Analysis of Challenges faced in Hybrid Annuity Model

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Abstract: *The Public Private Partnership has significantly aided the nation's infrastructure growth. Governments at both the national and state levels are focused on using the PPP model to execute their projects. The Public Private Partnership Model (PPP) was revived by the Ministry of Road Transport and Highways (MORTH) by implementing the hybrid annuity model (HAM), in which the government agreed to share the cost of funding by contributing 40% during the construction phase. Many projects received green signal under the HAM scheme in 2016-17 as a result of the scheme's introduction. Build Operate Transfer (BOT), Engineering Procurement & Construction (EPC), and Hybrid Annuity Model (HAM) are three public-private partnership models currently being used in the implementation of national highway projects. But, the Hybrid Annuity Model (HAM) is losing it's popularity because large numbers of projects are being stalled, adding to the non-performing assets (NPA's) for the government.*

Thus, this Work identifies challenges faced by Hybrid Annuity Model & the most critical challenges faced are determined by applying Relative Importance Index (RII) technique to the questionnaire survey data. The findings show that funding & land acquisition are the most critical challenges faced by HAM projects. It is also concluded from the work that challenges like Change of scope, delays in approvals & slow arbitration are the Moderately Critical challenges & major factors for delays of project & thus innovation into the model is necessary.

Keywords: *Hybrid Annuity Model (HAM), Build Operate Transfer (BOT), Engineering Procurement & Construction (EPC), Public Private Partnership (PPP)*

I. INTRODUCTION

In 1998, the Indian government initiated the National Highway Development Programme to repair, rebuild, and extend the country's national highways. The National Highway Development Programme, which is divided into seven stages, is still being implemented & managed by the National Highways Authority of India (NHAI). Many of these highways are built through Public Private Partnership (PPP), for which the National Highways Authority of India (NHAI) issues Model Concession Agreements (MCA). The Model Concession Agreement is a ready-to-use document between the NHAI and the Concessionaire, who has been shortlisted. The MCA addresses issues such as the financial support from the Government, party obligations, risk allocation and termination.

The National Highways Authority of India (NHAI) announced a new Model Concession Agreement (MCA) named 'Hybrid Annuity Model' for the construction of highways in India on November 24, 2015. The government hopes to resolve some of the issues that conventional PPP models in the road sector, such as Build Operate Transfer (BOT) and Engineering Procurement and Construction (EPC), face with this HAM model.

The Government of India launched the Hybrid Annuity Model to speed up the

development of national highways & to avoid risking the developers and contractors from essential problems associated to BOT & EPC model. Under Hybrid Annuity Model, Construction funding for projects by the government accounts for 40% of the total cost, while the balance 60% is arranged by the concessionaire.

This model was basically introduced to overcome the challenges faced by BOT & EPC and revive the existing PPP model in highway construction. But, the model is losing its popularity because large numbers of projects are being stalled, adding to the non-performing assets (NPA's) for the government. This work focuses on identifying challenges that are being faced by Hybrid Annuity Model. Also, this work determines the most critical challenges faced by applying Relative Importance Index (RII) technique to the questionnaire survey data.

II. LITERATURE REVIEW

Sawant, (2018): The HAM model failed to address the major issue of land acquisition. Financial closure is proving challenging. The Hybrid Annuity Model is also lagging in terms of overcoming the BOT model's flaws. There is even more research to be done on the HAM model.

Burke, R. et.al, (2017): In PPP projects, different types of risks are defined, such as project risk, which deals with design, execution & funding. There are also market uncertainties, such as demand and investment risk. The key to establishing trust between public and private partners is the allocation, distribution, management, and mitigation of risk.

Mahalingam Ashwin, (2010): For the basic success of the PPP model it can be concluded that the steady macroeconomic framework, firm regulatory structure, policies that are investor friendly, project revenues that are maintainable, transparent & consistent policies and efficient corporate governance are the essential necessities.

Dr. M Shivalingegowda et.al, (2019): PPP need effective distribution of responsibility between public and private sector like risk and cost concepts. PPP is important for development of roads & should be modified to overcome challenges.

