investigate essential aspects and structures of PPP infrastructure schemes to expose different levels of PCP, which were incorporated into the framework of the conceptual model. This research method was used to identify major concerns of essential aspects and structures of PPP schemes, in order to develop the conceptual model of different levels of participation that characterise PPP schemes. The systematic review of outcomes for this study were recorded in Table I,

representing essential aspects and structures of PPP schemes, ranking, and then rating them periodically.

The bigger number of collected number of sources was the higher concerns aspects and structures of PPP schemes. From a single source could be extracted number of factors. Ranking the collected number of sources was (1-8) where 1 was the biggest concerns and 8 was the lowest concern. Then, the collected numbers of sources were distributed according to the year of publication into three periods of rating.

TABLE I
A LITERATURE REVIEW OF PPP INFRASTRUCTURE SCHEMES

No.	Description	Collected number of sources	Ranks (1-8)	2001-2005	2006-2010	2011-2015
1	Funds/Equity	13	2	3	3	7
2	Risk Issues Transfer	17	1	2	5	6
3	Capital Asset Purchase	3	6	0	0	3
4	Innovation Performance	2	7	1	0	1
5	Technical Arrangement	2	7	1	0	1
6	Management Arrangement	1	8	0	0	1
7	Reviving the Economy	1	8	0	0	1
8	Administration Capabilities	1	8	0	0	1
9	Long Term Investment	2	7	0	2	0
10	Secure Long Term Payment	1	8	0	1	0
11	Law and Regulation	7	4	2	0	5
12	Project Specification	3	6	0	0	3
13	Control Mechanism	3	6	0	0	3
14	Contractual Agreement	4	5	1	0	3
15	Project Evaluation	3	6	0	0	3
16	Public Sector Encouragement	3	6	0	0	3
17	Land Use Regulation	3	6	0	0	3
18	Environmental Guidelines	3	6	0	0	3
19	Ministerial Coordination	4	5	0	1	3
20	Evaluation of Method	3	6	0	0	3
21	Concession Agreement	8	3	1	1	6
22	Interrelated Parties	3	6	2	0	1
23	Absence of Expertise	2	7	0	0	2
24	Financial Support	2	7	0	1	1
25	Less Control of Public Client	1	8	1	0	0
26	Development Plan	3	6	0	0	3
27	Budget Approval	4	5	0	0	4
28	Development Projects	4	5	1	1	2
29	Long Concession Duration	7	4	3	3	1
30	Increase Service Fees	2	7	2	0	0
31	Great Flexibility in the Project Design Stage	1	8	0	0	1
32	Changing of Public Sector Perception	1	8	0	0	1
33	Necessary Assurance of Public Sector	1	8	0	0	1
34	Government Guarantees	1	8	0	0	1
35	Investment Tendency	7	4	1	5	1

IX. RESULTS ANALYSIS

The literature review of PPP infrastructure schemes presented 35 essential aspects and structures. Table I shows that, out of 35 factors, risk and equity were the biggest concerns respectively. Risk was the biggest concerns with 17 collected numbers of sources in rank 1. Equity was the second biggest concerns with 13 collected numbers of sources in rank 2. As equity and risk were the two biggest concerns in the common areas of PCP, they were adopted to form the foundation of the modelling. These factors were measureable in applying diverse levels of participation within each state. Furthermore, risk in periodic rating from 2011 to 2015, had the biggest number of sources with a rating of 6. Equity, in Periodic Rating from 2011 to 2015, had the biggest number of sources, rating 7. This means that risk and equity have consistently been the biggest concerns for PCP for the last five years.

The consequence of conceptual model defines the different states of combined PCP. Both factors of PCP, risk and equity, are structurally designed in five states of PCP to apply different analysis of equity and risk rates within each state result in a different conclusion affecting asset delivery as it shown in Fig. 5. The first factor of PCP combination presents five selected levels of equity percentages in each state as following; twenty, twenty five, thirty, forty and fifty. Twenty is the lowest participated share of public client where fifty is the biggest participated shares. Twenty percent of equity is participated by public client allows eighty percent of share to

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private sector which may affect positively on the efficiency of asset delivery in PPP schemes.

