Challenges of Financing Infrastructure Deficits Through PPPs : Lessons from Global Experience

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Abstract

Public – private partnerships (PPPs) are increasingly being used globally to bridge infrastructure gaps. PPPs leverage private finances with public funds, thereby meeting infrastructure requirements of countries. PPPs also provide advantages of improved service quality and proper risk management. However, literature posits that PPPs are characterized by the presence of an array of challenges, making such projects vulnerable to distresses and/or cancellations. For instance, during the period from 2005–2018, 76 projects were declared cancelled/distressed, out of which 17 projects were in India alone, that too in a single year, that is, 2012. Against this backdrop, the objective of the present study was to identify the critical challenges pertaining to the lifecycle of PPP projects to enable policymakers formulate policies which minimize the risk of distress in PPP projects. The research methodology adopted was to rely on multiple case studies of PPP projects that had experienced challenges across the three phases of their project life cycle. Phase-1 of the cycle, known as the *project development phase*, was prone to challenges such as insufficient bids, inadequate competition, and poor feasibility analysis. Select challenges arising in Phase-2, the *construction phase*, were land acquisition, delays, and cost overruns. Finally, in Phase-3, which corresponded to the *operational phase*, challenges such as market demand risk and lower than expected revenues existed. Primarily relying on PPP projects in the transport sector, case studies were selected from countries such as India, Ghana, and Australia. Based on the enriching analysis from 12 such case studies, the paper concluded by providing a broad policy perspective.

Keywords : **infrastructure, infrastructure deficits, public – private partnerships (PPPs), case study, India**

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Governments today are increasingly promoting public – private partnerships (PPPs) to fund infrastructure deficits, arising due to gaps between infrastructure demand and supply. Given the importance of infrastructure in economic and financial development, meeting these infrastructure deficits is a priority (Sharma & Sharma, 2017 ; Tripathi, 2015). Economies today are facing challenges to build infrastructure, owing primarily to budgetary constraints. In this context, PPPs provide recourse for leveraging private funds to build infrastructure and assist in the endeavour for attaining sustainable development goals. In addition to supplementing finance, PPPs offer other benefits as well. These projects avoid cost and time overruns when compared to traditional public procurement (Hammami, Ruhashyankiko, & Yehoue, 2006). They also lead to operational efficiencies and better risk allocation (Casady, 2020). PPPs also provide value for money due to

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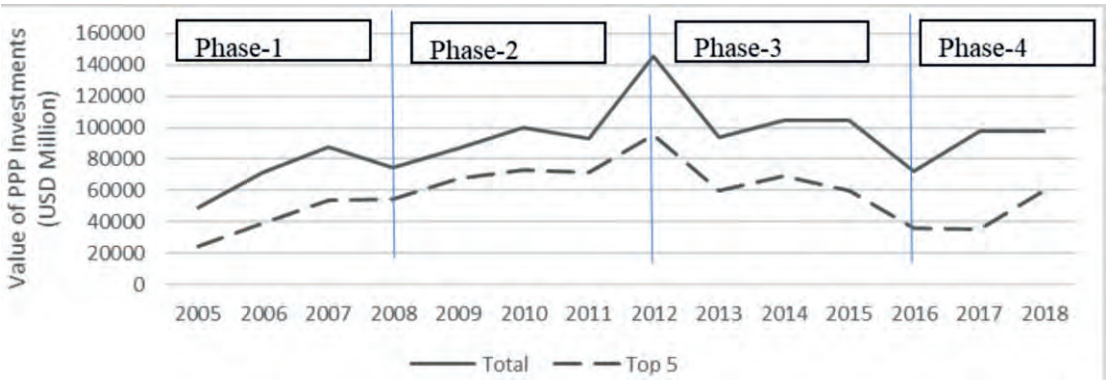
efficient risk handling and skilled staff, which focuses on timely completion of the project (Casady, 2020). Given these advantages, countries are exploring PPP options for bridging infrastructure gaps.

