Construction Planning and Risk Management in Public-Private Partnerships Projects: A Global Perspective

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Abstract **- Planning is an essential and integral part of every construction project's successful execution and completion. The project's execution through Public-Private Partnership is the best way to make it successful, especially for high-cost projects. However, just by opting for a Public-Private Partnership does not make a project ultimately successful. The real challenge arises in identifying risks involved throughout the project life, and strategically dealing with them makes the project a complete success. This paper presents twelve famous Public-Private Partnership projects worldwide, along with the analysis of reasons for which they are successful or unsuccessful. In the end, this paper discusses the importance of construction planning and risk management in making the projects successful.**

Index Terms **- Public-Private Partnership, Risk, Construction, Planning, Projects.**

1.INTRODUCTION

This compendium presents case studies of twelve select Public-Private Partnership (PPP) projects in India and out of India. In India, the PPP tool kit came into existence in the 17th Century, 500 years ago. The case studies mentioned here aim to highlight PPP, Risk Mitigation and Identification Techniques, and Project Planning. The choice of case studies provides representation across different sectors, covers different PPP project structures, includes projects at different stages of the PPP life-cycle, and has projects with different complexity levels. PPP has advantages like Better Service, Means of Financing, Capital, and Operation Savings. However, PPPs' generic barriers in the Indian context are barriers to the Institutional level, Organizational barriers, and Project level barriers. The risks include PESTEL, i.e., Political, Economic, Social, Technical, Environmental, and Legal risks. These risks are taken into mitigation by two methods, Decisioneering (Probabilistic) and Managerial (Strategic) methods. The Planning comprises the project's objectives, sequence works, construction methods, planning of resources, preparing estimation, and durations of activities to bring about the project's satisfactory completion. Construction industry is highly risk prone, with complex and dynamic project environments which create an atmosphere of high uncertainty and risk. The industry is vulnerable to various technical, socio-political and business risks. The track record to cope with these risks has not been very good in construction industry. As a result, the people working in the industry bear various failures, such as failure of abiding by quality and operational requirements, cost overruns and uncertain delays in project completion. Risk management is a process which consists of identification of risks, assessment with qualitatively and quantitatively, responses with a suitable method for handling risks, and then controls the risks by monitoring (Mhetre et. al., 2016).

2. PPP PROJECTS IN INDIA

2.1 Alandur Sewerage Project: Alandur is a town in the Tamil Nadu state of India, situated 15 kilometers from Chennai. In the late 1990s, there was an increase in the rate of urbanization and demand for urban infrastructure services. Alandur was unable to cater to the demands, and the Mayor of the Alandur felt the genuine need to undertake this sewerage project since 1996. In 1990, most of the households had installed their septic tanks to treat the wastewater. In the middle of 1990, there was an overflow of the wastewater from the septic tank. So, there was a genuine need for the sewerage project. In February 2000, the Mayor signed a contract and asked the Tamil Nadu Urban Development Fund (TNUDF) to coordinate technical issues. The TNUDF formed a steering committee with representatives from multiple stakeholders. The

project consisted of two components, like preparing the sewerage network and installing the sewage treatment plant. In 1998, the consultant engineer designed a system, and the cost of the project was around 10 Million USD. Alandur municipal revenues were insufficient to cover the project cost. So, TNUDF decided to structure the project based on a combination of soft loans, grants, user deposits, and fees. The municipal council decided to undertake the project through Public-Private Partnership (PPP). Based on all the preparatory work, the steering committee and the municipal council have approved the project. More than 80 percent of residents could pay their tariffs but not willing to do so for the project. Therefore, TNUDF came up with a graded system of user charges based on the facility's plinth area. TNUDF was unsure of the fact that people would pay tariffs. So, to gain the people's trust, TNUDF formed a team consisting of the Mayor, municipal officials, and TNUDF representatives. The team crafted a message based on data to convince the residents to pay. The team, led by the Mayor, campaigned from dawn to dusk, conducted door-to-door visits, held meetings at street corners, met with resident welfare associations, and kept project documents open to scrutiny, crafted newsletters and press releases on the project.

The TNUDF helped to clarify technical and financial issues by creating a separate bank account under the name "Alandur municipality underground sewerage system." The Mayor formed a monitoring committee to monitor the account, which involved resident welfare association leaders. Residents were supposed to pay deposits along with the taxes to make the payments easy. These all efforts of the Mayor and the municipal council resulted in raising twice the money than expected. The winning bidder had to build the sewerage network on an EPC contract, Build and Operate the STP on a BOT contract. Alandur municipality guaranteed a minimum flow of sewage to the operator. The operators were paid based on the quantity of sewage treated, at a fixed rate subject to annual increase. The bid variable was a combination of the fixed price for the sewerage network and the lease period. So, the private operator had selection through the non- controversial process. The type of risks and their mitigation measures adopted are as shown in table no.1 below.

Sr. No.	Type of Risk	Mitigation measure adopted
1	Political (Citizen's willingness to pay) risks.	They have appointed a substantial project Champion.
2	Economic and Financial risks.	The Alandur municipality signed the minimum guarantee agreement concerning flow into STP.
3	Social risks	They had intense stakeholder consultations with citizens and resident welfare groups.
4	Technological risks.	Selection of qualified private contractors.

