Rationales and Advantages of Financing Infrastructure Through Public – Private Partnerships : A Systematic Literature Review

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Abstract

The procurement of infrastructure is a significant concern for developed and developing countries alike. To address the challenges of infrastructure provision, several countries are exploring the possibility of procuring infrastructure through public–private partnerships (PPPs). Against this background, the current study had a primary research objective of identifying the rationale and factors that support the implementation of PPPs as a means to build infrastructure. Further, the study also aimed to discuss the benefits associated with the PPP modality of procuring infrastructure. For this purpose, the present study relied on a comprehensive review of existing studies using systematic literature review method. Based on qualitative analysis of articles published during 2006 – 2020 using Quirkos software, the following four key rationales supporting the implementation of PPPs were identified: low quality of existing infrastructure, widening infrastructure deficits, market and non-market failures, and budgetary constraints of the governments. Further, the results highlighted that PPPs provide several benefits, including access to financial resources and expertise of the private sector, better risk allocation, efficiency gains, enhancement or value for money, cost-effectiveness, reliability, and timely infrastructure development.

Keywords : **public – private partnerships (PPPs), rationales, India, budgetary deficits**

JEL Classification Codes : E60, H54, O18, O22

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With rising population and urbanization, the demand for quality and resilient infrastructure is also increasing. However, the infrastructure supply is not adequate to meet this immense demand, leading to a massive infrastructure demand-supply deficit, which is expected to be USD 14.9 billion between 2016 – 2040 (Global Infrastructure Hub, 2017). Given the importance of infrastructure, it becomes pivotal to minimize the existing infrastructure deficits. However, several economies, both developed and developing, are unable to bridge this deficit on their own. Resultantly, many governments have shown increasing interest in alternate modes of financing infrastructure. One such infrastructure financing mode gaining significant attention worldwide is public–private partnerships (PPP). PPPs are being used by governments globally with the underlying objective of meeting the needs of the growing population.

The World Bank (2019) specifies that PPPs are long-term contracts between the private sector and the government. These contracts aim to provide an asset/service in which the risks are allocated to parties capable

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of handling them effectively. PPPs play a pivotal role in ensuring the provision of urban development projects (Cai et al., 2019). Keeping in view the potential of PPPs, "promoting effective public – private partnerships" is included as one of the Sustainable Development Goals (SDG 17) (United Nations, 2019). The thrust on PPPs has prompted countries to explore the collaboration between governments and the private sector through PPPs.

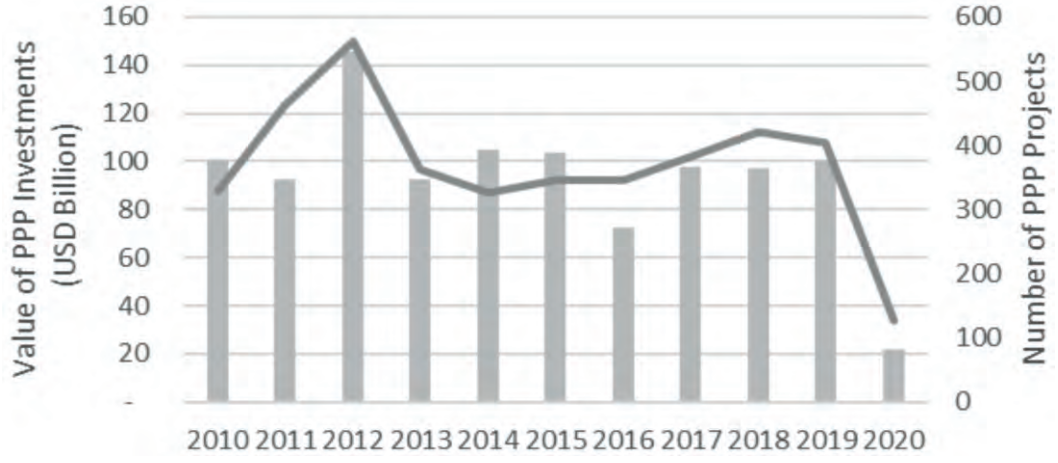
While PPPs are being looked at with renewed interest post the pandemic, at present, the number of countries using PPPs is limited. While some countries steer away from PPPs due to the complexities involved, several other countries are hesitant to use PPPs due to limited exposure to and understanding of the benefits of PPPs. While studies in the past have analyzed the successes, failures, and risk mechanisms of PPPs, not many studies have focused on identifying factors that support the use of PPPs. The current study has identified this research gap and has the objective of contributing to the relevant literature. The present study is one of few studies that focus on identifying factors that support PPPs' employment. The primary aim of this study is to identify the rationale and factors that necessitate the implementation of public – private partnerships as a means to minimizing infrastructure deficits. Further, the study also aims to discuss the benefits associated with the PPP modality. The study has two key contributions. The first contribution of this study lies in its methodology. The study has utilized systematic literature review as a methodology to identify the critical rationales of PPPs since it has a more explicit article selection process (Torchia et al., 2015). This ensures that relevant articles are taken into consideration for analysis (Wang et al., 2019). Second, the study aims to contribute to the scant literature focusing on the in-depth analysis of rationales and benefits of PPPs. This, in turn, will assist policymakers and governments in deciding when and in which situations should the procurement of infrastructure be through PPPs over the traditional procurement methods.

