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The attraction of public-private partnerships for road construction in India, as affected by both positive and negative factors

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A B S T R A C T

The paper aims to pinpoint and assess the perceived advantages and disadvantages of the Public-Private Partnership (PPP) for road development in India. Main PPP project contributors in Indian PPP road projects were polled via questionnaire. A literature review was used to select fifteen favourable characteristics and thirteen unfavourable factors for the questionnaire. Descriptive statistical analysis is used to analyze the data that was collected. The elimination of government financial restraints, project cost and time management, the reduction of government funds committed to capital investment, improved maintainability and accelerated project development are the key positive characteristics that draw PPP in Indian road projects. Excessive participation restrictions, protracted negotiating delays, ambiguity surrounding government objectives and evaluation standards, a lack of employment possibilities, and a lack of experience and the necessary skills make PPP undesirable. Both the public and private sectors can benefit from PPP in various ways. All sectors must make decisions based on proper assessment criteria during the project development stage. The decision-makers of PPP projects benefit early on from thoroughly understanding both positive and negative elements.

1. Introduction

A fundamental requirement for meeting a country's development requirements is strengthening key infrastructure. Because it is more difficult to finance infrastructure, the Government needs to be able to meet these needs independently. The rationale for incorporating this challenge's support from the business sector is compelling (Gunjeet Kaur et al., 2009). PPP (Public-Private Partnership) is advised due to its power to close the funding gap in Government and the private sector's ability to build and sustain infrastructure assets (Akintoye et al., 2016). PPPs were valued by many countries because of these benefits, making them the favoured method of providing infrastructure services (Klijn & Teisman, 2000).

Many PPP initiative implementations have evolved by concentrating on several research features. The popularity of PPPs, in particular, has forced studies to shift from focusing on how to operate to how to increase the use of PPPs (Cui et al., 2018). Due to reductions in public support for infrastructure, early PPP adoption attracted investment from the private sector (PR) (Crosslin, 1991). It has inspired academics to create fiscal models to evaluate the viability and cost-effectiveness of PPPs (VFM). Further research revealed that PPP participants have opposing concerns (Reijniers, 1994). In order to adapt concepts to PPP procurement, organizational forms and procurement stages were explored (Zhang & Kumaraswamy, 2001). Observing the suitability, appropriateness, and needs of a successful PPP plan was all part of the current comprehensive PPP decision. Internal project factors like stakeholder satisfaction, VFM, and financial feasibility influence the applicability

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of PPPs (Cui et al., 2018). PPPs' ability to increase service quality in some infrastructure projects has been questioned. Because of proven sectoral characteristics (Flyvbjerg et al., 2004). UK PPP is appropriate for transportation and health (Eadie et al., 2013). Due to less delay, the UK's transportation industry produces more PPPs than the health sector (Henjewele et al., 2014). PPPs in the Indian transportation industry, according to Rajan et al. (2014), failed to reduce delays.

There are 5.5 million kilometers of roads in India. The GOI knows that substantial sector investments are required to accelerate economic growth. According to the Indian Government's Vision 2021, highway improvements will cost 82 billion USD by 2022 and 1.4 trillion USD by 2025. Transportation infrastructure was identified as a major impediment to financial development. Investment has increased dramatically since these initiatives. GOI needs tremendous funds to construct such a massive road industry. GOI's challenge is funding such enormous investments. Highway development in India surged about 250% in the last five years. Road development requires 56% private participation (Malek et al., 2016). Recent road sector experiences show that PR road project bids are very low. From 2005 through 2010, road development used the PPP model extensively, but after 2011, it declined. Only 16 of 53 road projects had PR bidders, and 6 had only one bidder (Malek & Akalkotkar, 2016a).

This article examines the pros and cons of PPP in Indian road projects. It then addresses the following research questions:

1. Do different respondent groups rate perception differently?
2. Does the ranking correlate with responder categories?

The report then examines positive and negative variables that make PPP in Indian road projects attractive. After that, the study's methodology is detailed, followed by a discussion of the results. The last part includes this research's analysis, conclusion, and limitations.

2. Literature Review

2.1 Background of Positive factors for PPP

The advantages of PPP are briefly covered in this section, as they have been by various authors. Why do governments worldwide use PPPs for public amenities and services? Infrastructure and public services require private investment. Although the public valued these services, employing government funding would put a strain on the state's finances. As a result, it offered the people the best means of obtaining what they required without paying the Government, and economic opportunities in the PR improved (Cheung, 2009). PPP has brought the UK, Australia, and US experience to growing nations like China, Brazil, India, and Ghana (World Bank Group 2016). UK private funding spawned PPPs. PPP used the cash-loaded public sector (PU) to overcome restrictions. Private companies fund most UK PPP initiatives (Hodge & Greve, 2010). Governments limit public borrowing due to government shortages and total PU debt, especially in emerging countries (Akintoye et al., 2016). Public facilities and assets also need to be improved. PPP is suitable since it may shed constraints. PPP can address expanding infrastructure demand and supply. PPPs have venture capital and innovative project finance, reducing public funding. The project's guaranteed revenues also reduce debt (DEA, 2015). PU and PR have valued it (Bain, 2009). International bank financing requires foreign professionals. PPPs integrate goods and facilities in various ways (HMT, 2012). PR is better in planning, finance, development, and operations, So by reducing delivery obstacles, PPPs allow the PU to concentrate asset and service output. When additional projects are financed, project funding relieves the PU of the need to invest in infrastructure. The PR uses user tolls to fund and reclaim investments (Bain, 2009; Cheung et al., 2010). PPPs are desirable because of the numerous reductions they offer. Competitive tendering lets the Government set the contract price. Because of its commercial emphasis and autonomy, PPP may quickly select inventive asset and service delivery models and check cost overruns (DEA, 2015). PPPs are known for solving time overruns that have overloaded conventional approaches. Timely project completion can generate benefits for PPP. In the Indian road sector, PPPs completed one km of roads in six days, whereas EPC took 16 days (Thillai Rajan & Deep, 2019). PPPs' public benefit influence is notable. The client has been known to use PPP to scale results rather than provide project parameters (HMT, 2012). Hence, the PR needs help to develop project-compliant goods and services. The project's buildability depends on the performance and quality of materials, equipment, and other resources (Ferguson & Takane, 1989). This simplifies project management when assets require design, development, operation, and maintenance (Eaton et al., 2006). PPPs have also transferred international technology to a local firm near the project through memorandums of understanding and win-win cooperative endeavours with local participants (Li et al., 2005). The Government may also use risk transfer to liberate itself by supplying project facilities. Execute within schedule and budget. PR risk allotment and PR bidding anticipate risk transfer benefits (Akintoye et al., 2016). The PR can complete the project on schedule thanks to PPP risk allocation and freedom. This will hasten project development by providing the PR with contemporary, effective resources and technical capabilities.