Table no. 1: Risk mitigation measures adopted in Alandur sewerage project

In this way, the Alandur sewerage project was successful. However, later, TNUDF left the project after awarding the contract; thus, the project ran into a problem. (Devkar. et al.; 2013)

2.2 Dabhol Power Plant Project: Dabhol is a place in the state of Maharashtra, India. In May 1992, the power secretary of India 'S. Rajgopal' visited Washington, D.C., to encourage foreign participation in the power sector. India was experiencing liberalization, and the power was state-owned. The performance of states and central power authorities were inferior. India was all set for privatization in power. The corporation named Enron Development Corporation (EDC) came to India. The EDC provided services in the natural gas industry. They focused on satisfying infrastructure and energy to encourage foreign participation in the power sector. Enron propose6d a BOO (Build-Own-Operate) project, a power station that would provide 2,015 MW of power in Dabhol. They chose Dabhol because Maharashtra was having a State Electricity Board (MSEB). Enron demanded the Power Purchase Agreement (PPA). Dabhol natural gas-fired combined cycle power generation project in the world. The financing for the power plant’s first 695 MW was complete in early 1995, and construction of the $920 Million facilities commenced, with commercial operation states starting by the end of 1997. Enron made the strategies to mitigate the risks, such as picking a state with a reasonably good power sector as state board is profitable, it was already generating close to 10,000 MW (12% of India's generation capacity), and the location was also close to a port. The type of risks and their mitigation measures adopted are as shown in table no.1 below.

They had almost mitigated risks from the project. The Dabhol Power Plant Project looked successful.

Sr. No	Types of risks	Risk Mitigation Techniques
1.	Economic Risks	Paid PPA with fixed and variable tariffs. PPA also took care of a rise in fuel costs.
2.	Exchange Rate Risks	Indian government mitigated this risk.
3.	Political Risks	Made the International Arbitration Clauses. State and Central governments gave sovereign guarantees.
4.	Construction Risks	They have experienced partners such as BECHTEL, G.E.

However, the saga unfolded, and BJP came to power in 1995. There were lots of nationalistic noises. The Advani said that foreign power giants need not dictate them. Then, the committee prepared a report on DPC, and as a result, the project got canceled in 1995.

Table no. 2: Risk mitigation measures adopted in the Dabhol power plant project.

2.2.1 The Reasons for Cancellation: The lack of transparency and competition, as there was no bidding process followed. Some clearances were ignored based on the fast-track nature of the project. The Enron costs Rs 4.49 Cr per M.W., whereas the other project costs Rs 3.6 Cr per M.W. The tariffs were too high, which costs more than Rs 5/KmH. Environmental concerns and World Bank reports were unaddressed.

Sr.No.	Clauses	Old Contract	New Contract
1	Power Tariff.	Rs 2.4/KwH.	Rs 2.03/KwH in Ph 1 and Rs 1.84 in Ph 2.
2	Capital Costs.	Rs 90.6 Billion.	Rs 64.2 Billion.
3	Ownership.	Enron - 80; GE - 10, Bechtel – 10.	Enron - 65; MSEB - 10%, GE, Bechtel – 10
4	Fuel.	LNG.	LNG and locally available Naphtha.
5	Environment.		Enron agrees to manage this.

Table no. 3: Revised contract of the Dabhol power plant project.

After this, Enron went to the International Arbitration. However, PV Narsimha Rao said the agreement is between Enron and Maharashtra Government and not with the Central Government. The government sued in Mumbai high court, challenging the validity of Arbitration in England. Due to this, the negotiations re-opened in late 1995. The panel of 6 experts reviewed the project and approved a revised proposal with significant changes in May 1996. The revised contract is as shown in table no. 3 above. However, still, there were criticisms like take or pay clause not changed. The government was not still bearing currency risks. The price was still a little too high. The LNG needed to import, and there were price volatility risks. (Bhushan; 2001). In June 2001, phase 2 was in progress. The MSEB defaulted on the project. The counter guarantees did not work. The recourse to arbitration started again. However, Enron wanted to go out of the project.

2.3 Vadodara Halol Road Project: Vadodara is a city in Gujarat state, India. Vadodara Halol Toll Road Company Ltd (VHTRL) was a special purpose vehicle formed by the Government of Gujarat and I.L. & F.S. to widen, strengthen, operate, and maintain the 31.7 km state highway. This formation was a flagship project under 'Vision 2010'; and a master plan of the Government of Gujarat. The modality adapted for this project was BOOT (Build Own Operate Transfer). Halol and surrounding districts were expanding industrially due to tax incentives. There was an alternative National Highway (NH8) with the length being 50km shorter and avoiding Ahmedabad's congested area. VHTRL appointed Punj Lloyd and IRCON International contractors for this project. The aim was to boost industrial expansion and local revenues of the districts. The total project cost was Rs. 161Cr. with Rs. 67.9Cr equity and the rest as debt. The Government of Gujarat approved the widening and strengthening of the existing two-lane roads and service roads as an inclusion. The total duration of 18 months for completion was available, and the project got completed four months ahead of schedule within the proposed budget. The World Bank designated the project as the 'best practice' example among India's projects for its risk mitigation strategies and social rehabilitation procedures.