PPPs are long-term contracts between a private party and a government agency, "for providing a public asset or service, in which the private party bears significant risk and management responsibility" (World Bank Institute, 2017 p. 6). Notably, Brazil, China, India, Turkey, and Russia are the global leaders of PPP investments (Private Participation in Infrastructure [PPI] Database, 2019). For the period from 2005 – 2018, these five countries (referred to as the Top-5[1] henceforth) attracted close to 60% of the global PPP investments. Figure 1 shows the total PPP investment trends, along with the investments in Top-5 countries[2]. Based on the figure, four distinct phases are identified. During Phase-1 (until 2008), the total PPP investments and PPP investments in the Top-5 countries increased till 2007, followed by a decline in 2008, primarily owing to the global financial crisis. Phase-2 (2008 – 2012) experienced a revival in PPP investments with a peak observed in 2012, primarily due to an increase in PPP investments in the Top-5. The reasons cited for this spurt are availability of finance at lower interest rates and structural reforms promoting PPPs (World Bank, 2016).

Figure 1. ***PPP Investments of Global and Top-5 Countries from 2005 – 2018***



Source: PPI Database (2019).

In Phase-3 (2012 – 2016), a sharp decline can be observed in PPP investments in 2013 post the 2012 peak, owing primarily to variations in PPP investments in Top-5 countries caused by financial closures of few PPP projects. Though a marginal revival took place in 2015, it was followed by a further decline. The primary reason for this drop was lower PPP investments in Brazil and India (World Bank, 2016). In Phase 4 (post 2016), the investments witnessed a revival, highlighting the growing interest of countries in financing infrastructure through PPPs.

Despite the growing interest in PPPs, their implementation is mired in several challenges, sometimes leading to distress or eventual cancellations of the project. Figure 2(a) shows the total number of projects cancelled/distressed during the period from 2005 – 2018. As is clear from the figure, out of the total 76 projects, the majority were cancelled in 2012. Further, Figure 2(b) shows the regional distribution of cancelled/ distressed PPP

[1] A declining trend in PPP investments was observed in Brazil, Russia, Turkey, and India during 2005 – 2018. In contrast, an increasing trend in such investments was observed in China.

[2] Figure 1 shows that the total PPP investments and PPP investments in the Top-5 countries, in general, follow the same pattern, implying the critical role of Top-5 PPP investments in propelling the overall PPP investments. The correlation between the two is 0.889 (significant at 1%).

Figure 2(a). ***Total Number of Cancelled/ Distressed Projects***

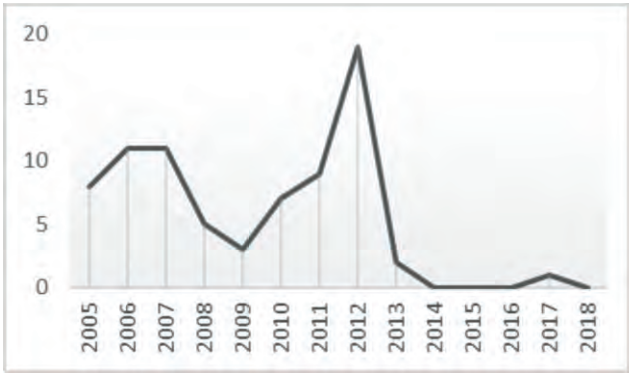
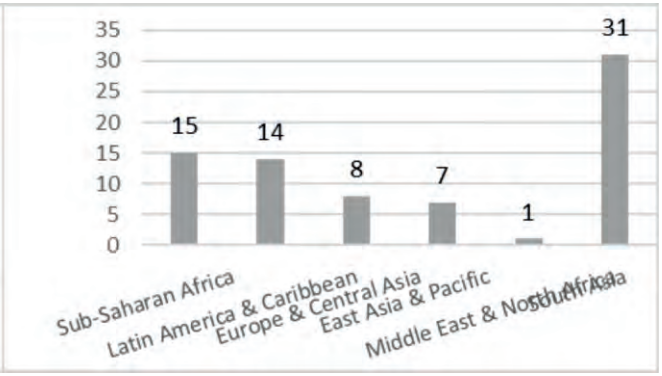


Figure 2(b). ***Regional Distribution of Cancelled/Distressed Projects (2005 – 2018)***



Source : PPI Database (2019).

projects for the period from 2005 – 2018. The figure highlights that out of the 76 failed projects, 31 were in the South Asian Region. Additionally, in South Asia, the maximum number of failed projects (21) was in India, and 17 of these were cancelled in 2012. Notably, both the maximum number of projects awarded as well as the maximum number of projects cancelled/distressed was in India. This is indicative of inadequate project feasibility analysis (in terms of aspects such as environment clearances and land acquisition by governments.