Hence, PPP reduces government administration and service delivery expenses (Cheung et al., 2010). The Government can easily create a project monitoring unit to monitor project results (Dolla & Laishram, 2018). PPPs also suffer from local change near the project. It provides economic incentives and peripheral resources (Li et al., 2005).

2.2 Background of Negative factors

This section briefly discusses PPP's drawbacks, as several authors have done. PPP received severe criticism. PPP affects the economy, institutions, transparency, future benefits, and procurement (Akintoye et al., 2016). Analysts said project liability is greatly reduced (Li et al., 2005a; Cheung et al., 2010; DEA, 2015). India's Central Vigilance Commission and Comptroller and Auditor General make conventional project procurement transparent (DEA, 2015). They share and report information efficiently. However, secrecy and decorum prevent the release of most PPP specifics (DEA, 2015; Lee et al., 2018). The fear of job loss and demotion also restrains the transfer of infrastructure delivery responsibility. In India, the Indian Airports Authority nevertheless faced resistance to airport growth and renovation (Malek & Akalkotkar, 2016b). Such worries are motivated by PR expectations for labour effectiveness, efficiency, and cost reductions. Because new operators may need help with development or operations in abandoned or unsuccessful projects, PPP initiatives usually rely on existing private participants. Due to this, ex-post transaction costs in the PU and PR opportunism are increased (Hodge & Greve, 2010). The public sector is disadvantaged by this. PPP initiatives have complex needs. Prospective contractors know this circumstance raises servicing costs. Contractors must spend on numerous sustaining types of research before submitting contracts to avoid excessive losses later in the project (Mahalingam et al., 2011). According to a large study, PPP bidding costs are greater than conventional ones (Patil et al., 2016). For a complex project, multiple private parties with varied knowledge must offer the bid, including costs. This includes corporate equity charges. Again, this affects the tender cost. Therefore, several PPP road projects have shown increasing end-user costs (Thillai Rajan & Deep, 2019). PPPs also take stretched to procure than standard project delivery techniques. Discussions and rules are included. Pre-contract negotiations take longer. PPPs cost more than conventional methods (Li et al., 2005a; Cheung et al., 2010; Patil et al., 2016; Lee et al., 2018). There are several reasons for this observation. Early in development, the PR makes large gains from unknowable risks. Compared to government borrowing rates, private financing costs are higher (Li et al., 2005a; DEA, 2010). Concern over the higher project cost has grown as the PPP model obtains more contracts (Flyvbjerg et al., 2004). Project size usually raises costs. Attacks often misrepresent project supporters' cost-benefit assessments (Flyvbjerg et al., 2004). PPP has a high termination ratio (Lee et al., 2018; World Bank Group, 2016). PPPs are typically criticized since many projects are abandoned before their concession term. Political ascendancy affects surviving projects most during procurement and bidding. It extends the time. Political consultation often continues after the project award (DEA, 2015). Because governmental officials need to understand PPP, its goals are often disregarded. PPP projects are long-term; thus, they require more understanding of contract mechanisms and assessment parameters to ensure competent bidder assortment (Li et al., 2005; Hodge & Greve, 2010; Mahalingam et al., 2011). Financial, legal, and technical advisors' differing mindsets lead to inefficient objectives and evaluation standards. Private contractors must be competent in long-term financing, activities, and maintenance. Due to tight involvement standards and lack of expertise, only some actors may bid on PPPs (Li et al., 2005; Hodge & Greve, 2010; Lee et al., 2018).