The revenue generated from the toll was too low. A toll review was called for, which led to the formation of TRC; otherwise, the VHTRL may have to shut operations by 2003. The reason behind this was the economic recession that means the industrial growth

was less than projected. There was the withdrawal of sales tax incentives. Computerized RTO check posts and the penalty for truck overloading at the Gujarat border led to traffic diversion through Madhya Pradesh. The traffic diversion due to the ongoing construction of the Halol-Godhra segment. The traffic diversion through the service roads, which was for local traffic between villages. National Highway was running free, and therefore the traffic moved on the service road. The survey for this project was done only for one day. Outcomes: The VHTRL proposed to increase the toll of multi-axial vehicles, but TRC had concern as MAV constituted only 17% of the earnings. The TRC demanded O.D. data and traffic leakage probabilities. They collaboratively decided to examine the data on the toll collection of Narmada Bridge at Baruch. The VHTRL provided the breakup of toll revenue, O.D. profiles of MAV, category wise users, and toll collection data to TRC. The TRC expressed dissatisfaction as the data was of a day survey. They proposed an increase in toll around Rs. 40, Rs. 80, and Rs. 120 for three axial, four axial, and five axial vehicles, respectively. The projected revenue additionally was between Rs.7 million to Rs. 10 million with increased tolls. (Devkar. et al.; 2013)

2.3.1 Suggestions: The survey could be at different times, locations so that the survey sample size could be significant to represent a system. There could be toll restructuring, such as shadow tolling, which could be an attempt. There could be a revenue increase and provision of cameras on service roads. There could be a restructuring of agreements like the extension of concession periods.

2.4 Delhi International Airport: Delhi is the capital of India. In 1998, the Government of India (GoI) constituted a task force whose focus was developing the transportation infrastructure. Prime Minister announced five cities, among which Delhi was one of them. The construction of the world-class International Airports with the possible private sector and 100% foreign investments. Delhi was the most profitable airport and an essential gateway to India. Ministry of Civil Aviation (MoCA) swung into action to determine the project's mode of implantation. GoI approached KPMG, who recommended a 30 years lease period with private sector involvement. By January 2003, GoI approved the use of a privately led joint venture with shareholding by AAI and GoI as the long-term lease provided to the Delhi Airport in November 2003, and New Delhi won the bid to host CWG, which further accelerated the implementation of the project. The selection for bids was on technical presentations in which the winner was to match the reserve price set by AAI / MoCA if they bid higher. The bid score for technical evaluation was 75%, and the presentation was 25%. Consultants developed a Model Concession Agreement (MCA). Ten bidders had submitted, out of which nine were qualified for the RFP stage. A combined bidding process for both Delhi and Mumbai airports was in place. GRC raised concerns that a majority of the scores were subjective. In conclusion, the government was with GMR as the sole winner for both the Mumbai and Delhi airport projects. The cutoffs were low, and GMR had a choice to choose, and they selected Delhi. They had to match the reset best financial bid submitted by the other qualified bidders for that airport. The GMR got the project to agree that the AAI's gross revenue share would be 45.99% and formed DIAL. The equity sharing ratio between the JVC and AAI or other GoI entities was at 74:26. The JVC was responsible for airport management, AAI for communication navigation surveillance, air traffic management, and GoI for sovereign services such as customs, immigration, security. The lease was initially for 30 years and extendable to another 30 years on mutual agreements. The operator had to employ all existing employees for three years who can choose later. The tariff increase was on the CPI X formula on the airport's total asset base and traffic volumes during that period. There was a penalty of 2.5% of the monthly revenue in non-attainment of the performance standards. The JVC's upfront payment of INR 150 crores and 45.99% of the gross revenue had paid to the AAI. A three-fourths majority among the directors was required by the JVC to undertake corporate decisions. Matters such as a change in equity, JVC's business, disposal of a substantial part of undertakings, and winding up of the company need to vote from all the AAI nominated directors.

A lease Deed Agreement was signed between the JVC and the AAI to lease out the existing airport premises to DIAL. The lease fee was a token amount of INR 100 per year. State Support Agreement got signed between the JVC and GoI. GoI's responsibility is to grant the requisite clearances for the project and fix the tariff fixation formula. The State Support Agreement was

executed between the JVC and Delhi's state government to ensure assistance in encroachments and utilities. The Memorandum of Understanding got signed between the JVC and the regulatory agencies such as customs, immigration. The Airport Operator Agreement was between the JVC and the airport operator to set parameters and standards for the operation. This project completed its construction within the timeline committed. The 'Earned Value' technique was made use of to monitor project progress. DIAL claimed a 40% increase due to the increase in scope for creating a new Air Traffic Control tower and a new runway to recoup additional expenses. The development fee for a fixed period of 4 years from March 2009 was to levy. However, the Delhi High Court issued (D.E.) to implement in two stages due to protests. (Jain; 2015)

2.4.1 Suggestions: Mumbai and Delhi modernization projects could have been tackled sequentially rather than simultaneously. Contract flexibility should be increased, and care to impose practical limits on the extent of acceptable changes on these projects.