Notably, the COVID pandemic has unearthed substantial deficiencies in the existing infrastructure systems, specifically in the healthcare sector. In this context, the study has high relevance as the study's findings will enable countries to ascertain whether or not they should go ahead with the PPP route to build infrastructure in sectors affected by the pandemic.

Magnitude and Distribution of PPP Projects

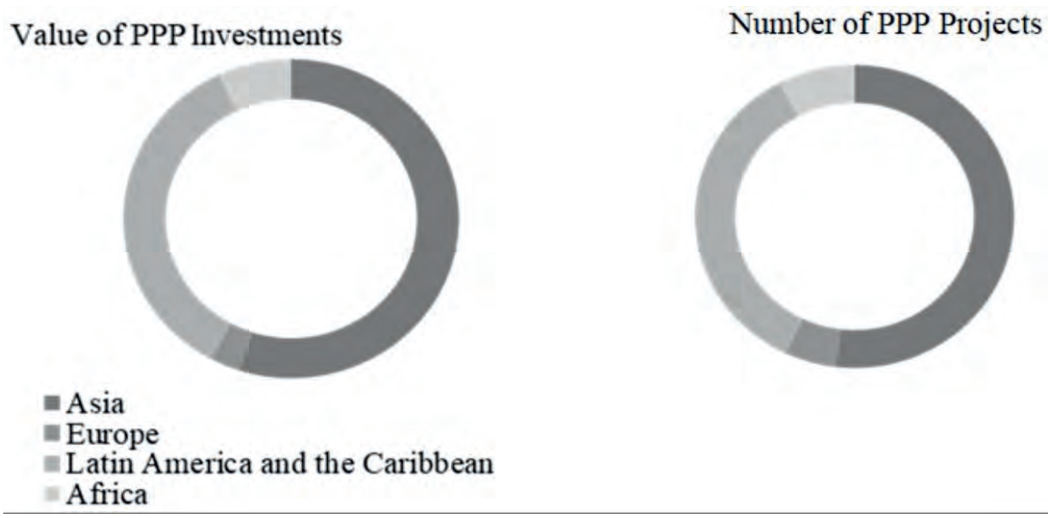
Figure 1 shows the trend of PPPs over the period from 2010 – 2020. Figure 1 shows that during the period, the

Figure 1. ***The Trend of PPPs During 2010 – 2020***



Source : PPI Database, 2019.

Figure 2. ***Regional Distribution of PPPs (2010 – 2020)***



Source : PPI Database, 2019.

value and number of PPP projects were highest in 2012, followed by a decline due to a fall in PPPs in Brazil, China, India, Turkey, and Russia. In Phase 4 (post-2016), the value and number of PPP projects witnessed a renewed interest in PPPs (Malik & Kaur, 2020b). The year 2020 witnessed a sharp decline on account of the COVID pandemic, which forced countries to halt the majority of their economic activities. The revival of PPPs post-2016 underlines the renewed interest in the PPP modality of infrastructure procurement and provision.

Figure 2 shows that during the period from 2010 – 2020, Asia emerged as the leading PPP market globally, in terms of both value of PPP investments and the number of PPP projects. Out of the total value of PPP investments, 52% were in Asian countries. Further, over the same period, Asia attracted 53% of the total number of PPP projects.