2.3 Indian Scenario in PPP road projects

The GOI has big ambitions to improve the internal road network. PPPs empower PR participation to improve development, operation, and maintenance. The Ministry of Road Transport and Highways (MoRTH) would invest 918.23 billion USD in 2020–2021, 11% more than in 2019–2020. Significant efforts have been made to increase interest in large infrastructure to address the nation's framework shortage. Since 2004, a few efforts have been taken to lawfully and PPP-enable PR infrastructure investment. The tenth five-year plan period, from 2002 to 2007, saw an increase in infrastructure. In order to encourage private investment in PPP road projects, the GOI declared several policies. For PPP road projects, the GOI has sanctioned up to 100% FDI and up to 40% financial assistance to boost project viability and draw domestic and international investors. Involvement of the PR was estimated to increase from 5% in the 10^{th} five-year plan to 34% in the eleventh and 40% in the twelfth. From 2002 to 2007, infrastructure investment rose from 5% to 7% of GDP due to 36.6% of PR participation. Nevertheless, this energy was unsustainable and fell to 5.6% of GDP in 2013–2017 (Malek et al., 2020). In recent years, infrastructure financial improvement assessments have somewhat offset the slowdown in PR speculation. To maintain infrastructure investment in the next five years (2017–2022), infrastructure spending must increase to 652.31 billion USD. This is needed for the Government to act quickly and lawfully to employ PR cash and control infrastructure projects economically. Hence, during 2004–2012, India saw a surge in PPP project grants as the administration established a framework for a methodical PPP structure by developing norms and institutionalizing PPP project records. 1539 PPP projects have been approved in India, according to the Ministry of Finance. Almost half of the projects are working; the rest are rejected or in various execution phases. Roads represent 58%, power 24%, community and business infrastructure 9%, and water and sanitation equalization 8% (Malek et al., 2020). Still, a critical granted projects count in 2004-2012 neglected to deduct, and the private sector speculations saw significant decay afterwards, further soiling India's PPP desire. Given India's confederate structure, absence of a unified PPP approach, and nationalized PPP setup, the PPP structure in India varied. State governments completed 68% of projects, while the national Government completed 32%. This emphasizes the importance of state-level arrangement and administration for Indian PPP success. Based on PPP projects, Maharashtra, Gujarat, Rajasthan, Karnataka, and Madhya Pradesh are ahead of Uttar Pradesh, Tamil Nadu, and Punjab. Some state governments have developed policies and mechanisms to streamline PPP projects.

NHDP started PPP on Indian roads. As it tested, Phase I and II NHDP projects were granted under PPP, and most were EPC. NHDP Phase III will increase PPP procurement. Phase III awarded 107 PPP projects. The ministry and Planning

Commission require 85% of later projects to be implemented on the PPP approach. Over the past few years, the GOI has taken significant steps to strengthen the PPP mechanism and enable the Indian ecosystem by proclaiming a few strategies. To electrify the PPP system, uniform tendering and concession agreement, India Infrastructure Finance Corporation Limited (IIFCL) in 2006, Public-Private Partnership Appraisal Committee (PPPAC), India Infrastructure Project Development Fund (IIPDF), and Viability Gap Financing were implemented (VGF). In 2010, 58 projects remained after the 2008 global financial crisis (Malek & Akalkotkar, 2016). Along with that, GOI also formulated rules for new inventive PPP methods, taking into account the surviving risk expectation and financier desire, such as adapting government-funded road projects costing 4.64 billion USD using the TOT (Toll Operate Transfer) model and extending and building more than 60 road projects under HAM (Hybrid Annuity Model). Using TOT and HAM PPP modes, GOI has effectively taken control beyond project usage risk and recovered the interest of PR and financial institutions in road sector PPP projects. The GOI now allows untied PR exits for reinvestment in new initiatives. Further steps include the establishment of NIIF (National Infrastructure Investment Fund) to transmit overseas institutional assets within infrastructure; correction in the Arbitration and Conciliation Act, 1996 to make dispute settlement savvier and time-limited; entry of PPP in new metro strategy; 27.53 billion USD plan to recapitalize government banks to restore bank-loaning and assist the Government with pushing through changes in parts that need it. These measures have greatly improved moping and newer extensions. Infrastructure groups, particularly airports and roads, are improving their finances and operations. The EODB World Bank placed India 100th out of 190 countries for outstanding performance, up from 130th a few years before. Even with the work done, more is needed. The Government must take more deliberate steps to revive the good PPP system and strengthen PPP execution capacity in government entities. To ensure replicability, GOI must expand PPP navigator projects and update or change Model Concession Agreements (MCA). PPPs are the best way for governments to stimulate private infrastructure investment. PPPs are long-term PR-PU partnerships that combine finance, development, operation, and maintenance. If the project is complex and vast, a PPP system can legitimate monitoring and transaction expenses and deliver VFM to the Government by considering the project's life cycle cost (Malek et al., 2020). The literature identified factors determining the desirability of PPP for road projects. Table 1 lists this study's factor summary.

Table 1
List of Positive and Negative Factors

	Positive Factors	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
P1	Resolve Government's financial constraints	*		*		*	*	*	*	#	#
P2	Enhances government-integrated solution capacity	*	*	#	*	*	*		*	*	
P3	Reduces government funds tied up in capital investment	#		#		*	*	*	#	#	
P4	Cap service cost	#	*			#	*	*	#	*	
P5	Private sector's skills and experience	*	#	#		*	*	*	*	*	
P6	Minimize total project cost.	#					*		*		
P7	Project cost and time control	#	*	*			*	*	#	*	*
P8	Risk transfer to the private party	*		#		*	*	*	#	*	*
P9	Reduces government administration cost	*				#	*	*	*		
P10	Promote local economic development.	*				#	#		*		*
P11	Improve buildability	*				#	*	*	*	#	
P12	Improve maintainability	*					*		*	#	
P13	Enhances technology transfer to the local enterprise	*	*				*	*	*	*	
P14	Non-recourse financing	*		*		*	#	*	*	#	
P15	Accelerate project development	#	*			*	*		*	*	
Negative Factors		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
N1	Reduce project accountability	#		*	*				*	*	
N2	High risk relying on the private sector	*		#	*		#			*	
N3	High rates of aborting projects before the contract	*	*		*	#			#	*	
N4	Lengthy delays caused by political debate	*		*	*	*	#	#		#	
N5	This leads to higher direct charges to users	*		*	*		*	#		#	
N6	Fewer employment opportunities	*		*	*				*	*	
N7	High participation costs	#	*	*	*	*	#			*	
N8	High project costs	#			*			#		*	
N9	More time spent in contract transaction	#		*	*	*		#		*	*
N10	Lack of experience and appropriate skills	*		#	*		#			*	
N11	Confusion over government objectives and evaluation criteria	*		#	*	*		#		#	
N12	Excessive restrictions on participation	#		#	*					*	#
N13	Lengthy delays in negotiation			*	*	*		#	#	#	