2.5 Tirupur Water Supply Project: Tirupur is one of India's textile hubs, generating as much as 90% of knitted garment exports. There was a genuine need for the Tirupur Water Supply Project because the textile industry is heavily dependent on clean water. In 1993, the Tirupur Exporters Association (TEA) approached the Government of Tamil Nadu (GoTN) to provide sustainable water supply. This project was the first PPP water supply project in India. The project estimate was of INR 12 Billion, which was way higher than what the government can spend. In 1996, GoTN, ILFS, and TEA came to form a Special Purpose Vehicle (SPV) called the New Tirupur Area Development Company Limited (NTADCL). After scrutiny by various government departments, the concession agreement was signed in 2000, allowing NTADCL to extract and treat 185 MLD from the Cauvery river. Rate of Interest (ROI) of 20%, concession period of 33 years (28 to 38 years flexible). Since on-time construction and international standards of quality were of high importance, NTADCL went for international bidding. International firms were wary of the externalities, NTADCL undertook, creating a contract document that would equitably allocate risks and ensure transparency. A consortium headed by Mahindra Realty emerged as the successful bidder (HCC, L&T ECC, and BenlWL. The debt-to-equity ratio was 1.5:1. NTADCL had poor prospects of gelling International funding because of India's nuclear tests and approached domestic lenders. ILFS and GoTN put up debt Service Recourse Fund of Rs 65 crores, and Water Shortage Fund by GoTN. The government had asked the contractors to redesign and reduce costs and revised INR 1023 crores (130 Cr less). The final agreement was signed in 2001 with Rs 45 per K.L. as an industrial tariff.

However, at the end of 2003, BenlWL exited due to the Dabhol issue. Wilbur Smith and Associates joined, and there was a need to ensure that the project was conforming to the agreement. There was a slight delay due to a school near STP, and the plant got relocated. The construction completed as planned within 30 months. Villagers started reacting water at low prices and steady supply for the industries at a cheaper rate (Rs 60 instead of 45). The industrial demand was lower than predicted. This scenario attributed to the global recession, stringent policing by TNPCB, and water reuse. Good monsoons, which led to small players shifting to this. NTADCL tried to reduce prices but could not compete with the FREE GW. There was the authority to regulate groundwater use for non-domestic purposes in the concession agreement but unenforced. The current Industrial Supply was 40 MLD and a breakeven of 60 MLD.

2.5.1 Challenges: There was initial skepticism on PPP because, at that time, PPP was a new concept. The off take of water from NTADCL was much lower than expected. There was a risk in the procedure of procurement. The challenges were redesigning and tariff setting. There were no International investors, which was the challenge in this project. (Saravanan and Velayutham; 2007)

2.6 Adyar Poonga Eco-Restorations Project: The Adyar Poonga, also called Tholakappia Poonga, was a unique eco-restoration project in Chennai's heart. Due to Chennai's rapid expansion, it led to a gradual degradation of the estuary and the creek and pollution in the river. The area had illegal encroachments both on the creek and the estuary side, contributing to polluting the ecosystem. This project progressed in two phases: 58 acres of restoration and other 358 acres of restoration (Sundaram; 2016). In 2003, the

Government of Tamil Nadu (GoTN) handed over the 58 acres in the Adyar creek area to Chennai's corporation for restoration. So, the Pitchandikulam Forest Consultants (PFC), TNRDC, and the GoTN were involved in brainstorming sessions over the park's conceptualization and Planning. The Eco-park would be a center for generating ecological awareness in the region, which showcase its diverse flora and fauna. By this natural formation, the park would also serve as a repository of information throughout restoring the environment and a vehicle for creating environmental consciousness among citizens. In December 2004, Chennai got hit by a tsunami. PFC used this time to understand Adyar's complete dynamics, including sewage and debris, dumping, and encroachment. The park got planned to develop through a 50:50 joint venture between the ACRT and D.C. For this, a Special Purpose Vehicle (SPV) called the Adyar Eco Park Limited.

The government changed in 2006 due to elections and were reluctant to continue the project to pressure from civil society and the insistence of the government's PFC and vital administrative officials. GoTN took up this project on a priority basis. In October 2006, Rs 100 crores set aside to restore the 58 acres Adyar creek, entrusted with implementing and managing the project to the Tamil Nadu Urban Infrastructure Finance Service Limited (TNUIFSL). Tamil Nadu created a new trust, 'Adyar Poonga Trust.' The Trusts Board comprising members from all the relevant government agencies and developments such as the Corporation of Chennai and the Chennai Metro Water Supply and Sewage Board (CMWSSB). The local encroachments got removed, and the people rehabilitated before the construction of the project. They protested against it but could not foster any support from the political party but were fairly compensated, and thus they finally agreed to move. The general NGOs, including the CAG, Environment Society of Madras (ESM), EXNORA, which was fighting for the restoration of the area, strongly suspected that the project was not right? Another attempt by the government is to carry out the area's developmental activity under the geological restoration. However, CAG argued that the park did not represent the restoration of the existing estuarial system, which was present before; it had long, diverse effects on the ecosystem and restoring only 58 acres, which could not protect the additional 300 acres of the estuarine system. A group by the name of Friends of Adyar Poonga (FAP) was formed by the Trust and the OFC in September 2007, using discontent and various stakeholders, which did an exemption of marketing the plan and gaining public support. (COELHO and RAMAN; 2010)