Given the relevance of PPPs in infrastructure provision, the current study has focused on identifying rationales and the benefits of PPPs that lead governments to enter into such contractual agreements.

Theoretical Framework and Literature Review

The present section discusses the theoretical framework leading to the widespread utilization of PPPs along with the review of literature that has studied the rationales of PPPs.

Theoretical Framework

PPPs gained significant attention in the New Public Management (NPM) reforms in the United Kingdom in the 1980s (Casady, 2020). The NPM suggested the provision of public services through collaborations between the private and public sectors. It was then that PPPs were considered a solution to fund infrastructure while benefitting both the public and private sectors (Rocca, 2017). Since then, PPPs have increased in popularity globally, with countries experiencing both success and failures in PPP ventures. Given that the concept of PPPs has been attracting increased attention globally, the present study aims to analyze the rationale for countries engaging in PPPs and the benefits associated with the PPP modality of procuring infrastructure.

Literature Review

Infrastructure plays a central role in propelling growth and development in developing and developed countries (Buso et al., 2017; Panda & Mishra, 2018). Infrastructure affects growth in three key ways. First, Malik and Kaur (2020a) highlighted that PPPs were responsible for directly boosting economic activities, including facilitation of trade, movement of people, goods, and services. This was achieved by the construction of new infrastructure and the upgradation of existing infrastructure. Second, Teo and Bridge (2017) stressed that the infrastructure leads to enhancements in productivity.

Further, continuous access to electricity and access to ICT infrastructure enable the efficient and effective functioning of manufacturing, retail, and financial services sectors, thereby leading to increased productivity. Last, Rosell and Saz - Carranza (2020) underlined that access to infrastructure facilitates amelioration of quality of life. Access to infrastructure systems such as education and healthcare lead to employment opportunities, better health, alleviation of poverty, and increased life expectancy, thereby increasing the quality of life.

Notably, as per Chou and Pramudawardhani (2015), governments sought PPP arrangements as an alternative based on the benefits they offered. PPPs provided governments with monetary resources, thereby mitigating financial pressure on the governments (Ramanathan, 2018). PPPs also offer the necessary skills, experience, and technological innovations to the project, which in turn improves the operational efficiency of the public assets (Jomo et al., 2016). Another advantage offered by PPPs is the sharing of risks appropriately, thereby reducing the burden of the project on the public party (Solomon & Aggarwal, 2020). However, concerns specific to PPPs also exist. For instance, issues such as monopolistic control of the private sector over public infrastructure, the efficiency of PPPs given the high costs of private borrowings, and the significant transaction costs associated with PPPs do not necessarily make PPPs a preferred modality for financing infrastructure (Vecchi et al., 2017; Wegrzyn et al., 2019). Despite these concerns, public entities encourage infrastructure funding through PPPs to bridge infrastructure deficits (Basilio, 2017).

Data and Research Methodology

The present article is a qualitative study. The data were collected from secondary sources. The methodology relies on the systematic literature review method to summarize and draw inferences from the extant literature on PPPs. The study has relied on the systematic literature review as a methodology since it has a more explicit article selection process in comparison to the traditional narrative methods (Shobha & Chakraborty, 2017; Torchia et al., 2015). This ensures that relevant articles are taken into consideration for analysis (Wang et al., 2018). The methodology used in this study is based on the work of Eshun et al. (2020). This review approach comprises four steps, as shown in Figure 3. Each of these is discussed hereby.

