

# COMPARATIVE RANKING OF THE CRITICAL SUCCESS FACTORS USING AHP FOR THE PPP MODEL IN AFFORDABLE HOUSING

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DOI: <https://doi.org/10.5281/zenodo.6528473>

Published Date: 08-May-2022

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**Abstract:** This research work aims to find out the critical success factors (CSFs) with implementing Public Private Partnership in affordable housing segment in India. Housing can be a way to define the living standard of a country. As India is a developing country and moving towards the urbanization with a very faster pace, it results the increased cost of land, development of slums, shortage of affordable housing for low or medium income groups. It becomes difficult for the low or medium income people to purchase a house in the urban areas. The government of India takes number of initiatives to tackle the problem of affordable housing.

The involvement of private sector has playing a major role in the success of Affordable housing projects. The provision of housing for all cannot be the only responsibility of public sector. The burden on government can be reduced by investment from private sector. Affordable housing in Partnership, plays major role for promoting, the affordable housing. The community and private sector are the prominent resources, which have to be incentivized and channelized in the process. There are also various important factors which affect the success of Public private partnership in affordable housing.

The Research Work is done by comparative ranking of the Critical Success factors using Analytical Hierarchy Process. The AHP tool provides both Individual and global comparative ranking of the critical success factors. The AHP tool also checks consistency of the survey by individual, the consistency ratio must not be greater than 10 % as per the tool. Each and every factor could be analyzed comparatively by the response of the respondents. The combination of these comparative ranking of all factors into one literature developed the final conclusion.

**Keywords:** Affordable Housing, AHP, Critical Success factors, Public Private Partnership.

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## I. INTRODUCTION

The goals of affordable housing are quite obvious ones but on close analysis we find some less obvious reason which is equally important. Among the obvious ones are the provision of shelter and the potential creation of wealth. Perhaps less obvious goals are growth in psychological wellbeing due to resident sense of home and its resulting stability, the improved physical health of homeowner's family, the resident's increased participation in civic society and the improved educational performance of their children. Another goal might be to achieve racial and economic integration in order to allow a wider range of residents to partake of the benefits often associated with the mixed race and mixed income communities, such as greater cultural diversity more and better municipal services, greater social and the social connections that might lead to better employment opportunities. Still other might be to enhance the housing accessibility for those with disabilities to create environmentally friendly housing or to preserve the historic and cultural value of property. Government of India has recognizing the housing issue in country and has taken various initiatives

Affordable housing provides all basic amenities, quality and facilities but at a price point that is affordable to income of

household whereas low cost housing provide bare facilities. Affordable housing is basically for LIG or MIG category, whereas low cost housing is for EWS category.

### **Aim and Objective**

This Research Paper aims to find out the Comparative Ranking of the Critical Success Factors using AHP for the PPP model in Affordable Housing.

Objectives are discussed below:

- i. To determine the RI weightage of critical success factors for implementation of public private partnership in A.H.
- ii. To do comparative ranking of the critical success factors using AHP tool.

### **Methodology**

The research starts with a comprehensive literature review of the identification of the success factors in PPP model in the A.H. Most of studied literature includes published literature, unpublished papers, books and internet resources relevant to area of investigation. Literature review provides a major support to make decisions on selecting success factors which affect the success of project.

Brainstorming session provided a framework for making questionnaire for research work. This includes the case study of actual ongoing

A.H. project on PPP mode. By literature review it is analyzed that there are various factors which are responsible for the projects where construction of A.H. is going on with PPP mode. Based upon the checklist, general as well as AHP questionnaires were prepared. After doing this part three PPP mode affordable housing projects are selected for deep study and examination.

### **Significance of Project**

The A.H. is a project which will reduce the difference between various income groups in terms of their living standards. The need of

A.H. arises with increment of the slum areas. When communities take a moment to consider their most important assets, the aspects that are often mentioned include high-quality schools, employment and living standard. Instead, they may travel long distances from more reasonably-priced suburbs. Due to limited income source the middle income group people are unable to afford a house in a high quality environment. The partnership with private sector would lead to faster completion and use of technology in the project.

## **II. LITERATURE REVIEW**

As Infrastructure status is given to the A.H, which opens up a number of ways for financial support by govt. The smooth flows of funds for the affordable housing working tremendously to fulfill the dream of 'housing for all by 2022'. The success of public- private partnership in A.H. is controlled by a number of factors which could be demonstrated as Critical Success Factors (CSFs). So, this study based on the CSFs for Implementation of PPP model in A.H. segment in India.