Various reasons have been cited as causes for the failure of PPP projects. In this context, Table 1 sheds light on the main reasons of failure for the 10 most recent cancelled/distressed projects (PPI Database, 2019). Select reasons for project cancellations/distress have been found to be financial scarcity, land acquisition issues, poor feasibility analysis, and delays in obtaining necessary clearances.

Notably, the failure of PPP projects adversely impacts the investors' trust, thereby reducing PPP investments. It,

Table 1. ***List of Cancelled/Distressed Projects***

	Name of Project	Country	Year	Status	Reason(s) for Cancellation /Distress
1	Cirebon-2 Coal-Fired Power Plant	Indonesia	2017	Distressed	Corruption, violation of resettlement and compensation clause of the contract
2	Tangerang Water Supply	Indonesia	2013	Cancelled	Change in contracts, demand risk
3	Maa Durga Expressway	India	2013	Cancelled	Lack of finance
4	L&T Great Eastern Highway	India	2012	Cancelled	Poor financial feasibility analysis
5	L&T East-West Tollway	India	2012	Cancelled	Land acquisition issues, lack of financial viability
6	Sankofa Gas Project	Ghana	2012	Distressed	Lack of finance, changes in the political party
7	Aurangabad Barwa Adda Expressway Limited	India	2012	Cancelled	Non-availability of environment and forest clearance
8	Birmitrapur Barkote Highway Private Limited	India	2012	Cancelled	Land acquisition issues, non-availability of forest and environmental clearances
9	GVK Shivpuri Dewas Expressway Private Limited	India	2012	Cancelled	Delay in achieving financial closure and obtaining clearances
10	Gurgaon Rapid Metro	India	2012	Cancelled	Poor feasibility analysis, overestimation of demand

therefore, becomes imperative to identify the causes of such failures with the intention of mitigating similar experiences in the future. In this context, the primary aim of the study is to examine the challenges faced during the lifecycle of PPP infrastructure projects, through select cases from across the developed and developing economies. In the present study, 14 cases have been analyzed, including a few listed in Table 1 (L&T Great Eastern Highway, Sankofa Gas Project, Gurgaon Rapid Metro) to understand the challenges faced by them so that appropriate policies can be formulated.

The study has pivotal contributions to the extant literature on PPPs. At present, the studies specific to the investigation of factors attributing to challenges in PPP project implementation are at their nascent stage. Further, the existing studies in this domain are primarily based on surveys or expert-interviews. In this context, our study is based on an in-depth and enriching case-by-case analysis of PPP infrastructure projects in sectors such as transport and energy. The cases scrutinized span across the globe, making the lessons learnt relevant for policy makers and private investors alike. It shall assist to enable them incorporate project-specific arrangements to mitigate chances of cancellation or failure of PPP projects.

Theoretical Framework and Literature Review

Theoretical Framework

Though collaborations between the public and the private sectors have been going on for decades, the term PPP was coined in the early 1990s, during the regime of Margaret Thatcher in the United Kingdom. PPP was a component of her New Public Management reforms (NPM). NPM called for private participation in providing services that were earlier considered to be the domain of the public sector. These partnerships aimed to achieve operational efficiencies by combining the best of both sectors (Casady, 2020). Resultantly, PPPs became a popular instrument for funding infrastructure. Over the years, PPPs have been used widely owing to the advantages of improved service quality, proper risk management, and project-specific innovations (Solomon & Aggarwal, 2020). However, these benefits can be best reaped only in cases where there are no delays and concerns such as land acquisition, poor feasibility analysis, political risk, and lack of finance are adequately addressed. Hence, this study aims to analyze the factors causing cancellations/distress in PPPs to enable policymakers in addressing them accordingly.

Literature Review

Literature posits that all PPP projects are characterized by the presence of an array of risks and challenges, making such contracts vulnerable to facing implementation delays and/or cancellations (Ameyaw & Chan, 2013). These challenges can either pertain to the macroeconomic environment or can be specific to the project conditions (Carbonara, Costantino, Gunnigan, & Pellegrino, 2015 ; Yu, Chan, Chen, & Darko, 2018). Further, these challenges may arise due to factors such as the long gestation period, the existence of uncertainties, and the number of stakeholders involved in the PPP contract (Wibowo & Alfen, 2015). Following the categorization by Carbonara et al. (2015), the PPP specific risks and challenges can be associated with the following three broad categories that affect PPP implementation during the project's life cycle:

(i) *Project Development Phase* : This is the initial stage of the PPP project cycle and involves challenges associated with the procurement and designing of the PPP project. Challenges and risks associated with this phase are related to conducting feasibility analysis, environmental concerns, issues concerning the preparation of the

sites, lack of skilled investors, insufficient bids, high financing costs, inadequate competition (Maslyukivska & Sohail, 2007), corruption (Hammami et al., 2006), and ill designing of the PPP contract.