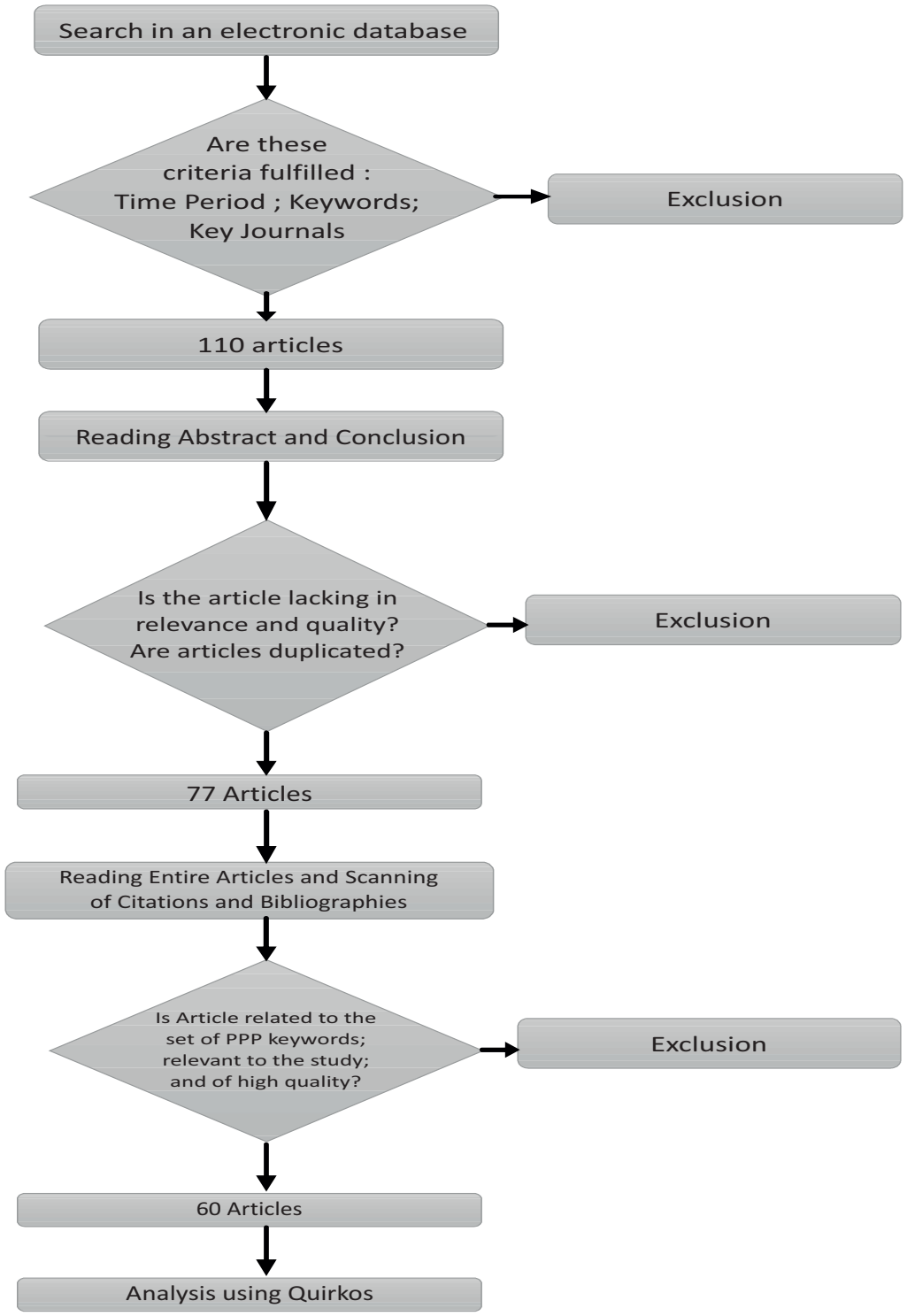
Time-Horizon

For analysis, the present study relies on the research articles and studies published between January 1, 2006 and December 31, 2020. While the studies on PPPs gained significant traction due to the New Public Management regime in the early 1990s, the reason for choosing 2006 was the study by Hammami et al. (2006) on the determinants of PPPs that led to further widespread attention to the area of research.

Database Selection

The present study has relied primarily on Scopus to comprehensively collect the research articles relevant for

Figure 3. ***Systematic Literature Review Methodology***



Source : Authors' depiction based on the study by Yong et al. (2019).

analysis. Specifically, only the Scopus indexed articles were considered for analysis. This ensured that only peer-reviewed articles were included for analysis, thereby maintaining the quality of the articles and the study.