* Represents research has indicated with analogous terms; # represents research has been evaluated in a vast sense. Reference: (A) Li et al., 2005; (B) Eaton et al., 2006; (C)Bain, 2009; (D)DEA, 2009; (E)Hodge and Greve, 2010; (F)Cheung et al., 2010; (G)HMT, 2012; (H)Robert et al., 2014; (I)DEA, 2015; (J)Akintoye et al., 2016; (1) Li et al., 2005; (2) Eaton et al., 2006; (3) Hodge and Greve, 2010; (4) Cheung et al., 2010; (5) DEA, 2010; (6) Abdul-Aziz and Jahn Kassim, 2011; (7) Mahalingam et al., 2011; (8) HMT, 2012; (9) Ismail and Haris, 2014; (10) Lee et al., 2018.

PPP projects, especially road construction, involve multiple stakeholders with different skills. The project must be economically viable to cover such costs. The literature analysis showed that earlier research targeted infrastructure development using the PPP strategy and tried to identify as many aspects as possible that contribute to PPP project success. The Indian Road industry needs much investment; thus, evaluating positive and negative variables for project performance is important.

These elements' impact on respondents' impressions of PPP road projects is the issue to be investigated. Indian questionnaires examined this issue.

3. Methodology

This research is exploratory. It examines PPP's good and bad effects on road infrastructure in India. This research uses literature, the internet, case studies, expert interviews (to validate identified factors), and questionnaires to gather data.

3.1 Sample plan

The Road and Building (R&B) department, Gujarat State Road Development Corporation (GSRDC), and National Highway Authority of India (NHAI), as well as developers, contractors, and consultants in India, are the target population for the Indian PPP road projects.

3.2 Questionnaire survey

Quantitative data analysis of large samples is easy with a questionnaire survey. This method is popular in social science and management research (Akintoye & Macleod, 1997; Bing et al., 1999; Kangari, 1995; Hartman & Snelgrove, 1996; Shen et al., 2001; Thomas et al., 2003). Questionnaires offer wider geographic coverage, reduced prejudice, anonymity, and low cost (Nachmias & Nachmias, 1981; Thomas et al., 2003). PPP professionals in the Indian PPP road sector confirmed this research's questionnaire. Six PU, eight PR, and six researcher experts were chosen for validation. Using a Likert five-point scale, where one is Least Important, five is Most Important for positive features, five is Least Important, and one is Most Important for negative aspects, these respondents were asked to rate how well they understood each recognized element. Five hundred questionnaires yielded 275 responses. Fifty-five per cent is acceptable for such a survey (Dolla & Laishram, 2019). To boost survey reliability, all respondents were upper and higher-middle-level individuals with extensive field practice. 43% have 20+ years of experience. 41% have 11–20 years of experience. Just 16% have fewer than ten years. 50% of respondents are PR, 26% PU, and 24% are researchers.

3.3 Tools for Data Analysis

Importance Index (II) for identified factors

Based on their perception and experience, respondents were asked to rank these selected good and negative criteria. Scaling from "Not Important" to "Very Important" quantified both factors. Its possibility and influence determine its importance. Malek and Gundaliya, 2020; Malek and Zala 2022 utilized the index to calculate factor importance:

$$\text{Importance Index} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{5(n_5 + n_4 + n_3 + n_2 + n_1)}$$

In descending order, the number of respondents who indicated most important to least important was n5, n4, n3, n2, and n1. Index 0.5 to 0.7 is irrelevant, 0.7 to 0.9 is crucial, and 0.9 is most significant regarding favourable aspects. N5, N4, N3, N2, and N1 represent the proportion of respondents who ranked negative characteristics from most to least significant, respectively. Indexes between 0.5 and 0.7 are extremely significant, 0.7 and 0.9 are significant, and > 0.9 are insignificant.

Analysis of Variance

ANOVA with an F-test was used to compare the mean importance ranking of different responder groups (Malek & Zala, 2022; Malek et al., 2021). One-way ANOVA investigated the null hypothesis (H0): PU, PR, and researcher perceptions of PPP road project effectiveness determinants are not significantly different.

Post-Hoc

ANOVA/F-tests determine if the means differ significantly. The post hoc test (Tukey HSD) was used when the F score was substantial (Malek & Gundaliya, 2021). This test examines two means sets to pinpoint the significant difference.

Spearman rank correlation

Spearman's rank correlation was used to evaluate the relative positions of the three respondent groups. Only some scholars (Malek & Bhatt, 2022) use this method to quantify the link between two ranked variables in psychological, complicated environmental, and socio-economic problems. Compare responders' ranks. Correlation < 0.4 is weak, 0.5 to 0.7 is moderate, while > 0.7 is strong (Kothari, 2004).

4. Analysis and Discussion

4.1 Ranking of positive factors for suitability of PPP

All response categories were combined to create the significance index, which was then ranked. Table 2 displays opinions of both positive and unfavourable traits from the PU, PR, and researchers. Respondents' ratings of each category rank all elements.