Mohammad Akrma Ali et.al, (2015): To solve the issues, there is a strong demand for qualified professionals, especially those with committed minds in the fields of engineering, planning, economics, and political science.

Hande Aldag et.al, (2017): Changes in design and construction work are the most significant risk in the BOT, followed by Loan Risk (bankruptcy) and financial issues.

Ankit Kumar, (2017): The Model Concession Agreement is expected to evolve further in the future, based on the insights gained by PPP stakeholders in the industry.

Mayur S. Ghayal et.al, (2019): As per concern of financial model BOT model have their plus and minus point. Where the traffic is high BOT model should have to prefer by government. And for remote areas where traffic flow is less BOT model should not preferable. Further modification is needed to be done in contract condition of BOT project to make it better for major project.

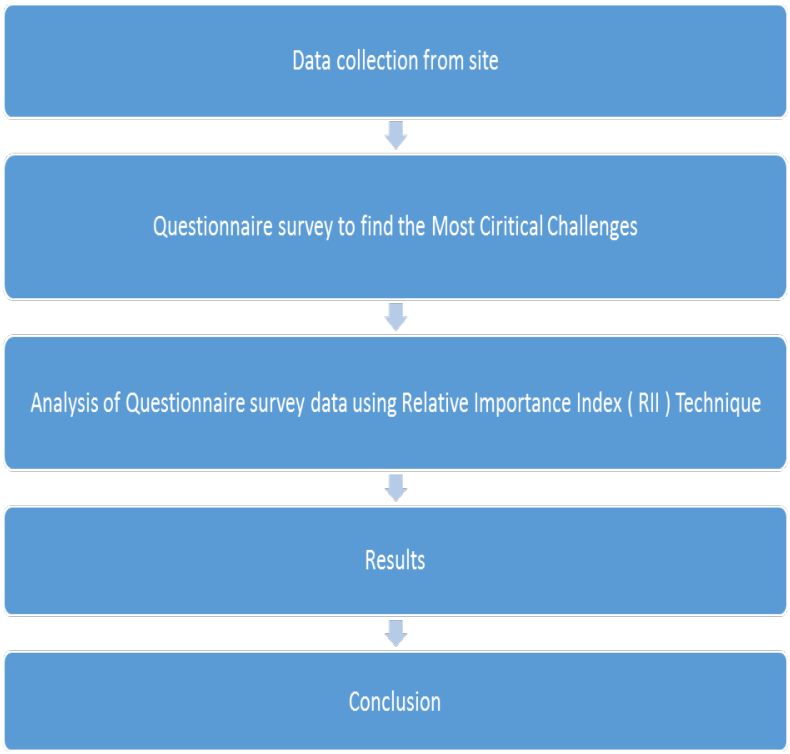
Dipanshu Sharma et.al, (2020): Since the maximum percentage of risk's are transferred to contractor's side in EPC Contracts, it should be the duty of client to be clear and specific towards his design and contractual requirements.

Pankaj Joon, (2014): The key cause of project delays is the absence of a clear construction site.

III. OBJECTIVES

1. To identify challenges faced and issues pertaining to delays and success of the Hybrid Annuity Model.
2. To determine the most Critical challenges faced by using Relative Importance Index (RII) technique.

IV. METHODOLOGY



V. DATA COLLECTION

A) Prelude

Initially data was collected from 4 Case Studies. Further, Data was collected in the form of responses through a Questionnaire survey to apply Relative Importance Index technique to generate hierarchy of most Critical Challenges.

B) Case Studies

1. Case study 1:-

- Name of Project :- Four Laning of Akkalkot to Solapur from km. 99.400 to km. 138.352 of NH-150 Extn including Akkalkot Bypass
- Length :- 38.95 Km
- Project Cost :- Rs. 807 Crore
- Project Authority :- National Highways Authority of India (NHAI)
- Construction Period :- 2 Years
- Operation Period :- 15 Years

2. Case study 2:-

- Name of Project :- Four Laning of Sangli - Solapur (Pkg I) [Sangli - Borgaon km 182.556 - km 224.00]
- Length :- 41.44 Km
- Project Cost :- Rs. 1102.4 Crore
- Project Authority :- National Highways Authority of India (NHAI)
- Construction Period :- 2 Years
- Operation Period :- 15 Years