Article Selection

The present study followed a systematic review procedure as summarized in Figure 3 and described hereby. First, only research articles in the English language were considered for the analysis. Second, select keywords were defined and used as search criteria in all the databases. These keywords were "Public – Private Partnerships," "PPP," "Private provision of infrastructure." All articles with the aforementioned keywords in the title in the selected database published during 2006 – 2020 were considered for preliminary analysis. The preliminary result revealed 110 articles. Next, the content of each of these articles was read to assess their relevance for the present study, and all the articles that discussed the advantages and rationale for engaging in PPP arrangements were considered. Post elimination of non-relevant and duplicate articles, 60 articles were finally selected for analysis.

Article Classifications

The articles selected were classified into two categories. While the first category comprised articles that discussed the rationale of PPPs in detail, the second category comprehensively discussed the benefits of PPPs.

Analysis

For the analysis of text and content amongst the selected articles, Quirkos software was used. This software enables the comparison of themes amongst multiple articles simultaneously.

Analysis and Results

General Description of Articles

The selected articles considered both developing and developed countries in their investigation. Figure 4 shows

Figure 4. ***Countries Covered by the Articles***

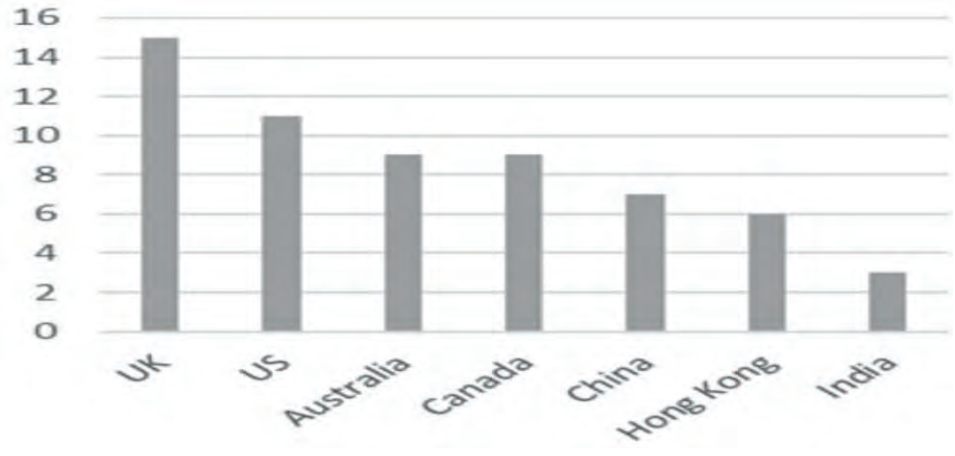


Table 1. *Journals of the Selected Articles*

Journal Name	No. of Articles	%
Public Money & Management	11	18.3
Public Performance & Management Review	9	15.0
International Journal of Project Management	9	15.0
Public Management Review	8	13.3
International Journal of Public Sector Management	8	13.3
Others	15	25.0
Total	**60**	**100**

the countries covered by the articles. The Figure depicts that majority of the PPP-specific studies have been conducted in developed countries such as the UK, US, and Australia. The reason for the adoption of PPPs in these countries can be justified by the fact that these countries have well-developed legal and regulatory frameworks in place. Among the developed countries, most of the studies focused on the UK primarily because it was one of the first countries to adopt PPPs (Wang et al., 2019). Further, studies have covered China and India amongst the developing countries, though the number of such studies is minuscule.

The analyzed articles were of English language, and Scopus indexed. Table 1 shows that more than 18% of the articles were published in *Public Money & Management*, which is a well-reputed public administration journal. This is followed by *Public Performance & Management Review* and *International Journal of Project Management*, both of which published 15% of each of the selected articles.

The selected 60 articles were classified into two categories: (a) articles that discussed the rationale of PPPs and (b) articles that discussed the benefits associated with PPPs. The results emerging from the analysis of these are discussed further.

Rationales for PPPs

This section presents the four rationales for engaging in a PPP arrangement emerging from the systematic literature review. Primarily, these are poor quality of existing infrastructure, infrastructure deficits, government constraints, and market failures. The rationales are discussed as follows :

(1) Poor Quality of Existing Infrastructure : High-quality infrastructure, as governed by well-built transport and telecom network, water and sanitation facilities, is central to a country's development and is essential for everyday life, along with access to education and health services. However, countries today suffer from infrastructure-related issues such as congested and poor-quality roads, bridges on the verge of collapsing, poorly maintained railway networks, under-equipped health and education institutions, and deteriorated sewage treatment facilities (Deloitte, 2020). These deficiencies act as a deterrent for harnessing the benefits associated with infrastructure.