(ii) ***Construction Phase*** **:** Challenges in this phase occur when the infrastructure is being constructed. Some examples are land acquisition issues, non-availability of labour, delays, frequent changes in designs, lack of availability of funds, and overrun of total costs (Bing Akintoye, Edwards, & Hardcastle, 2005 ; Wibowo & Alfen, 2015 ; Zhang, Sun, & Xue, 2019).

(iii) ***Operation Phase*** **:** Challenges in this category are specific to the stage when infrastructure is built and operational. These are risks arising due to low demand (market demand risk), overestimation of expected revenues, inability to repay debts, and interest rate volatility (Carbonara et al., 2015 ; Song, Hu, & Feng, 2018 ; Zhang et al., 2019).

The present study has identified select risks from the literature review in several PPP projects, and a discussion on the same is hereby provided.

Data and Research Methodology

The study has employed a theoretical approach based on findings from multiple case studies from across the globe for identification of the challenges faced with PPP projects. The underlying strengths of case studies are that they are most appropriate for exploring answers to the questions of "how" and "why" (Yin, 2014) of PPP failures. Hence, multiple case analyses using qualitative research methodology are considered appropriate for this study since providing such micro insights is not possible through quantitative research techniques (Rajasekar & Aravanan, 2011). For this purpose, the study has relied extensively on secondary sources of data such as reports, research papers, and newspaper articles. Resultantly, this is a novel study that provides comprehensive analysis based on deep insights from 12 PPP projects.

Analysis and Results

This section provides an in-depth analysis of 12 PPP projects and the risks and challenges faced by PPP parties across several countries during different phases of their project cycles. Primarily, our discussion pertains to three such phases :

(1) Challenges during Project Development Phase,

(2) Challenges during the Construction Phase, and

(3) Challenges during the Operational Phase.

Challenges During the Project Development Phase

Table 2 shows the list of PPPs and the specific challenges faced by them during the project development phase.

↳ ***Taiwan High-Speed Rail, Taiwan*** **:** Taiwan High-Speed Rail project was approved in 1990 and began its operations in 2007. The project faced significant challenges in raising financing required for the construction of the toll road, primarily due to the Asian financial crisis. While the domestic banks no longer had enough funds to

Table 2. ***Projects Which Faced Challenges During the Development Phase***

Project Name	Country	Issues Faced
Taiwan High-Speed Rail	Taiwan	Access to finance
Vizhinjam Seaport	India	Insufficient bids and environmental constraints
L&T Great Eastern Highway	India	Poor financial feasibility analysis
Bujagali Dam	Uganda	Environmental constraints
Sankofa Gas Project	Ghana	Biased contractual terms
Gurgaon Rapid Metro	India	Site selection, poor feasibility analysis

lend, the foreign banks refused to offer loans due to fear of the consortium's inability to pay back (Marotta, 2011). Resultantly, it took over a year (from the date of award) for the project to raise enough funds. Due to lack of sufficient funds, the PPP contract was ultimately cancelled. This illustrates the difficulties in sourcing long-term funding for infrastructural development in domestic markets with high infrastructural requirements (Ni, Chang, & Kao, 2016). In general, difficulties encountered in sourcing long-term funding for infrastructural projects have been attributed to the lack of depth in local financial and capital markets as well as the temporary downturn in economic conditions. These difficulties in accessing sufficient funds for infrastructure development often necessitate promoting PPP projects.

↳ ***Vizhinjam Seaport, India*** **:** The construction of Vizhinjam Seaport, initiated by the Kerala government, was central to the government's revenue drive due to the port's strategic location and ability to boost the State's commerce. The USD 65 billion project attracted adverse attention primarily due to its inability to attract sufficient bids, despite having two bidding rounds. When the third bidding process was initiated in 2015, only three private parties showed intent in bidding. Further, due to insufficient bids and lack of competition, the project was awarded to the sole bidder (Radhakrishnan, 2016). The decision was deemed to be in favour of the private party, since post completion of the 40-year concession period, the party would earn an additional revenue of USD 292 billion. Environmental constraints too dampened the spirits associated with this PPP project. Lack of environmental impact assessment studies raised several environmental concerns, such as its adverse impact on preventing high tides, thereby causing erosion of the coastline. Further, the fishermen affected were not compensated for the loss of their livelihoods (Bhowmick & Basu, 2019). Resultantly, the project is in a distressed state and has missed the construction completion deadline of December 2019.