Table 2
Statistical analysis of the factors

Factors	PU		PR		Researcher		Combined			
	II.	Rank	II.	Rank	II.	Rank	II.	Rank	F	Sig.
P1	0.89	1	0.85	1	0.78	6	0.84	1	5.814	0.003^
P2	0.65	12	0.69	6	0.63	12	0.67	10	1.44	0.239*
P3	0.82	3	0.7	4	0.8	3	0.75	3	7.972	0.000^
P4	0.59	13	0.52	13	0.66	11	0.57	12	10.926	0.000^
P5	0.68	10	0.67	7	0.87	1	0.72	7	16.239	0.000^
P6	0.5	15	0.49	15	0.66	10	0.53	15	9.706	0.000^
P7	0.77	6	0.75	2	0.81	2	0.77	2	1.901	0.151*
P8	0.68	9	0.67	8	0.7	9	0.68	9	0.621	0.538*
P9	0.71	8	0.62	11	0.58	14	0.64	11	7.379	0.001^
P10	0.84	2	0.65	10	0.72	8	0.72	8	16.245	0.000^
P11	0.81	4	0.65	9	0.78	5	0.72	6	14.81	0.000^
P12	0.8	5	0.7	5	0.8	3	0.75	4	7.482	0.001^
P13	0.55	14	0.55	12	0.62	13	0.57	13	2.168	0.116*
P14	0.67	11	0.5	14	0.54	15	0.56	14	12.658	0.000^
P15	0.73	7	0.71	3	0.75	7	0.73	5	0.531	0.589*
N1	0.7	3	0.6	3	0.51	13	0.61	3	11.101	0.000^
N2	0.61	6	0.74	1	0.67	2	0.69	2	4.847	0.009^
N3	0.43	12	0.56	4	0.6	6	0.54	8	8.634	0.000^
N4	0.59	7	0.52	6	0.79	1	0.6	4	22.616	0.000^
N5	0.76	1	0.69	2	0.66	3	0.7	1	2.575	0.078*
N6	0.59	8	0.43	12	0.55	10	0.5	10	12.793	0.000^
N7	0.64	5	0.51	7	0.56	9	0.56	6	9.962	0.000^
N8	0.73	2	0.53	5	0.62	5	0.6	4	15.739	0.000^
N9	0.66	4	0.44	11	0.62	4	0.54	7	30.661	0.000^
N10	0.53	9	0.5	9	0.58	7	0.53	9	2.061	0.129*
N11	0.44	11	0.5	8	0.56	8	0.5	11	4.852	0.009^
N12	0.41	13	0.46	10	0.53	11	0.46	13	4.13	0.017^
N13	0.49	10	0.43	13	0.52	12	0.47	12	3.854	0.022^

Note: * - indicates that the null hypothesis is accepted; ^ - indicates that the null hypothesis is rejected and indicates the difference in perceptions of stakeholders

The II rating for the 15 positive criteria ranges from 0.84 (resolve government budgetary restrictions) to 0.53. (minimize total project cost). II classified no factor as important (>0.9) or unimportant (<0.50). This is likely due to respondents' tendency to avoid prejudice and lacking the Most Important and Not Important elements. Its scoring nonappearance suggests that the Likert five-point scale was likely trying to measure perception differences that were too modest at the zeniths. However, it does not refute the differentiations identified (Li et al., 2005c). Significant positive factors (II 0.7–0.9): Eight major aspects determine PPP's appeal. PPP's budget-relieving effects are the first major factor in its selection (II 0.84). Most emerging nations struggle to fund infrastructure investments. Due to limited finance, developing countries utilize PPP to lessen the government budget burden. It lets the government finance more crucial sectors to strengthen the economy (Robert et al., 2014). PPP has more benefits than money; thus, economic motivation should not be the main reason for choosing it. Governments usually adopt PPP for budgetary reasons. This factor affects government funding to meet competing needs worldwide (Cheung et al., 2010). So, respondents valued this attractive quality.

Project cost and time control (0.77) rank second. Respondents consider PPP's benefits beyond financial limits. PPP allows the PU and PR to use innovative methods to speed up project development and avoid time and cost overruns in project execution (Li et al., 2005c). Many Indian road projects are delayed and beyond budget due to PPPs. It impacts the nation's economy. This may explain its significance. Enhancing buildability (II 0.75) and maintainability are also crucial (II 0.72). The PR, according to respondents, could improve constructed asset maintainability. According to life cycle integration, the PR will consider assets and services throughout the design. PPPs, according to respondents, could enhance the creation of assets and services. This is only a desire, however. The requisite technologies are typically unknown to the PU. As a result, the PR ought to prosper marginally. This global issue can be properly understood and updated by the PR. Private sector skills and expertise (II 0.72) enhance local economic development (II 0.72). The PR's expertise and cost-effectiveness can help governmental services. Every cost-effective PR strategy would lower costs and increase profit (Hwang et al., 2013). PPP encourages PR creativity and innovation in project delivery, resulting in superior government services (Ismail, 2013).

Governments are drawn to PPP when the private party delivers the project with the stipulated output standards within budget and time and possesses the financial and technical skills required for such projects. To maximize project value, the private party unifies estimation, planning, cost control, resource allocation, documentation, and other processes into a single management system (Almarri K., 2017).

Public policy benefits local economic development, not a specific initiative. It is also hard to quantify most financial improvement criteria benefits. Nonetheless, it demonstrates that PPP PU and PR are conscious that their projects must provide enormous financial benefits to their locations (Li et al., 2005c). Significant positive factors (II 0.5–0.7): This segment has seven factors. This portion prioritizes private risk transfer (II 0.68) Public-private partnerships share risk. The PR is known for its risk-controlling asset acquisition and facility delivery (Robert et al., 2014). The factor suggests that the PPP method could improve private sector risk. The PR may be better prepared to handle dangers because they were informed of them (Hwang et al., 2013). Risk transfer to the PR simplifies large government initiatives. Delivering facilities to end users may experience delays and cost overruns due to the Government's inability to create critical projects systematically and potential dangers. The PR develops the project according to specifications, utilizing the required funding and avoiding putting the Government at risk (Almarri K., 2017). Private-party risk transfer is not the most significant benefit for PPP road projects, according to Indian respondents.