Table 2 shows the rankings and scores of the top five countries with scores based on their quality of existing infrastructure as per the Global Competitiveness Index (GCI) for the years 2018 and 2019. The scores and ranks of India are also presented in Table 1 for comparison. The GCI ranks a sample of 141 countries based on the quality of physical infrastructure present in these countries. The countries are scored between 0 – 100. While a low score implies deficiencies in existing infrastructure, a high score indicates a better position of the country in terms of its infrastructure pillar. Table 2 shows that Singapore emerged as the leader in 2018 and 2019 based on its

Table 2. ***Global Competitiveness Index Ratings***

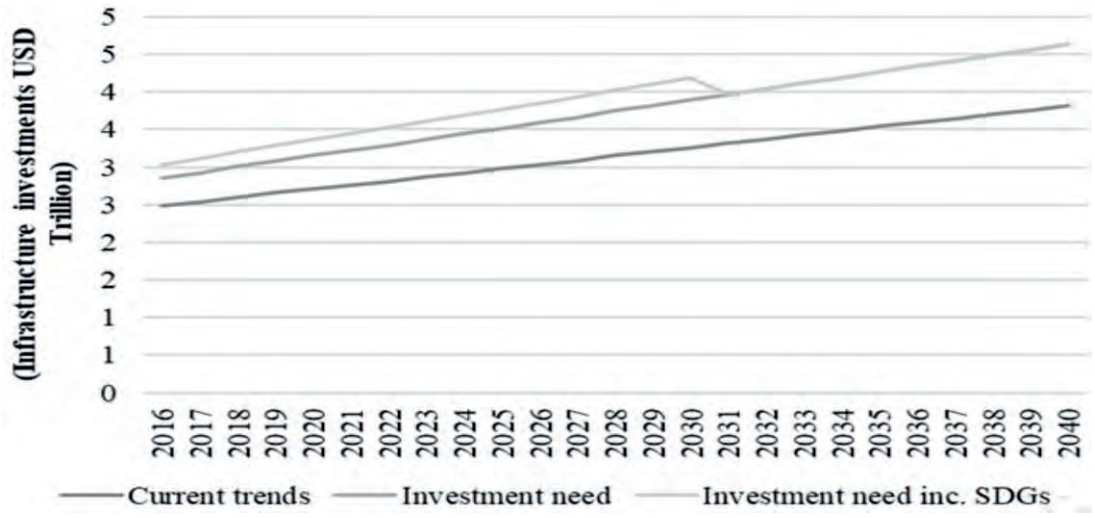
Country	2018		2019	
	Rank	Score	Rank	Score
Singapore	1	95.70	1	95.45
Netherlands	4	92.38	2	94.34
Hong Kong SAR	2	94.02	3	94.05
Switzerland	3	93.31	4	93.16
Japan	5	91.46	5	93.16
India	63	68.69	70	68.09
Global Average	0	65.23	0	65.40

Source : Global Competitiveness Index, 2019.

infrastructure quality. Singapore and Japan retained their ranks in 2018 and 2019 (1st and 5th rank, respectively), while the Netherlands improved its score. Notably, Hong Kong, Switzerland, and India witnessed a decline in their ranks. India's rank slipped substantially from 63rd in 2018 to 70th in 2019, indicating the deterioration in the quality of infrastructure facilities provided by the country.

(2) Infrastructure Deficits : Literature has highlighted existing infrastructure deficits as another factor propelling the use of PPPs as a modality to build the requisite infrastructure (Kaur & Malik, 2020; Osei-Kyei & Chan, 2017a, 2017b; Rosell & Saz-Carranza, 2020). Infrastructure deficit refers to the difference between the current infrastructure investments and the investments needed to meet the demands for infrastructure. The infrastructure deficit is a culmination of the poor quality of existing infrastructure and other factors such as growing population base ; urban migration ; and higher needs for transportation, water, energy, and

Figure 5. ***Global PPP Investment Needs***



Source : Global Infrastructure Hub, 2017.

telecommunications. With increasing populations and constrained government funds, infrastructure deficits are increasing globally (Malik & Kaur, 2020b). This rationale has been substantiated by the information provided in Global Infrastructure Hub (2017). Figure 5 shows that the total infrastructure investments based on the current trends will be USD 3.8 trillion in 2040 compared to USD 2.5 trillion in 2016. The investment needs (infrastructure deficit excluding SDGs) will increase to USD 4.6 trillion in 2040 compared to USD 2.9 trillion in 2016.