↳ ***L&T Great Eastern Highway, India*** **:** This project involved widening the highway roads between the Maharashtra and Gujarat border. While the process of selection of the private party involved a competitive bidding process, the shortlisted party (L&T) communicated its inability to go ahead with the project construction, a year after the project was awarded (Projects Monitor, 2014). A glaring failure from the side of L&T was its inefficiency in conducting the initial financial feasibility analysis. The company did not take into account a possible increase in costs of input materials such as diesel and bitumen. After a year from the date of award of the project, the prices of the inputs went up, and the aggregate costs associated with the project increased, rendering the project financially unviable. Resultantly, L&T cancelled the project, citing financial non-viability as the reason (Larsen & Toubro, 2015).

↳ ***Bujagali Dam, Uganda :*** The Bujagali Dam, a pioneer PPP project in Uganda, is a 250 MW hydropower power plant that started its operations in 2007. The plant was built with the support of the World Bank on the river Nile.

Even though the project became operational in 2012, it is still marred with several issues reflecting poor feasibility analysis. Few of these are hereby discussed. First, the government invited bids to the projects without conducting geotechnical analysis, which resulted in a significant cost increase as the construction of the project led to flooding of the land surrounding the lake and rendering people homeless (World Bank, 2018). Second, the private party proposed initially that the project would produce 250 MW electricity. However, the actual production now is 121 MW, underlining critical lacunae in the public procurement process. Third, due diligence was not carried out to assess the environmental impact of the project. Resultantly, the land surrounding the lake was flooded (Irigoyen, 2017). Additionally, the project was also ridden with contractual violations. Further, as many as 8,400 people had to be relocated. Though they were promised financial compensation or resettlement, even by 2018, a significant proportion of the displaced population had not been compensated (Pilling, 2018). Further, the project did not address human rights violations (World Bank, 2018). For example, many of the workers who sustained permanent injuries in the project did not receive compensation until 2019 (Compliance Advisor Ombudsman, 2018).

↳ ***Sankofa Gas Project, Ghana :*** A pioneer PPP project in Ghana, it is supported by the World Bank. The project, which became operational in 2018 in the city of Abaodze, was built with the objective of providing natural gas to the city of Uganda for power generation (World Bank, 2018). The contract had the condition wherein the plant had to produce 180 million cubic feet (mmcf) of gas. However, production cap was fixed without conducting any demand analysis (Saulon, 2019). The demand for the city was only 120 mmcf. Resultantly, the excessive gas remained unutilized, thereby triggering the take-or-pay clause of the PPP contract. As part of this contract, the government promised to pay for 154 mmcf gas, in case there was no demand for the gas produced. This clause added to the government's fiscal burden, which depending on the demand, had the potential to increase the government's deficit by USD 28 million per month for the unused gas ("Ghana pays $28 million, not $40 million for take-or-pay gas contract – Energy ministry," 2019).

↳ ***Gurgaon Rapid Metro, India*** **:** The Gurgaon Rapid Metro was opened for public in two phases in 2013 and 2017, respectively. The project was built at the cost of USD 226 million. Within six years of its operations, the private partners expressed their inability to continue operations of the projects, owing to low revenues. The primary factor responsible for low revenues was cited as low ridership, which, in turn, was due to improper site selection (Bhatt, 2019). The metro route has been divided into two parts : Phase-1 and Phase-2. While the Phase-1 surrounds the office complexes in Gurgaon, Phase-2 is aligned along the Golf Course Road. Both these sites do not attract riders. This is because Phase-1 connects a very small stretch, and Phase-2 connects places that are not densely populated. Hence, the project was facing challenges of sustaining in the long run due to poor feasibility analysis and improper site selection ("Gurugram Rapid Metro is in trouble, here's why nobody wants to run it," 2019). Resultantly, the private party communicated its inability to operate and the government took over the metro's operations in 2019.

Challenges During the Construction Phase

Issues faced by the selected projects in the construction phase are listed in Table 3. Risks/challenges in this category occur when the PPP infrastructure is under construction. Select concerns could be pertaining to aspects such as: land acquisition, non-availability of labour, delays in construction of the project, repeated changes in the design of the project, inadequate availability of funds, and overrun of total costs (Bing et al., 2005).