**Identification of Critical success factors** has been done from the review of a wide range of published literature in diverse area of Affordable housing, Construction management & Public- Private Partnership projects etc. Reviewing the literature helped for better categorizing the critical success factors. The missing parts or less developed items lead to extending the checklist and to conduct interviews with experts. According to the literature review and further discussion with experts a comprehensive checklist of 41 factors was selected. This checklist will become the basis for AHP analysis. In Affordable housing Typical size 300 sq. ft.-800 sq. ft. whereas in affordable housing typical area is less than 300 sq. ft. per unit. (*Affordable Housing in India, JLL India report, 2016*)

The research concentrates on Critical Success factors for the implementation of PPP model in the A.H. segment in India. The research involves a combined questionnaire survey of professionals who have experience in handling PPP model in the A.H. The case studies are based on A.H. projects of Delhi and Gurugram. This study focuses on the recent initiative taken up by the Central Government in

A.H. sector. This research will analyze the total of 8 models that Ministry of Housing and Urban Affairs has come up with and try to find out the Advantages and Disadvantages associated with each models.

Reasons for Private Sector Reluctance:

- Unavailability of urban land
- Land costs
- Lack of adequate infrastructure
- Regulatory concerns - delay in approvals & multiple stage processes
- Rigidness of archaic laws & their inapplicability in today's market
- Lack of clarity in national and state level laws
- Limited profit margins
- Financing options for developers

The time for research is limited; this forces the researcher to conduct study on limited scopes specially to attain research objectives. Due to time and resource constraint the research has to confine in Delhi & NCR region. It is unable to cover more geographical location throughout in India.

The relative importance Index of all factors is then found by calculating RII based on which ranking is done. After that Ranking of Critical Factor for Success as per RII (Relative Importance Index) are sequenced; in ascending order. The strategy adopted for this study is Analytical Hierarchy Process. The survey approach is used to gather data from respondents within a limited time frame. The research is established to investigate the perception of industry practitioners, academic and business person into the Critical success factors that contribute to the successful implementation of PPP model in Affordable Housing.

**RI Weighage of CSFs: Table 1**

S. No.	Political Criteria (1)	RI Weightage
CF1.1	Government guarantee	0.778
CF1.2	Well-organized and committed public agency	0.768
CF1.3	Transparent political situation	0.726
CF1.4	Political Willingness/Support	0.642
	<b>Social Criteria (2)</b>	
CF2.1	Stable and effective social support	0.695
CF2.2	Transparent social situation	0.632
	<b>Financial Criteria (3)</b>	
CF3.1	Adequate Funding and its provisions	0.8
CF3.2	Access to finance	0.789
CF3.3	Project economic viability	0.768
CF3.4	Availability of suitable financial market	0.726
S. No.	<b>Legislation Criteria (4)</b>	
CF4.1	Efficient legal framework	0.716
CF4.2	Action against errant developers	0.716
CF4.3	Favorable legal framework	0.653

	<b>Partnership criteria (5)</b>	
<b>CF5.1</b>	Strong and good private consortium/capable private partner	<b>0.716</b>
<b>CF5.2</b>	Shared authority, openness and communication between public and private sectors	<b>0.684</b>
	<b>Land Criteria (6)</b>	
<b>CF6.1</b>	Effective land use planning	<b>0.863</b>
<b>CF6.2</b>	Availability of Land	<b>0.811</b>
<b>CF6.3</b>	Land Finance	<b>0.789</b>
<b>S.No.</b>	<b>Project Management Criteria (7)</b>	
<b>CF7.1</b>	Quality Work	<b>0.832</b>
<b>CF7.2</b>	(Detailed) thorough and realistic assessment of the cost and benefits	<b>0.779</b>
<b>CF7.3</b>	Consistent monitoring	<b>0.779</b>
<b>CF7.4</b>	Project management success/Support	<b>0.747</b>
<b>S.No.</b>	<b>Feasibility Study Criteria (8)</b>	
<b>CF8.1</b>	Planning and design with fast legal approvals	<b>0.811</b>
<b>CF8.2</b>	Favorable locations/Connectivity	<b>0.8</b>
<b>CF8.3</b>	House buyers' demand	<b>0.779</b>
<b>S.No.</b>	<b>Risk Criteria (9)</b>	
<b>CF9.1</b>	Detailed risk analysis	<b>0.737</b>
<b>CF9.2</b>	Equitable risk allocation and sharing	<b>0.695</b>
<b>CF9.3</b>	Appropriate risk allocation and risk sharing	<b>0.695</b>
<b>CF9.4</b>	On time Project approvals and permits	<b>0.653</b>
<b>S.No.</b>	<b>Technical Criteria (10)</b>	
<b>CF10.1</b>	Transparent Procurement	<b>0.8</b>
<b>CF10.2</b>	Adequate Latest Technology and construction	<b>0.758</b>
<b>CF10.3</b>	Technical competence	<b>0.758</b>
<b>S.No.</b>	<b>Profit Criteria (11)</b>	
<b>CF11.1</b>	Multi benefit objectives	<b>0.695</b>
<b>CF11.2</b>	Project profitability	<b>0.684</b>
<b>CF11.3</b>	Profit assurance for private sector	<b>0.663</b>
<b>S.No.</b>	<b>Environmental Criteria (12)</b>	
<b>CF12.1</b>	<b>Environmental performance of housing facility (Eco-friendly)</b>	<b>0.779</b>