In January 2008, the high court allowed the Adyar Poonga Trust to go ahead with the project and approved its revised master plan. The High Court also ordered the setting up of a monitoring committee for the project. By this order, the committee was a representative from CAG. Indian National Trust for Art and Cultural Heritage (INTACH), EXNORA, and Care Earth environmentalists are independent monitors. In April 2008, the Adyar Poonga trust appointed PFC as the implementing agency for the project. Fifteen thousand tons of debris were removed; 100,000 saplings and 37000 reeds were planted to restore the creek. The project also involved intense coordination with government departments to the inflow of sewage, manage solid waste, and select the location of a dumpsite for restoration is removed from the park. This coordination was facilitated by the various agencies, including the Corporation of Chennai; CMWSSB was made part of both the Adyar Poonga Trust and the monitoring committee board. The park opened in 2011 with restricted access to the public. Phase 2 got continued, but problems with it were like rehabilitation of the people, which was not easy as they were already rehabilitation due to Chennai's tsunami. (ELLIS; 2011)

3. PPP PROJECTS OUTSIDE INDIA

3.1 Cochabamba Water Supply Project: Cochabamba is a town in the country named Bolivia, south-central America, since the 16th Century. The town consists of 500,000 inhabitants. The financial and economic status of the town was low. Due to the lack of economy, there was a problem with water and sanitation. The government of Bolivia 'SEMAPA' provided water for the public. The private trucks and other associates provided water to some areas. There was only 75 percent of urban water supply coverage in Bolivia and 36 percent of sewer connections. The water providers' financial status was weak since the tariffs covered operation costs but left no investment money.

In Cochabamba, only 4.7 employees worked per 1000 connections, which was more than twice as insufficient as the global benchmark. Only 57 percent coverage of water was unaccounted for, which means there were leakages and theft. There were 5 to 10 percent of illegal connections (no one paid tariffs), and only a few hours a week of water was available. There was also over-reliance on groundwater among the community. The poor people were paying more money and a more significant share of their income. As the efficiency of SEMAPA was low, they decided to enable PPP for the water supply project. In 1994, they created a private water regulator authority, "SIRESE," so that poor people need not pay very high. In 1997, they finalized the concession award procedure. In 1999, they passed the law of water and services, which had details on rights and tariffs. In this way, the stage was ready for privatization. They have also suggested lumping together their irrigation, water, and power project. However, the project did not start because people were not interested in the project, and risky. Therefore, in 1998, a revised concession agreement was floated again, and several parties showed interests. One party named 'AdT- Aguas del Tunari' submitted the only bid for this project, and the bidding process declared thanks and void. However, in 1999, SEMAPA negotiated directly with AdT and awarded the contract to them. So, they signed a concession agreement of 40 years with the project sponsor Aguas del Tunari and told them to look after the project's operation and maintenance. The tariffs went up to 35 percent initially in 1999 and then 29 percent in 2002. They have adopted Increasing Block Tariffs (IBT), due to which wealthier people had to pay more. AdT has received the opportunity to serve the expansion and coverage of targets that they had to meet. Later on, they have increased tariffs, and the residents were upset. Because of all these issues, there were widespread protests. There was a need to declare a state of emergency. The protest was so massive that the government needed to call the army and snipers to control the crowd. In this protest, shots fired, innocent people were found dead. That was the level at which the protest was too hot to handle. Within six months, the AdT canceled the concession agreement and handed it back to the government operator SEMAPA. (Bustamante; 2004)

However, the project failed. From 1990-1999 there were economic crises in Bolivia; only 4.2 percent of GDP growth took place. As a result, there was much disillusionment with privatization. The local people were against the fact that a foreign firm would charge for water. The exclusivity was a concern, as some of the water tankers and other providers had to go out of business. There was an average increase of 35 percent in tariffs under AdT, but only 10 percent of the poor's tariffs increment. The quality of water supplied was better, which led to more utilization and an increase in water bills, which the citizens did not like.

Sr. No	Problems	Cause of failure	Suggestions
1.	Social Inclusion and Transparency.	SSSB had no funds. AdT did not incline.	The integration of existing water providers could have been done.
2.	Independent Regulator.	Low tariffs and exclusivity clauses.	Tariffs could be raised by the government before privatization to counter the ideological protests. The exclusivity clauses could be re-thought.

Table no. 4: Causes of failure and suggestions in the Cochabamba water supply project.

Due to all these issues, farmers pre-emptively protested; wealthy residents had already built water infrastructure, and therefore did not want to forego this to buy water from AdT. The professional and citizen associations were not involved in the planning stage of the project. They demanded cancellation or tariff reductions. The government did not have funds to educate and campaign, and AdT was indifferent to the public. There were even more problems that the divisions within the government; the municipal allies were against privatization. The SSSB was not an independent regulator, so it could not set tariffs. It was forced by the government to go in for the project. So, due to these problems, the Cochabamba Water Supply project faced failure. (Helgegren et al., 2019). The causes of failures and suggestions are discussed in table no. 4 above.

The project seemed to have structured well with an innovative strategy like increasing block tariffs. It ensured that the poor did not suffer from significant tariff increases. However, a lack of political

consensus, social opposition, and an economic downturn led to the project's failure.