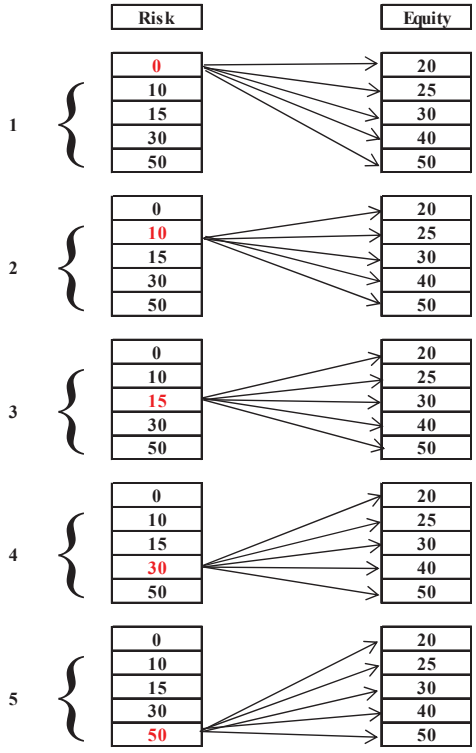

Fig. 5 A Conceptual Model of Different Levels of PCP

The more shares of equity put into any PPP schemes, the greater the possible profits outcome. The second factor also presents five selected levels of shares in each state as following; zero, ten, fifteen, thirty and fifty. Zero is the lowest participated share of public client. Fifty is the biggest participated of public client and the half risk share with private sector. As risk share of public client decreases risk share of private sector increases. This may be beneficial to the efficiency of asset delivery in PPP schemes. Classified levels of PCP map to conduct the conceptual model of the study. Applying diverse levels of PCP within each state exhibits the rational basis for establishing how the degree of PCP affects the efficiency of asset delivery in PPP schemes.

The five levels of each factors, risk and equity, can be extended to as many as possible share percentages for analysis; however; the optimum risk shares of the public client can be around fifty otherwise PPP arrangement is not effective. Additionally, more than fifty equity shares of the public client minimize the equity shares of private sector, chances of profitability and investment tendency. Therefore, the selections of equity and risk levels in this conceptual model are reasonable in a way that can theoretically and practically measure.

X. Discussion

The results of the review showed Risk was ranked the biggest concerns with 17 collected numbers of sources. Then Equity was raked the second biggest concerns with 13 collected numbers of sources. Concession agreement was ranked the third biggest concerns with 8 collected numbers of sources. Law and regulation was ranked the fourth biggest concerns with 7 collected numbers of sources. Law and regulation, long concession duration and investment tendency were ranked the fourth biggest concerns with 7 collected numbers of sources. Therefore, equity, risk, concession agreement, law and regulation, long concession duration and investment tendency were the highest concerns of essential aspects and structures of PPP schemes; However, risk and equity are the measurable factors to be incorporated in this conceptual model.

The inclusion criteria in this study were limited to 112 papers relevant to PPP infrastructure schemes and PCP from 2001 to 2015. Extended number of collected sources to more than 112 papers and including longer duration might reflect more major factors with bigger number of collected sources on the result analysis of the study.

This research has identified two major factors, risk and equity, which will directly affect private sector assessments in any infrastructure developments. The data collection of the literature review, related to PPP infrastructure, indicated that the study results were valid.

XI. Conclusion and Further Work

This study focuses on PCP in PPP infrastructure schemes, highlighting the challenges and defining the different states of combined PCP. The defined states are the foundation of establishing how the degree of PCP affects the efficiency of asset delivery in PPP schemes.

The outcomes of this paper are valuable for the engagement of the public and private sector in implementing PPP schemes more successfully. This study is crucial in assisting and encouraging PCP and for identifying further investigations for PPP schemes.

In further studies, inclusion of more defined measurable factors, would improve the significance of any results obtained. The findings and a conceptual model of different levels of participation will help to establish crucial theories and practices for asset delivery in construction and to develop a conceptual framework for representing the relationship between PCP and asset delivery performance “ADP”. This relationship is critical for any PPP implementation. The conceptual framework decides the essential variables and factors and assumes the relationship between them. The conceptual framework allows for a number of factors or variables as well as an explanation of these factors or variables. It also demonstrates analytical context and explanatory way to the truth of general public.

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