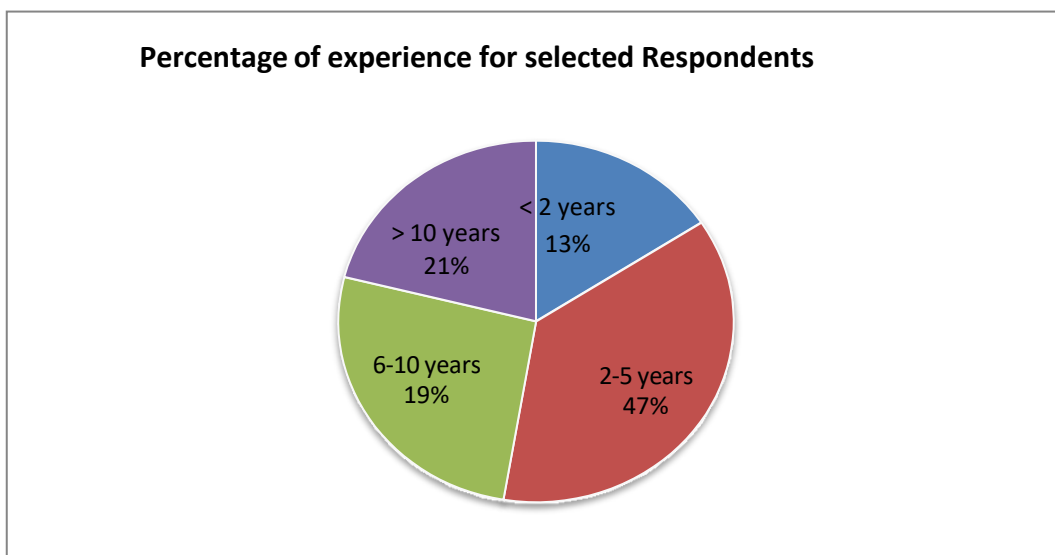
### III. DEVELOPMENT OF QUESTIONNAIRE

The strategy adopted for this study is Analytical Hierarchy Process. The survey approach is used to gather data from respondents within a limited time frame. The research is established to investigate the perception of industry practitioners, academic and business person into the Critical success factors that contribute to the successful implementation of PPP model in A.H. Chart for the comparative analysis of **Major Factors & Sub Factors** has been prepared on the AHP scale. This can be step 1 for the development of AHP Questionnaire. The Scale shows '1' for 'Equal Importance', 2 & 2' for the 'Slightly Important', 3 & 3' for the 'Moderately Important', 4 & 4' for the 'Strongly Important' and 5 & 5' for Strongly Important. The respondent can fill the answer based on the comparative analysis for the two factors. The Panel for the Questionnaire has been finalized and, procedure of development of Questionnaire has been explained in detail in next section. The research is established to investigate the perception of industry practitioners, academic and business person into the Critical success factors that contribute to the successful implementation of PPP model in A.H. The working process of AHP software discussed in length with exemplar study. So, with this procedure AHP questionnaire is formulated for further Survey. Analysis of Demographics of Respondents

The questionnaire consists of two parts, part A shows the respondent personal Info. Such that whether he is a contractor, engineer, architect or project manager etc., their work experience and designation in their company. Part B consists of success factors identified after Dissertation survey result. The respondents were asked to give comparative Weightage to the factors on an AHP scale. Value of 9 is given to the factor having comparatively extreme importance then other factor and value 1 given to factors when both factors carried equal Importance for the Public private partnership implementation in affordable housing segment in India. Experience of the respondents was asked during the questionnaire survey, 21 % of the respondents had an experience greater than 10 years and 19 % were in the range of 6-10 years experience in Construction.

S.No.	Experience	No. of Respondents	Percentage
1	< 2 years	3	13
2	2-5 years	9	47
3	6-10 years	3	19
4	> 10 years	4	21

**Fig.1 Respondent experiences on pie- chart**



In this approach combine all your researched information in form of a journal or research paper. In this researcher can take the reference of already accomplished work as a starting building block of its paper.

#### Jump Start

This approach works the best in guidance of fellow researchers. In this the authors continuously receives or asks inputs from their fellows. It enriches the information pool of your paper with expert comments or up gradations. And the researcher feels confident about their work and takes a jump to start the paper writing.