An accurate sector perception, various threats, and risk allocation activity are required for such a reaction. The PR suffers commercial and technological risk even though it is interconnected with the PU. It is also critical to increase the capability of government-integrated solutions (II 0.67), decrease government administrative costs (0.64), cap service costs (0.57), and transfer technology to regional businesses (II 0.57). PR PPP engagement has been pushed as a means of overcoming traditional approaches. Project scope is typically increased by integrating solutions. The primary priority in the road industry is design, construction, operation, and transfer to a single commercial concessionaire. Responses showed that included outcomes are only help occasionally. In order for the PPP strategy to overcome the constraints of conventional methods, PR participation is required. This indicates that the PPP technique may expand the project's scope to cover more elements. This could enable the growth of an integrated result (such as integrating multiple events like design, building, financing, maintenance, etc.) earlier handled through different divisions into a single project, assuring economies of scale (Debela, 2020).

Bringing government road projects typically involves higher expenditures. To oversee projects, the Government typically employs project managers and consultants. Government workers maintain the new facility after construction. PPP relieves the PU of its administrative obligations and transfers administrative costs to the PR (Robert et al., 2014). PPP benefits that cap the cost of the final service receive a lower rating. It may be questioned if the PR can control service costs. This factor may have been lower in a developed nation like the UK. However, some programmes can improve local technical proficiency, especially in areas where unemployment is prevalent due to the collapse and undesirability of old systems (Li et al., 2005c). In India, PPP has focused on skill development through technology transfer to indigenous businesses to reduce PR risk. The Indian road sector ranks this favourable aspect 13th. This is crucial and deserves a greater answer. Nonetheless, various technologies have been used in projects. The local contractor must be able to set up and manage future projects using the transferred technologies (Dolla & Laishram, 2019). The other attractive elements may have been more positive because this attractive factor's immediate effects were not visible. Non-recourse finance (II 0.56) and project cost reduction are the final two considerations (II 0.53). PPP projects need more project funding or non-recourse. However, non-recourse finance is less desirable than other considerations (ranked 14th). Indian PPP road projects have trouble getting debt funding because VGF is expected for unprofitable projects. The segmented nature of projects means that project earnings rarely cover loan servicing costs (Dolla & Laishram, 2019). This may be because the UK government relies on private financing, management, skills, labour, and experience to build its initiatives efficiently (Almarri, 2017). PPP project bidding and funding are expensive, notwithstanding the private sector's efficiency (Skietrys et al., 2008). Conversely, PPP project tendering costs are too high (Grimsey & Lewis, 2007). This raises project costs rather than lowering them. PU and PR consider this a key PPP selection factor (Robert et al., 2014). As the last good point, the PU did not choose PPP to reduce road project costs. The PU should recognize PPP's cost-reduction strategy. This requires a value-for-money examination that the Indian road industry usually lacks (Dolla & Laishram, 2019).

4.2 Ranking of Negative factors affecting PPP

II ratings for the 13 negative elements range from 0.46 (severe participant constraints) to 0.70 (resulting in increased direct user charges). No factor was deemed unimportant (>0.9) by II. This is predicted since respondents try to avoid biased viewpoints and disregard irrelevant factors. Nonetheless, it does not dispute the differentiations found. Its scoring nonappearance shows that the Likert five-point scale was probably attempting to quantify perception differences that were too modest at the zeniths (Li et al., 2005). Very unfavourable aspects (II 0.5): The PPP is mainly impacted by four things. Prohibitive participant limitations are the main problem (II 0.46). The Cuttack High Court's decision to reduce and retender projects shows that governmental sectors sometimes set unreasonably high competence restrictions (Dolla & Laishram, 2018). Governments are also required to review qualification requirements. Allowing more participants is often debated. Finally, the PR's interest in PPP projects may depend on the PU's success in acquiring them. Second, a lengthy negotiation delay (II 0.47) upsets PPP's selection in this phase. The lengthy PPP acquisition negotiation process may increase costs and

the likelihood of a break-up (Singaravelloo, 2010). The project failed because of the lengthy negotiation procedure between contracting parties (Abd Karim, 2011). PPP extensions are large and unpredictable, making their acquisition lengthy. PPP ventures have this property. Hence only worthy and valuable projects should consider PPP. The UK (Li et al., 2005), Malaysia (Hwang et al., 2013), Singapore (Hwang et al., 2013), and Australia and Hong Kong (Cheung et al., 2010) all identified this factor as a significant barrier to PPP projects (Ismail & Haris, 2014). Due to the complicated procedures, lengthy acquisition times, and complex nature of PPP projects (Li et al., 2005), the PR is deterred from participating in bids.