3.2 Montreal Olympics Complex Project: The Montreal Olympics Complex project took place in Canada. Canada wanted to build a stadium for the Olympics in 1976. For this project, the Planning was started six years earlier, in 1970. The initial cost for the project was $40 million. However, eventually, the cost went to $838 million, and the final product was lesser than what envisaged. Due to financial and constructability issues, the project met to failure. There were design issues wherein the final design was very complicated, with several constructability issues. There were irregular shaped structural elements such as the ring beam, ribs, façade. The low tolerances in the design-led to construction problems since precise construction were complicated. The ice formation in post-tensioning tubes in the winter led to delays in the construction process.

There were labor and material issues, and unionized labor went on strikes, and approximately 100 days were unproductive. Construction techniques regarding post-tensioning were new and required learning for the construction crew. Resources were scarce in terms of material and workforce, leading to procurement delays and cost overruns. Winter in Canada was not conducive to construction and led to delays. The initial schedule was unrealistic and led to spatial conflicts that were to finish on time; multiple crews had to work in the same area leading to overcrowding. This issue, in turn, led to reduced productivity. Planning could start a little earlier than in 1970 to mitigate a few risks. The price contraction affected project economics. The change of owner led to team failure. There was a breakdown in trust, adversarial relationships. The force of significant events, such as natural disasters, could slow down construction. Lack of labor and material resources due to macroeconomic conditions could lead to slippage of the schedule. Material procurement delays and supply chain problems could lead to late delivery of material on-site, thereby prolonging construction activities. Price fluctuations after the contract signing could lead to the destruction of construction economics. Sabotage and vandalism from local community activities and strikes could lead to rework and delays. The need for project planning and control was a must to mitigate the above risks. It was essential to use bar charts and critical path method (CPM), critical path monitoring, and earned value analysis. (Patel et al.; 2013)

3.3 Bujagali Dam Project: Bujagali is a place in Uganda. They gained independence from the British in the year 1962. The Major General 'Idi Amin' seized power in 1971 after many military coups. During his 8year reign, around 3 lac Ugandan were killed. The National Resistance Army seized control in 1986, when ‘Yoweri Museveni’ was the President. Museveni privatized many state-owned companies. During this period, the GDP fell from 9.2% (1993-1999) to 2.6% (1999-2001). The domestic power demand was growing at 7% per annum. For poverty alleviation, Museveni planned to build six hydroelectric projects in the Nile. Therefore, Museveni came into agreement with AES Corporation and Madhvani group, forming AESNP. AESNP had three options for this project, Kalagala, which was having high power generation with high environmental and social costs. Karuma, which was having low power generation, with low environmental and social costs. Bujagali, which was having medium power generation, with medium environmental and social costs. Therefore, they have selected the Bujagali fall to build the dam. (Irigoyen; 1994)

The estimated project cost was 582 million USD. The power plant had a 200 MW capacity and a 100-kilometer-long transmission line connecting the national grid. In this project, the World Bank offered help, and after evaluating options like a geothermal plant, they agreed with AES, without public explanations, to proceed with the hydroelectric plant. AES expected a rate of return (ROR) of 16% - 20%. After running in debt for 11 months, Ugandan Parliament and AES signed Power Purchase Agreement UEB, and AESP signed a contract for 30 years BOOT project. The environmental issues like the project had to adhere to specific social and environmental standards. The IFC commissioned 'Acres International Limited' to verify the credibility, and they concluded that hydropower is the most feasible option. The AES independently hired experts to do an Environmental Impact Assessment and developed an environmental action plan. The report of EIA said 14496 people would be affected, and 2236 people would be displaced. Water rafting might get halt; cultural properties might get disputed. (Kimbowa and Mourad; 2019)

The World Bank ordered to prefer Kalagala falls for spiritual and cultural values. AES agreed to minimize impacts and provide compensations and rehabilitation by holding several meetings with NGOs, cultural leaders, and residents. However, Save Bujagali Crusaders (SBC) and the National Association of Professional Environmentalists (NAPE) persuaded the World Bank to drop the project. The people were insufficient to pay the tariffs; the social and environmental concerns have not met. The bidding and PPA process was not transparent. Alternative options were not considerable. The project was too costly, and the feasibility analysis was flawed. IRN worked to help local opposition groups. They campaigned on their website and invited NGOs around the world to mobilize. Repeated letters were urging the World Bank to desist. IRN went to court to obtain PPA release and also convinced the World Bank to send an inspection panel to study the project. The Government and AES reviewed the work done; they were concerned with environmental issues. The Parliament approved the PPA and economic concerns. They realized that the foreign NGOs have not been to Uganda, arguing with incorrect information. The World Bank continued with the project because potential economic growth gains were very high. They scraped the project and investigated alternative energy sources to reduce the distribution losses and other poverty reduction programs. They continued with the project but asked AES to take environmental and social precautions and renegotiate the PPA. World Bank's inspection panel found several non-compliance regarding the environmental and social issues, and the project halted. The Ugandan court-ordered release of PPA in November 2002. The survey by NGO Prayas found the project to be a lousy deal economically for Ugandans compared to other projects. On 8th August 2003, AES announced withdrawal from the project. Later the Ugandan Energy Ministry puts the project out for a competitive bid and received five proposals. (Pottinger; 1999)

3.3.1 Suggestions: There should have been competitive bidding. Extensive examination and a debate on the PPA and contract arrangements with various stakeholders could be held. Other power options should have been openly evaluated.