↳ ***Delhi – Gurgaon Expressway, India*** **:** This expressway, presently one of the busiest routes, commenced its

Table 3. ***Projects Facing Challenges During the Construction Phase***

Project	Country	Issues
Delhi – Gurgaon Expressway	India	Land acquisition
Sankofa Gas Project	Ghana	Delays, political risk
I-4 Project	Florida	Delays ; cost overruns

operations in 2008. The project, built with an investment of 98 million, faced several delays, primarily on account of land acquisition issues (Ministry of Finance, 2018). Even though the National Highways Authority of India (NHAI) and other agencies directly involved in the project tried to intervene for speedy negotiations of acquisition processes, the concerns remained unsolved. The landowners of residential and commercial buildings were not willing to accept the government prices since these were substantially below the market price (Tiwari, 2015). Ultimately, the project suffered significant delays, as some sections of land were extremely difficult to acquire (Balachandran, 2013).

↳ ***Sankofa Gas Project, Ghana*** **:** The Sankofa Project, too, faced challenges during its construction phase. The project experienced significant delays in the construction of infrastructure that was meant to transfer gas from the wellhead to thermal plants of other cities in Ghana, particularly Tema (EIU, 2019). The primary reason for this delay was the change in the ruling political party, bringing to the forefront a debate pertaining to the necessity of the project. Delay also ensued because of unclear continued payment mechanisms. In fact, the project was not given a continuous stream of financial funds, breaching the PPP contract (EIU, 2019). This delay, in turn, led to insufficient funds to build the project. Resultantly, the additional gas produced remained unconsumed, the cost of which has been borne by the government.

↳ ***I-4 Project, Florida*** **:** The commencement of I-4 Ultimate Highway Project in Florida was initiated in 2015, with the objective of widening the existing Orlando highway (PFAL, 2016). The initial deadline for the project was 2021. However, the project encountered a delay of 271 days. As such, the project is now expected to become operational in 2022 (Spear, 2019). While the government has not shared any reasons for the delay, the private party to the contract cited reasons such as Hurriance Dorian, construction failures, and lane issues (since the tollway is one of the busiest tollways, closing the lanes for construction is an issue) for the delay (DeGood, 2019). Meanwhile, the project has already garnered the adverse attention of human rights activists due to the accidents and death fatalities during the construction phase. These accidents have been cited as an additional reason for the unexpected delay (Hazen, 2020). The delay in the project's construction has led to cost overruns of USD 125 million (Duke, 2020) and rendered the project in a distressed state.

Challenges During the Operational Phase

The challenges faced by PPP projects in the operational phase are listed in Table 4 and discussed herewith.

↳ ***Delhi Airport Metro Express Project, India*** **:** This was the first metro project to be implemented under a PPP arrangement in India (Asian Development Bank, 2013). The metro started its operations in 2010 after several missed deadlines. The operations of the metro were not profitable, owing to low ridership. In the proposal, the estimated expected average ridership was 46,000 passengers per day. However, the actual average ridership turned out to be only 9,000 passengers, much lower than expected. In fact, it was less than one-fifth of the initial

Table 4. ***Projects That Faced Operational Challenges***

Project	Country	Issues
Delhi Airport Metro Express Project	India	Overestimation of projected demand
Sydney Airport Rail Link	Australia	Contract violation ; low demand
Sydney Cross-Country Tunnel	Australia	Overestimation of projected demand
Gurgaon Rapid Metro	India	Inability to tender contract
Delhi – Gurgaon Expressway	India	Underestimation of projected demand

estimates in 2013, leading to severe operational concerns. In 2012, the private party (DAMEPL) served a termination notice to the public party (DMRC), stating its inability to run the operations. DMRC asserted that the termination was illegal and filed a legal dispute in 2013. In its appeal, while DMRC maintained that DAMEPL should pay for voiding the concession agreement by exiting the project, DAMEPL sought money from DMRC against bank guarantees invoking the agreements of the contract (Prasad, 2019). After going through several stages of arbitration (first with a single-member committee, followed by a three-member committee) and a lengthy dispute redressal process, finally, in 2017, the dispute was resolved in favour of DAMEPL. Despite the final decision, DMRC was delaying the payment of the arbitration amount, thereby prompting DAMEPL to go to court again in 2018. The case is still pending disposal (Ray, 2017).