The third most negative aspect was the confusion about government aims and evaluation criteria (II 0.50). The possible explanation is poor PPP execution regulations, which cause a discrepancy between the legislature's exacted targets and the assessment rules the PR should have met to ensure PPP projects. Bidding, funding, execution, observation, and examination lack organization (Takim et al., 2009). Smoothing the acquirement process helps attract PR PPP projects. Road projects can face challenges from partners over quality, cost, bidding and selection, attracting competent and strong promoters, and project requirements. Instead of a PPP project failing because initial finance is excessive and recovers slowly, a clear acquisition process makes the project economically reliable. Less jobs (II 0.50) ranked last. PPP gives employment prospects in India, but job security, working conditions, and pay could be better. This contradicts earlier research in Malaysia (Ismail & Haris, 2014), the UK (Li et al., 2005), and Hong Kong (Cheung et al., 2010), where respondents ranked this element as less important. Negative factors that are extremely important (II 0.5–0.7): The eight PPP road elements are crucial. Inadequate training and lack of expertise are the first important factors (II 0.53). The PU refutes PR competence. The technology's incapacity to complete their projects is the main problem, and many local contractors place the blame without considering whether it is appropriate. Lack of knowledge and abilities raises the risk of experiencing disasters, which deters the PR from investing in PPP projects (Hwang et al., 2013). According to Devkar et al. (2013), the PU lacks the skills to carry out Indian PPP initiatives successfully. Due to its vulnerability and demand for viewpoint adjustments, the project's VFM impacted the PU's requirements, scheduling, and cost (Henjewele et al., 2011). Extended contract transactions (II 0.54) and high project abort rates (II 0.54) are two additional important requirements. Leaving tasks unfinished came in sixth. This wonder was brought on by delays in land acquisition, political controversy, and the PR's failure to develop a financial solution due to a denial of a loan application. Survey participants from Hong Kong gave this factor high marks, while those from Australia gave it the lowest marks (Cheung et al., 2010). The seventh contract transaction time is now. Contractual agreements for PPPs are difficult and intricate, requiring numerous tests to authenticate the concession agreement and show their financial, economic, legal, and social sustainability. Another drawback of PPP was its high participation cost (I.I.0.56). Due to the scale, complexity, and formalities imposed by the PU, they need independent expert counsel in the early stages of most projects. The cost of PS participation rises as PPP projects get more sophisticated. PPP bid costs exceeded traditional procurement methods (Birnie, 1999). Hence, PPP projects' attraction to the PR was diminished by high participation costs (Hwang et al., 2013). Indian players might not give a damn about capital and consortium costs or other contribution/bidding fees. Such costs should have been addressed when choosing PPPs since the public sector believes no other option exists.

Higher project cost (II 0.60) is also significant at position nine. PPPs are not thought to be the cause of rising project costs. The PU always foots the bill, whoever provides the service. Costs in the PU and PR cannot be compared. Before the PR's involvement, the PU could have used more resources and accomplished something (Dolla & Laishram, 2019). Politics delay PPP appropriation. This issue is essential because political engagement in PPP project execution is ongoing in India. Farmers' objections to the project's location result in delays and price increases. Respondents thought that significant political interference in this area was damaging the credibility and reality of the initiative. Political argument overruns are the main barrier to PPP acceptability in Hong Kong (Cheung et al., 2010). The PU assisted a PPP, which also transferred a sizable amount of the liabilities and risks to the PR. So, despite its significance, high-risk PR reliance (II 0.69) is ranked tenth. Without being forced, the PU is becoming increasingly reliant on PR. The broader PR, however, might be hesitant if the risk is beyond their purview if the PR's response only sometimes satisfies the needs of the PU (Li et al., 2005a). When PR initiatives are offered, the PU becomes less active. The PU must know that projects require the coordination agency to enforce them strictly. Although the risk may appear PR, the Government is equally responsible for compiling the concession agreement. This occurs when the PU stops keeping track. This would motivate the PU to establish a strong PPP framework and discourage using PPPs when the PR finds it difficult to implement project components (Dabarera et al., 2019). Although it is crucial, decreasing project accountability (II 0.61) came in last in its category. PPP participants in India are covered by the Right to Information Act of 2005, which anyone may access and provides access to many data. This was discovered after 2013 (Dolla & Laishram, 2019). When the PR wins a project, and the PU becomes disoriented, the entire PPP participant typically messes up. As a result, the PR only suffers a financial loss. When the PU loses it, they also lose the project, societal well-being, the environment, and project development. The benefits of PPP projects are lost to the PU. The PR experiences losses. This is a good thing, and it makes a bold argument that the PU should refrain from offering flexibility by shirking its responsibility throughout the stages of agreement encirclement or agreement observation. Significant unfavourable factors (II 0.7–0.9): The sole drawback to PPP in India is a higher direct user price (II 0.70). Last. Though it ranked last, respondents deemed it essential since sometimes the prices are overly high or continually hiked, which disappoints consumers. So, Indian PPP road projects should consider it. The UK (Li et al., 2005) and Hong Kong (Cheung et al., 2010) also did not rank this factor highly, although Malaysia (Ismail & Haris, 2014) did. Prior to PPP, not all resources and services were offered by the PU. As a result, the use of PPP may not instantly result in high user prices. This stopped user fees from being assessed at ordinary procurement costs.

4.3 The difference in perception rating for factors

To ascertain whether researcher, PR, and PU attitudes varied, one-way ANOVA F-tests were performed for each factor (as mentioned in Table 2). Table 2 demonstrates that the PU, PR, and researchers agreed upon just five of the fifteen favourable characteristics. These are: Increases the capacity of the Government to provide integrated solutions, project time and cost control, risk transfer to a third party, technology transfer to local businesses, and speeds up project development. Only two of the thirteen negative traits were not cited in conflict by researchers, the PR and PU. These factors are interrelated: increased user direct costs and a need for more knowledge and abilities. A post hoc test (Tukey HSD) was employed for the remaining covariates to compare the groups.