3.4 Conoco Ecuador Oil Drilling Project: Conoco is a place in Ecuador, and now it is renamed as Conoco Philippines. The key players were Ecuador Government, local indigenous groups, the Conoco, and the environmental group. The role of the Ecuador Government is to maintain and improve oil revenues, diversify foreign investments. They were even addressing concerns of Indians and environmental groups. The local indigenous group's role was to look after whether the project's environmental impact on food chains, land rights, and cultural rights. They welcomed medical, educational facilities, jobs. Conoco's role was to increase the revenue by 4%, developing a 'Model Project' to gain a competitive advantage in such geographical areas. The environmental groups helped protect ecology and biodiversity, prevent oil exploration at all costs, and minimize damage & disruption resulting from oil exploration. (Southgate et al.; 2009)

Even after putting all these efforts, the Conoco Oil Drilling Project was not successful. The EMP took a meeting in Rio Napa with the NGOs. They went there with a massive thick report and asked the NGOs whether they have any points to restructure this project. This meeting with NSRC and C.S. was privately held in Rio Napa, but the memo got leaked. The Conoco did not indeed seek independent input, and the meetings were not properly facilitated. The Zone of Possible Agreement (ZOPA) was tiny, and most Huaorani was against this development. The environmental groups were very fragmented, and each had their views. Some environmental groups were opposed to getting funding. The scientific EIA seemed to be missing. However, later, the government permitted Conoco to proceed further legally. The government gave the following options to proceed. (Williams; 1972)

3.4.1 Option 1 to G.O.: Development outside of Yasuni National Park boundaries.

This option aligns better with tribunals and special interest groups. However, there were low economic rewards.

3.4.2 Option 2 to G.O.: Extend Government deadline, more participatory meetings, Block 16 as a pilot before Block 22.

This option was to restart participatory discussion in the right way and get all groups to contribute and buy-

in. There was a potential of a win-win situation, and there were economical & social gains. However, more money could be spent with little to show for it. Groups might continue to protest and stall projects. The delay and new EMP can affect project economics.

3.4.3 Option 1 to NO Go: Seek alternative Block for development.

Reputation will be built in less contentious areas and then come back to Block 16. It can continue to develop relations with SIGs that will help in Block 16, and some economic reputations will be gained. But there will be a loss of face. There will be a sunk of costs of $ 44 million. Block 16 may go to someone else. Other locations might have similar issues. But still, Conoco was unsure about the support of the Ecuadorian government. The other opportunities were beckoned. They faced conflicts with stakeholders; the top management decided to withdraw from the project.

3.5 Chad Cameroon Petroleum Development And Pipeline Project: Chad and Cameroon are the countries that are financially, socially, and politically unstable. The advantage of going for a Petroleum Oil drilling project was that the chad could be developed socially and economically. However, the risks were that they might misuse the funds on buying weapons for the wars. Due to this issue, the project sponsors were not getting the expected returns from the project. The oil was extracted from the Doba basin and exported to the Kribi. A total of 300 wells were constructed, and a pipeline of 1070-kilometers was constructed. The corporation finance system gave $ 608 M, the project finance structure of $ 321 M, and the total outlay was $ 929 M. The project finances structure created three Special Purpose Vehicles (SPV), Upstream Consortium, Chad Pipeline Company, and Cameroon Pipeline Company. This enabled the government to get revenue from the project. The incentives for the government were $ 270 M and $ 148 M, respectively. (Utizinger et al.; 2005)

The advantages of the project finance, in this case, they were sharing risks, the political risk mitigation by the involvement of host governments, the World Bank, and IFC. The advantage of corporate finance was that the lesser transaction costs due to the AAA rating, the sponsors were trying to blend both. The role of the World Bank was to appraise the project. They were ensuring the economic development of chad, the revenue management plan, and capacity building. They financed the project, thereby infused confidence in other investors. They were helping to mitigate political risks. The construction and operation risks were low, whereas economic risks were medium, and environmental and political risks were high. (Guyer; 2002)

The World Bank endorsed and funded the project because Chad desperately needed development. Most of the population was living on less than $1 and the resource-starved government, and there was high infant mortality. Apart from oil, chad had few alternatives. The project was commercially viable. The project structure was reasonably fair. The social and environmental risks were addressed. The document had 19 volumes, and several consultative meetings were held. The World Bank had a capacity building plan, and debt had shown signs of reforms. Chad was a despotic ruler, misused the funds, and expropriation risks were high. The investment was hazardous. Cameroon was having several political issues. Therefore, the players did not invest in this project. Also, RMP problems like lack specificity, how much money will be spent, and how much in each sector/region. The oversight committee had a majority of government members who were not potentially biased. The Enforcement mechanisms were poorly defined. (Keenan; 2014). There was an invasion of Sovereignty rights. There were other reasons like Chad returned later on in the project; due to some commercial risks. There was a potential for significant economic and social risks to occur. Later, the World Bank approved the project. The Chevron and Patrons paid Chad $ 25 M as agreed. The Deby spent $ 4.5 M military expenditures. However, World Bank dismissed Deby's action as an analogy and instituted an International Advisory Group headed by the Prime Minister of Senegal to monitor the RMP project. Deby re-elected in 2001 and amidst political controversy. (Marieme; 2010). In late 2005, Chad modified their Petroleum Revenue Management Law. The funds were directed towards security (war) and away from poverty alleviation. In January 2006, World Bank stopped assisting Chad. In June 2006, the World Bank and Chad government signed an MOU pledging 70% of poverty alleviation revenues. (Edward. et al.; 2008)