↳ ***Sydney Airport Rail Link, Australia*** **:** This project was constructed in the wake of Australia's hosting of the Sydney Olympics in the summer of 2000. The project was estimated to cost USD 800 million (Darvish, Zou, Loosemore, & Zhang, 2006). Six months after the project officially opened in 2000, the operations of the rail line incurred huge losses. Resultantly, the Government of New South Wales had to bail out the private parties by injecting a sum of USD 34 million (Darvish et al., 2006). The primary reason for the loss was considerable shortfalls in revenue collections. The actual ridership was under 12,000 per day compared to the initial projections of around 48,000 per day. The reduced ridership, in turn, was attributed to the operation of a rival route (Eastern Distributor highway), which offered an alternative means of transportation on the same route (Baker & Nixon, 2006). Despite the contract between the public and private sectors regarding not opening the Eastern Distributor highway, the government violated this clause as the ruling political party had changed by then. Series of such events ultimately led to the private party (Airport Link) facing financial troubles, which, in turn, incited a dispute between Airport Link and the public party (RailCorp). While Airport Link blamed RailCorp for poor train schedules and cleanliness as causes of low ridership, RailCorp cited high train fares as the reason for poor revenues. This bitter dispute got settled after 5 long years, with the restructuring of the original PPP contract during the concession period (Newman, 2017).

↳ ***Sydney Cross-Country Tunnel, Australia*** **:** Another highly controversial PPP project in Sydney has been the cross-country tunnel. The project was valued at USD 51 billion. The construction of the tunnel began in 2003, and the tunnel became operational in 2005. As soon as this tunnel was opened, the alternative roads into the city were cut off (for traffic calming). This action led to anger amongst the motorists, who, in turn, chose not to use the tollway. The motorists also complained about a high toll charge for a short duration. Subsequently, the actual ridership was 34,000 compared to the estimates of 90,000 a day in 2005. Due to a lack of sufficient revenues to cover the costs, the project was terminated and sold to another party in 2013 ("Cross City tunnel sold to Transurban for $475m," 2014).

↳ ***Gurgaon Rapid Metro, India*** **:** This project has been facing severe issues due to low revenues. While the revenues were already low due to poor ridership, the private parties were unable to raise additional revenues from other sources, as the government did not meet its contractual obligations. The government promised to tender the contractual clauses that would serve the purpose of increasing ridership and provide additional sources of revenues (Bhatt, 2019). These included the allocation of parking spaces at metro stations, the arrangement of feeder and bus services, and approval for commercial development of land allocated to the rapid metro parties. However, the government failed to provide these services, and as a result, the private party was unable to generate revenues.

↳ ***Delhi – Gurgaon Expressway, India*** **:** This project is unique as it faced a higher than expected demand for its services. Regrettably, the project relied on ridership estimates calculated by the NHAI in 1998, the time of procurement of the project. At the initiation of the project, the authorities had estimated the traffic on the road to be between 13,000 – 15,000 cars per day. However, at the commencement of operations on the road, the number of vehicles plying the route was actually exponentially higher at 180,000 cars per day. Given that the initial estimate was a mere 15,000, the provision at the respective tollgates was accordingly designed to accommodate this number. As expected, the astronomical rise in car numbers overwhelmed the toll booths. The result was long queues at the booths and long delays along the route, which somewhat defeated the purpose of initiating the contract in the first place. Given the unbearable increase in travel time, fuel costs, and overall congestion along the route, the authorities had no choice but to terminate the operations of the concessionaire. This untimely termination led to a legal dispute, wherein the private party (DGSC Ltd.) maintained that the termination was illegal. After a two-year long legal battle, the dispute was resolved with the decision to demolish the toll and relieving DGSC from its financial and contractual obligations.

Conclusion and Policy Implications

PPPs have been receiving growing attention globally, given the financial leverage they provide in funding infrastructure. While PPP investments have been used to fund infrastructure globally since 1990s, they reached their peak in 2012, owing primarily due to high PPP investments in the top-five countries (Brazil, India, China, Turkey, and Russia). This peak was followed by a decline in 2016, resulting from low investments in the top-five countries. PPP investments have rebounded since the fall in 2016 and are on the rise again, underlining their global resurgence. Notably, several challenges encompass the process of PPP procurement and completion, leading to cancellations and distress in some PPP projects. During the period from 2005 – 2018, 76 projects were declared cancelled/distressed, out of which 17 such projects were in India in the year 2012 alone. The challenges faced by PPPs primarily pertain to three phases of the PPP project cycle.