3. Case study 3:-

- Name of Project :- Four Laning of Sangli - Solapur (Pkg II) [Borgaon-Watambare km 224.00 - km 276.00]
- Length :- 52 Km
- Project Cost :- Rs. 1029.4 Crore
- Project Authority :- National Highways Authority of India (NHAI)
- Construction Period :- 2 Years
- Operation Period :- 15 Years

4. Case study 4:-

- Name of Project :- Four Laning of Sangli - Solapur (Pkg IV) [Mangalwedha-Solapur km 321.6 - km 378.1]
- Length :- 56.5 Km
- Project Cost :- Rs. 1141 Crore
- Project Authority :- National Highways Authority of India (NHAI)
- Construction Period :- 2 Years
- Operation Period :- 15 Years

C) Challenges faced in Hybrid Annuity Model

1. Difficulty to lend loan because of the contractor's exposure limit :- Banks are not able to lend because of the contractor's exposure limit. It means that a particular contractor has already availed the loan from banks upto his maximum limit.

2. Difficulty to lend loan to contractors because of the non-performing loans :- Banks are finding it difficult to lend to contractors because of the non-performing loans. Due to non-repayment of loan, there has been a rise in the non-performing assets and banks are forced to follow strict lending norms.

3. Possibility of default by NHAI :- As NHAI has to finance various projects, there is a possibility that NHAI will default. If NHAI is not able to recover the toll collection, then it will lead to burden on the government.

4. Road right-of-way conflicts :- Due to the urgency in which DPRs are submitted, rough estimates of land acquisition information are made, resulting in significant delays and road right-of-way conflicts when it comes to carrying out the execution in later stages.

5. Land acquisition problems :- Many projects get stalled due to land acquisition problems causing delays in project.

6. Lack of High qualified, Trained, Skillful & Experienced staff :- Lack of High qualified, Trained, Skillful & Experienced staff in the contractor's organisation causes various issues related to scheduling, planning, quality & management.

7. Experience of Contractor's & sub-contractor's :- Contractor's & sub-contractor's having no experience or less experience in road construction create huge cost & time escalation due to less knowledge of work.

8. Delays in taking Approvals & Clearances :- Delays in taking Approvals & Clearances are among the most common reasons of time & cost overrun.

9. Slow arbitration :- Disputes take place due to Contractual Problems, delays in work progress, time extensions, quality of works, change of scope, etc. These disputes are resolved by arbitration. One of the most common causes of project failure is slow arbitration.

10. Improper & Incomplete Feasibility study :- Improper & Incomplete Feasibility study caused by urgency in Feasibility Report submission causes Change of scope which further leads to time & cost escalation.

11. Change of scope :- Change of scope is one of the key limitations of the HAM model. This clause causes the project to go over budget and schedule.

12. Political intervention :- The majority of areas in India are heavily ruled by political figures. This results in a change in the project's scope, as well as a cost and time overrun.

13. Temporary Diversions of low quality :- Temporary Diversions & roads prepared of low quality standards leads to accident at these locations.

14. Violation of safety rules :- Local Workers do not follow safety rules which causes accidents and further leads to stopping of work by political interference.

15. Frequent changes, unclear contract conditions & approvals after commencement :- Frequent changes in road design, unclear contract conditions & approvals of new works after commencement of work results in time and cost overrun.

D) Questionnaire Survey

A Questionnaire survey was conducted to determine the most critical challenges faced in Hybrid Annuity Model. Responses were taken based on 5-point likert scale ranging from Least Critical to Most Critical. Around 91 respondents were surveyed under the study.