Table 3
Post-Hoc analysis of the factors

Factor	SECTOR (I)	SECTOR (J)	Mean Difference (I-J)	Std. Error	Sig.
P1	PU	Researcher	.55975*	0.1649	0
P3	PU	PR	.57854*	0.16338	0
	Researcher	PR	.49635*	0.16981	0.01
P4	PU	PR	.33937*	0.14382	0.05
	Researcher	PR	.68647*	0.14948	0
P5	Researcher	PU	.9583*	0.2118	0
		PR	1.0262*	0.1871	0
P6	Researcher	PU	.84362*	0.23631	0
		PR	.87782*	0.2087	0
P9	PU	PR	.43756*	0.15566	0.02
		Researcher	.68472*	0.1832	0
P10	PU	PR	.99290*	0.17437	0
		Researcher	.60379*	0.20522	0.01
P11	PU	PR	.79932*	0.16279	0
	Researcher	PR	.65222*	0.1692	0
P12	PU	PR	.51095*	0.1587	0
	Researcher	PR	.51095*	0.16494	0.01
P14	PU	PR	.85251*	0.17047	0
		Researcher	.64847*	0.20062	0
N1	PU	PR	.50045*	0.16744	0.01
		Researcher	.92392*	0.19706	0
	PR	Researcher	.42347*	0.17403	0.04
N2	PR	PU	.65873*	0.21352	0.01
N3	PR	PU	.66683*	0.19003	0
	Researcher	PU	.84932*	0.22364	0
N4	Researcher	PU	.97956*	0.22247	0
		PR	1.31802*	0.19648	0
N6	PU	PR	.7636236*	0.1630435	0
	Researcher	PR	.5705783*	0.1694628	0
N7	PU	PR	.66533*	0.1492	0
N8	PU	PR	.99420*	0.17838	0
		Researcher	.53614*	0.20993	0.03
	Researcher	PR	.45806*	0.1854	0.04
N9	PU	PR	1.11069*	0.15792	0
	Researcher	PR	.91870*	0.16414	0
N11	Researcher	PU	.6373*	0.2049	0.01
N12	Researcher	PU	.6067439*	0.2117784	0.01
N13	Researcher	PR	.46861*	0.18387	0.03

*The mean difference is significant at the 0.05 level.

Ten positive factors are all in agreement; none contradict all three groupings. The weightings for the PR and researchers are far lower than those for the PU. Researchers and PR evaluate these criteria equally. Reduces government cash locked up in capital investment, caps service costs, improve buildability and maintainability, and receives lower rankings from the PR than from the PU and researchers. Government financing restrictions are given less weight than those of researchers in the PU and PR. Less than researchers, the PU and PR recognize the talents and experience of the PR. Respondents from the PR believe that restricted public financing and improved government-integrated solution capacity are more crucial than those from the PU and researchers. These considerations directly impact the advantages for the PU in PPP projects with the PR. According to experts, the PU and PR are different parties with distinct ideologies, and each has its motives for participating in PPP. While the PR is more concerned with the business benefits of the collaboration, the PU is becoming more concerned with the social benefits. Two of the eleven unfavourable variables conflicted with each other. PU weights reduce project liability higher and more evenly than researcher and PR weightings. Very few systems have reached the contact stage lower. Fewer job possibilities, higher participation costs, project costs, and contract transaction time, according to respondents in the PR, are less important than they are in the PU and among researchers. Political discussion delays, ambiguity regarding government objectives and evaluation standards, excessive involvement constraints, and negotiation delays received far

more weight than findings from academics in the PU and PR. More respondents from the PR than from the PU, and researchers appreciate the excessive risk.

4.4 Correlation among respondents on the ranking of factors

Table 2 shows how II-based respondents ranked positive and negative elements. The positive and negative characteristics rankings also show a link between responder categories. Table 4 shows positive and negative factors important to spearman's rank correlation.

Table 4
Correlation among respondents on the ranking of factors

		PU	PR	Researcher
Positive Factors	PU	1		
	PR	0.7*	1	
	Researcher	0.6*	0.7*	1
Negative Factors	PU	1		
	PR	0.5*	1	
	Researcher	0.3*	0.5*	1

*Spearman's rank correlation is significant at 0.05 levels

Higher parallels for the importance of the positive element demonstrate that the PU, PR, and research communities have a common understanding of the positive aspects of Gujarat PPP Road projects and a high degree of trustworthiness in their evaluations. As respondent groups did not differ, combined positive factor II was used to find and categorize positive factors. Compared to researchers, PU and PR officials performed worse. According to the degree of agreement on the significance of the negative aspect, the PU, PR, and researchers have a moderate understanding of the drawbacks of Gujarat PPP Road projects, making their evaluations somewhat reliable. While the PU and researchers have a weak association, the PR and researchers have a moderate correlation.

5. Conclusions and Implications

Researcher surveyed opinions from the PU, PR, and scholarly communities about what makes Indian road projects successful. Eight favourable factors were identified as "very critical" to the allure of PPPs for Indian road projects. The key positive variables and their II were the removal of financial constraints on the Government (0.84), control of project costs and timelines (0.77), reduction of government funds tied to capital investments (0.75), improvement of maintainability (0.75), and accelerated project development (0.75). The key unfavourable factors that prevented PPP in Indian road projects were fixed. Excessive involvement restrictions (0.46), lengthy negotiation delays (0.47), misunderstanding of government goals and evolution standards (0.50), and decreased job opportunities are these unfavourable characteristics (0.50) (Refer Table 2). Stakeholders in Indian PPP road projects agree on both factors' relevance. PU and researchers scored lower than PR employees (Tables 3 and 4). The findings will benefit PU and PR professionals contemplating or engaging in PPP initiatives. The outcome might help the Government review PPP legislation to ensure successful PPP road projects in India. Existing project practitioners can learn how to run them more effectively. It encourages practitioners considering PPP projects to act. This encourages development. The report covers Gujarat Road PPP projects. Further research can include other sectors and Indian states. This research study's questionnaire survey could be reproduced in different jurisdictions for national and worldwide comparison.

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