During the period from 2016 – 2040, the total global investment needs will be USD 94 trillion (3.7 % of the global GDP) and USD 97.53 trillion (3.5% of the global GDP) after accounting for investments needed to meet the criteria of infrastructure as per SDGs, indicating high infrastructure deficits. In this context, PPPs are being considered a modality to build infrastructure, as they can help obtain additional funding from the private sector.

(3) Government's Budgetary Constraints : Infrastructure investments required to meet the increasing infrastructure deficits are momentous (Wang et al., 2018). Infrastructure, traditionally, is publicly financed. However, many governments have clamped down or lack funds to finance infrastructure, leading to under-investments in infrastructure and unmet growing population demands (McKinsey Global Institute, 2016). One of the primary reasons cited for the inability of governments to meet such exuberant investments in infrastructure is the fiscal constraints of governments (Engel et al., 2010; Hammami et al., 2006; Kavishe & Chileshe, 2019). Several studies have shown a positive and strong effect of public debt on the government's inclination towards PPPs. Hence, while governments do discern the relevance of infrastructure in attaining their strategic objectives, due to their fiscal constraints, they limit their infrastructure investments. It is in this context that PPPs are considered as an alternative to traditional procurement (Engel & Galetovic, 2014). PPPs enable the private sector to fund the infrastructure requirement of countries, thereby allowing governments to utilize their funds for other policies/goals.

(4) Market and Non-Market Failures : The research articles considered for analysis also highlighted that market and non-market failures tend to lead to the adoption of PPPs (Almarri & Abuhijleh, 2017). Market failures arise due to a lack of Pareto Optimality in the process of allocation of resources. The infrastructure sector is prone to market failures related to public goods, externalities, and merit goods. In such cases, the government intervenes to combat the failures (Chileshe et al., 2020). However, at times, governments too can fail, thereby giving rise to the situation of government failures (Audretsch et al., 2019; Fleta-Asin et al., 2020; Teo & Bridge, 2017).

The presence of market and government failures indicates that the private sector and the public sector rarely have the resources to manage public infrastructure on their own (Bayliss & Van Waeyenberge, 2018; Wang & Zhao, 2014). In such situations, PPPs can be an alternate solution. PPPs play a pivotal role in such a situation. They act as an instrument to respond to market and/or government failure. PPPs combine the relative strength of government and private provision in a way that minimizes the risk of efficiency and promotes economic growth. It is expected to bring in the best of both the market and the government.

Key Benefits Arising from a PPP Arrangement

Literature has highlighted several benefits arising from PPPs. The same have been discussed below.

Alfen et al. (2009) initiated a serious sustainability discussion of these predetermined arrangements between governments and the private sectors. The authors highlighted that for these partnerships to be successful, PPPs should produce expected benefits for both the private sector firms and the government. The study lists down the following benefits of the PPPs :

(i) PPPs transfer part or whole of the total obligation of funding the project to the private sector ;

(ii) PPPs enable competition across markets;

(iii) PPPs enable the adoption of executive practices and experiences from private organizations;

(iv) PPPs deliver the mechanism to streamline public sector services through the implementation of private sector capital and expertise.

The World Bank Institute (2019) appreciated the role of PPPs in infrastructure by weighing through the following advantages of using the PPP modality :

(i) Full integration or "whole-of-life" costing of the infrastructure under the PPP contract acts as an incentive for the private party to complete the project in a way that leads to the minimization of the total project cost;

(ii) Since the private party, generally, receives its revenues after the construction of the project, the entire focus of the private party is on timely delivery of the project without experiencing any delays from within the private sector's management ; and

(iii) The opportunity for innovation is greater in a PPP contract due to the involvement of technical skills provided by the private sector.