Challenges arising in Phase-1, the project development phase, are insufficient bids, inadequate competition, and lack of feasibility analysis. In Phase-2, which corresponds to the construction phase of the project lifecycle, challenges such as land acquisition, delays, and cost overruns exist. Finally, select challenges arising in the Phase-3 of the project which relates to operation phase pertain to market demand risk and lower than expected revenues. Given that PPPs are complex contractual arrangements involving many stakeholders, it becomes pivotal to mitigate these challenges in order to ensure successful completion and operation of PPP projects. In this context, the primary objective of this study has been to examine the risks and challenges during the PPP's project cycle. By drawing cases from both developed and developing economies, the study has identified key barriers that are common to PPP projects, irrespective of their locations. The results are in line with literature that has emphasized inaccurate demand estimation, delays in land acquisition and clearances, and contractual violations

as hurdles to PPP project implementation (Global Infrastructure Hub, 2018 ; Newman, 2017 ; Song et al., 2018). Based on in-depth and enriching case study analysis, the following vital implications emerge pertaining to each of the phases. These are hereby discussed.

(i) *Project Development Phase* : Based on our analysis that environmental constraints and poor feasibility analysis are deterrents to PPP project development, governments should consistently work on making the pre-feasibility analysis more robust. In this context, lessons can be taken from Indonesia, which has detailed criteria requirements specific to economic viability as well as technical and site-related feasibility as part of its Infrastructure Guarantee Fund. Further, environmental clearances should be obtained from the concerned departments prior to the project construction phase.

(ii) *Construction Phase* : Our analysis indicates that land acquisition is a major concern that delays PPP implementation since many countries initiate the process of acquisition after the PPP project is procured. To address these issues, the process of land acquisition should be initiated in tandem with the PPP tendering process. Further, land acquisition policies should be framed, which clearly state the procedure for land acquisition and provide resettlement and compensation specific clauses. Lessons can be taken from India, which introduced such an Act (Land Acquisition, Rehabilitation and Resettlement Act, 2013) post the high failure rate in PPP projects in 2012, primarily owing to land acquisition issues. The Act is aimed at speeding up the process of land acquisition and ensuring fair compensation for the affected parties (Seetharaman, 2018). As a result of this Act, the land acquisition process for the Hyderabad metro was swift and the project planning phase ensured that majority of the metro area is built on government property, thereby minimizing additional delays (Kumar, 2017).

(iii) *Operational Phase* : Based on our findings that traffic-risk caused by overestimation/underestimation of demand is a deterrent to smooth operations of PPP projects, governments should put significant efforts in traffic forecasts. This will assist the governments in comparing traffic estimations made by them with the forecasts provided in bids, thereby eliminating speculative bidders. In this context, lessons can be taken from Turkey, which has mandated preparation of traffic study reports prior to the tendering of PPP projects. The report preparation process should involve independent advisors, and the forecast estimations should be calculated using both quantitative (sensitivity and scenario testing) and qualitative (traffic-risk index) statistical methods (Chao & Harris, 2016). Further, given the finding that PPPs are prone to contractual violations and lengthy dispute mechanisms, it is essential to set up Dispute Resolution Boards (DRB) for the entire timeline of the PPP projects as they provide advantages of swift resolution of disputes. In this context, the port of Miami Tunnel is a project which set up a DRB and held meetings at regular intervals, thereby successfully resolving disputes (Global Infrastructure Hub, 2018).

To conclude, it should be noted that though PPPs offer several advantages, they cannot be treated as a panacea. The government's commitment to PPP initiatives should not be driven by immediate gains, but instead be based on ideology of bridging infrastructure gaps and the attainment of sustainable development goals.

Limitations of the Study and Scope for Future Research

The current study comes with a few limitations. First, the current study pertains primarily to the transport sector (except Bujagali Dam and Sankofa Gas Plant). Future studies can conduct similar in-depth analyses for PPP projects specific to other sectors such as water and sewage, information and communication, and energy so as to investigate sector-specific causes of distress and cancellations. Second, the study has captured cases covering

Asia, Africa, Australia, and North America. Future studies can conduct similar analysis focussing on a particular country in order to enable formulation of country-specific policies that ensure project success.

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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