3.6 Cambodia Water Supply Project: 'Phnom Penh' is the city in Cambodia where a water supply project was

undertaken. "Ek Sonn Chan" was of Phnom Penh Water Supply Authority in 1993. The general director faced many issues for providing clean water to the citizens and came back after the Khmer Rouge regime by 1979. Moreover, after that, he knew that everything was destroyed. The Khmer Rouge's authority operated the water supply at Phnom Penh to some part of the city, but not the whole city. The treatment plant was partly in operation and not maintained. The distribution was completely abandoned. They had no technicians since all the engineers were killed. That was the situation in which they had to run the water supply at that time. Over 70 percent of the water was lost through leakages since the distribution system was ancient. However, in the meantime, people started making illegal water connections. The transformation from an empty city to a 700,000 people city took around three months. The most important thing was that the pipes were laid under the ground. The director and the team required the documents, designs, and drawings, but they too got destroyed. They had nothing but had a human resource with them. (Biswas. et al.; 2010). In 1993, Ek Sonn Chan called the management team, and the first reform in terms of human resources was to try bringing the young qualified staff, who wanted to work, and to which they will not say “No." The team was very frank with each other, and they were like a family. Their teamwork was so strong. The technical director Long Naro played a vital role in this project. The director of the Commercial department of this project believed that the poor people around this area are pleased to connect to the network because the water authority had a policy of paying in instalments.

After consultations, the community agreed to pay for connecting the city. Around 20 percent of the people had already got the water at a low cost from their system. The other 80 percent, who were the poor people, still did not get any water from the water supply. They had to buy water from different sources, where the price was very high. The rich had a water supply because they had money. However, the poor had to buy from others since they were depended on what they can afford. (Vanny. et al.; 2015). The authority could not install the network around the railway track because of the foundation and the fact that it was in use 4 – 5 times a day, also since the railway cars are quite heavy (30 tonnes). This can damage the foundation. However, the community had agreed that the network could be installed there. They tried to see the real situation of the water supply at the time. They had 24,000 customers. Only around 40 percent of those customers paid the water bills. They had to make a customer survey because they knew that many people had the connections, got the water, but they never had any bill from the water supply. In the meantime, some people never got water, but they still received bills from the water supply. Most of these old pipes had plenty of illegal connections. The water tariffs at the time were also very low. The income from the water supply at that time was just enough to cover 50 percent of the cost of the operation. They had a visit to individual houses and finally found that they had around 30,000 customers instead of 24,000. (Dany. et al.; 2000). They were not able to force the customers to pay tariffs. They had to send their people to have discussions and negotiations with their customers to convince them that the water could not be free. However, some rich people were not willing to pay. The director went door to door and told them that the water could not be free as they use more water; they have to pay more tariffs. Therefore, they have installed the water meter, and it will affect the customer's mind. The consumption was measured to make sure that they had to pay. The metering was done with the help of the benchmark. The second group was tough to handle. This group was of soldiers, military. These people were unwilling to pay, and the general director brought their forces and then disconnected them, which took around half a year.

Sr. No	Name of the project.	Status
1.	Alandur Sewerage Project.	Successful, but ran into a problem when TNUDF left.
2.	Dabhol Power Plant Project.	Unsuccessful.
3.	Vadodara Halol Road Project.	Unsuccessful.
4.	Delhi International Airport Project.	Successful.
5.	Tirupur Water Supply Project.	Successful.
6.	Adyar Poonga Eco-Restoration Project.	Successful.
7.	Cochabamba Water Supply Project.	Unsuccessful.
8.	Montreal Olympics: Complex Project.	Unsuccessful.
9.	Bujagali Dam Project.	Unsuccessful.
10.	Conoco Ecuador Oil Drilling Project.	Unsuccessful.

11.	Chad-Cameroon Petroleum Development and Pipeline Project.	Unsuccessful.
12.	Cambodia Water Supply Project.	Successful.

Table no. 5: Summary of all case studies

The collection ratio started from 70, 80, 90, and then it was reached 99 percent collection. After three years, they were able to generate revenue and were able to run the facilities. In this way, the project was successful, but sanitation was the major challenge to deal with later.

4. CONCLUDING REMARKS

The above case studies studied are just a bunch of examples to arrive at the conclusion that the PPP projects are very efficient in making the project successful. There are many other case studies around the world, which talks about the importance of PPP projects in construction projects. Also, risk management is an important technique which should be used to identify the upcoming risks in the project, and to deal with them successfully. These risks can be identified before the starting of the project, by spending more time on planning of construction projects, before starting actual execution. The time spent on planning determines the success of the construction project, i.e. the more the time spent on planning, the more clearly the risks involved in the project can be seen. Therefore, construction planning before the execution, and proper risk management plan by adopting PPP, will definitely ensure the success of the project, as seen from the above mentioned case studies. The entire summary of this article is as shown in the Table no. 5 above.

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