Robert et al. (2014) provided a list of benefits of PPPs for infrastructure service delivery. As per the authors, PPPs lead to:

(i) The enhancement or value for money through efficiency, cost-effectiveness, reliability, and innovation;

(ii) The avoidance of direct capital and lowered management cost by the government;

(iii) The delivery of on-time and on-budget project lifecycle;

(iv) The reduction of budget deficiencies; and

(v) Innovation and timely infrastructure development.

Furthermore, Trebilcock and Rosenstock (2015) provided the following three advantages which act as motivations for governments in emerging markets to enter into PPP arrangements :

(i) The involvement of the private sector in the PPP project induces production of infrastructure with lower costs and risk involved for the public sector ;

(ii) PPPs enable the government in addressing the construction phase related concerns smoothly and quickly; and

(iii) PPPs act as a tool to meet the increasing infrastructure needs without hampering on-budget restrictions.

Kaur and Malik (2020) provided the following benefits associated with PPPs :

(i) PPPs provide access to private sector capital;

(ii) PPPs have better risk allocation. Such a partnership creates a unique feature of better allocation of risks by involved parties. This risk allocation is based on the player's comparative advantage and project characteristics; and

(iii) PPPs have efficiency gains: PPP contracts provide efficiency gains since the partnership emphasizes outputs and less on the inputs.

Fleta-Asin et al. (2020) posited that the PPP modality of financing infrastructure is gaining popularity based on the advantages that it offers. First, a PPP project allows the public sector to build infrastructure without burdening the already constrained budgets of the public sector. Second, the PPP arrangement provides the advantage of utilizing the best of both sectors in terms of skills, expertise, and innovations. These, in turn, lead to increased efficiencies. Third, because of the financial leverage provided by the private sector, the public sector can employ its financial capabilities on building alternate other areas such as policy making and implementation of other development programmes.

Chou and Pramudawardhani (2015) focused on the key benefits arising from a PPP-based arrangement. First, PPP allows the bundling of contracts compared to traditional government contracting, wherein the construction and operations are given as separate contracts. Such bundling leads to avoidance of any conflicts that may arise otherwise due to the presence of multiples parties. Second, PPPs aim to bring in operational efficiency of infrastructure assets since the private sector seeks to maximize profits while at the same time reducing costs. Third, PPPs assist in the formulation of unique risk-sharing arrangements, thereby relieving a single party from being burdened with all the risks associated with building infrastructure. In this context, the government's willingness to take demand risks reduces the uncertainties of future cash flows for the private sector.

Conclusion and Implications

The study's primary aim is to identify the rationales and benefits of PPPs through a systematic literature review. Based on the qualitative analysis of 60 papers, four broad rationales that motivate the employment of PPP arrangements are identified. These are (a) deteriorating quality of existing infrastructure, (b) global mismatch between needs and supply for infrastructure, (c) high budgetary constraints and fiscal deficits, and (d) the possibility of market failures. The study has also highlighted the key benefits arising from PPPs. These include leveraging private capital, better risk allocation, efficiency gains, and access to skills and resources of the private sector. Owing to these advantages, PPPs should be actively explored for the procurement of infrastructure.

The present study has implications for the private and the public sectors. Based on the finding that budgetary constraints are often cited as a primary reason for going ahead with the PPP modality, governments with limited PPP exposure that are facing high budgetary pressures should also actively explore PPPs as an alternative to public procurement. This will enable the governments to meet the increasing demands of the population without putting additional stress on their balance sheets. Further, based on the finding that PPPs can lead to better risk allocation, the private sector should explore PPPs since these projects will enable them to pass on appropriate risks (such as political risk and the risk of rejection of clearances) to the public sector. As opposed to fully private projects, PPPs can enable private parties to take responsibility for only those risks they can handle well, thereby minimizing potential losses and cancellations of projects.

Limitations of the Study and Scope for Future Research

The current study has a few limitations. First, the present study has considered the most recent articles since the analysis period is 2006 – 2020. Future studies can expand the time frame in order to enable the inclusion of articles over a wider time span for analysis. Further, the current study has covered articles listed in Scopus indexed journals in order to ensure that only peer-reviewed articles were considered. Future studies can include other databases as well for their analysis.

Authors' Contribution

Prof. Simrit Kaur and Sakshi Malik conceived the idea for the present study. Sakshi Malik conducted the process of data collection and performed the analysis. Prof. Simrit Kaur supervised the findings of this work.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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