Table 1: Questionnaire Survey Responses

Sr. no.	Challenges	Most critical	Moderately critical	Critical	Less critical	Least critical
1	Difficulty to lend loan because of the contractor's exposure limit	27	30	23	9	2
2	Difficulty to lend loan to contractors because of the non-performing loans	37	28	17	6	3
3	Possibility of default by NHAI	11	16	25	24	15
4	Road right-of-way conflicts	25	30	21	10	5
5	Land acquisition problems	31	30	18	8	4
6	Lack of High qualified, Trained, Skillful & Experienced staff	6	14	24	29	18
7	Experience of Contractor's & sub-contractor's	7	15	20	22	27
8	Delays in taking Approvals & Clearances	19	26	28	13	5
9	Slow arbitration	18	27	27	11	8
10	Improper & Incomplete Feasibility study	22	30	23	11	5
11	Change of scope	27	29	21	10	4
12	Political intervention	11	16	28	21	15
13	Temporary Diversions of low quality	18	14	19	27	13
14	Violation of safety rules	13	11	18	29	20
15	Frequent changes, unclear contract conditions & approvals after commencement	15	17	20	21	18

VI. DATA ANALYSIS

The Relative Importance Factor (RII) of different Challenges was found with the help of RII formula and raking to these challenges were given in descending order of RII i.e. the challenge having highest RII value was ranked first and challenge having least value was ranked last.

Formula of Relative Important Index (RII) :

$$RII = \frac{\Sigma W}{(A\ X\ N)} = \frac{a1n1 + a2n2 + a3n3 + a4n4 + a5n5}{A\ X\ N}$$

Where:

W= Weightage given by the respondent to each factor

A= Highest Weightage

N= Total number of respondent

n_1, n_2,…n_5 = Feedback data number

Table 2: RII Rating Scale

Sr. no.	Interpretation	Rank
1	Least Critical	1
2	Less Critical	2
3	Critical	3
4	Moderately Critical	4
5	Most Critical	5

Table no 2 shows the RII ranking and its interpretation. Rank one means the question asked in questionnaire is Least Critical and rank five means question asked in questionnaire is Most Critical.

For Example:

RII for difficulty to lend loan because of the contractor's exposure limit :

$$RII = \frac{\Sigma W}{(A\ X\ N)} = \frac{a1n1 + a2n2 + a3n3 + a4n4 + a5n5}{A\ X\ N}$$

$$RII = \frac{(5X27)+(4X30)+(3X23)+(2X9)+(1X2)}{(5X91)}$$

RII = 0.756044

VII. RESULTS

Table 3: Relative Importance Index of Challenges

Sr. no.	Challenges	RII Value	Rank
1	Difficulty to lend loan to contractors because of the non-performing loans	0.797802	1
2	Land acquisition problems	0.767033	2
3	Difficulty to lend loan because of the contractor's exposure limit	0.756044	3
4	Change of scope	0.742857	4
5	Road right-of-way conflicts	0.731868	5
6	Improper & Incomplete Feasibility study	0.716484	6
7	Delays in taking Approvals & Clearances	0.69011	7
8	Slow arbitration	0.679121	8
9	Temporary Diversions of low quality	0.593407	9
10	Frequent changes, unclear contract conditions & approvals after commencement	0.578022	10
11	Political intervention	0.571429	11
12	Possibility of default by NHAI	0.564835	12
13	Violation of safety rules	0.52967	13
14	Lack of High qualified, Trained, Skillful & Experienced staff	0.514286	14
15	Experience of Contractor's & sub-contractor's	0.496703	15

VIII. CONCLUSION

Highways play an important role in the country's growth. Various steps have been implemented by the Indian government to enhance the present state of road network in the country. Public Private Partnership (PPP) has been the officially accepted methodology by Indian Government for expansion of road network amongst which the

BOT, EPC and HAM are the most commonly used models for awarding the projects. However, the recently introduced Hybrid Annuity Model suffers from various inadequacies and need improvements for effectiveness.

From this work it can be deduced that funding & land acquisition are the most critical challenges faced by Hybrid Annuity Model projects. Challenges like Change of scope, Poor quality of feasibility reports, delays in approvals & slow arbitration are the Moderately Critical challenges. Contractor's & sub-contractor's Experience and Lack of High qualified, Trained, Skillful & Experienced staff are some of the critical challenges causing time & cost overrun.

The sector continues to face these key issues. Due to inefficient revenue management, necessary modifications should be done on financial parameters & other parameters like land acquisition causing failure of projects in order to make the existing HAM model more effective. Also there is a need for a more effective dispute resolution mechanism and a more balanced risk allocation. Thus, innovation into the model is necessary.

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