Table 2: Hierarchy with Consolidated Priorities

Decision Hierarchy			
Level 0	Level 1	Level2	GlbPrio
CSF PPP Housing	Political 0.097	Government guarantee 0.497	4.80%
		Well-organized and committed public agency 0.267	2.60%
		Transparent political situation 0.136	1.30%
		Political Willingness/Support 0.100	1.00%
	Social 0.091	Stable and effective social support 0.804	7.30%
		transparent social situation 0.196	1.80%
	Financial 0.121	Adequate Funding and its provisions 0.360	4.40%
		Access to finance 0.276	3.30%
		Project economic viability 0.219	2.70%
		Availability of suitable financial market 0.145	1.80%
	Legislation 0.113	Efficient legal framework 0.557	6.30%
		Action against errant developers 0.280	3.20%
		Favorable legal framework 0.163	1.80%
	Partnership 0.076	Strong and good private consortium/capable pr 0.544	4.20%
		Shared authority- openness and communication 0.302	2.30%
		Indecisiveness-compatibility and strong partn 0.154	1.20%
	Land 0.101	Effective land use planning 0.516	5.20%
		Availability of Land 0.346	3.50%
		Land Finance 0.138	1.40%
	Project Management 0.077	Quality Work 0.439	3.40%
		(Detailed) thorough and realistic assessment 0.296	2.30%
	Feasibility Study 0.074	Consistent monitoring 0.157	1.20%
		Project management success/Support 0.108	0.80%
	Risk 0.074	Planning and design with fast legal approvals 0.538	4.00%
		Favorable locations/Connectivity 0.270	2.00%
	Technical 0.054	House buyers' demand 0.192	1.40%
		Detailed risk analysis 0.461	3.40%
		equitable risk allocation and sharing 0.263	1.90%
		appropriate risk allocation and risk sharing 0.164	1.20%
	Profit 0.050	On- time Project approvals and permits 0.112	0.80%
		Transparent Procurement 0.578	3.10%
		Adequate Latest Technology and construction 0.242	1.30%
	Environmental 0.071	Technical competence 0.181	1.00%
		Multi benefit objectives 0.567	2.80%
		Project profitability 0.259	1.30%
	1	Profit assurance for private sector 0.174	0.90%
		Environmental performance of housing facility 0.553	3.90%
		Use of environmental friendly materials 0.277	2.00%
		Environmental protection 0.170	1.20%

**Table 3: Consolidated Global Priorities**

Consistency Ratio CR: 0.7%			
Cat		Priority	Rank
1	Political	9.70%	4
2	Social	9.10%	5
3	Financial	12.10%	1
4	Legislation	11.30%	2
5	Partnership	7.60%	7
6	Land	10.10%	3
7	Project Management	7.70%	6
8	Feasibility Study	7.40%	8
9	Risk	7.40%	9
10	Technical	5.40%	11
11	Profit	5.00%	12
12	Environmental	7.10%	10

In this chapter the analysis of demographics of respondents are discussed in brief. The analysis of the result from the AHP software result has been studied thoroughly. Based on the overall respondent result the critical success factors are arranged in ascending order of their ranks; attribute with highest rank 1 indicates that it has max. Comparative weighted Impact on the success of A.H. in partnership, attribute with lowest rank indicates that it has relatively less impact then other. The consolidated decision matrix has been developed for the group and individual responses. The AHP tool provides not only the group priorities but the analysis of individual priorities.

#### IV. DATA ANALYSIS AND RESULT

The ranking of the Main Criteria of Critical Success Factors for the implementation of PPP model Affordable Housing segment in India. As we all know the sequencing of Construction Project as Feasibility study will be on top but as in this research the ranking of the Critical Success Factors for the implementation of PPP model for Affordable Housing segment in India has done.

The below table consists ranking of main criteria of critical success factors in which financial is on top as critical success factor with maximum priority percentage Weightage. Each factor is important but here the research has found the critically important factors by the comparative weighted analysis of factors using AHP Survey. In the previous chapter the results of AHP survey has been studied thoroughly including study of the response by experts.

**Table 4: Ranking of Main Criteria of CSF in PPP**

Consistency Ratio CR: 0.7%		
Ranking of Level I Main Criteria		Priority
1	Financial	12.10%
2	Legislation	11.30%
3	Land	10.10%
4	Political	9.70%
5	Social	9.10%
6	Project Management	7.70%
7	Partnership	7.60%
8	Feasibility Study	7.40%
9	Risk	7.40%
10	Environmental	7.10%
11	Technical	5.40%
12	Profit	5.00%

Similarly, the ranking of sub criteria is as given below by which we can find out the factors which affect internally the projects and sometimes these factors got less importance which leads to the failure of the PPP model affordable housing. A brief discussion on the top three factors provides analytical approach towards result. By the research the ‘**stable and effective social support**’ got maximum priority Weightage by the experts (which is global priority). According to Juli Ponce (2010), the role of affordable housing as an element to promote social inclusion. The article concludes that public intervention should promote social mix, which could be a useful remedy for urban segregation. The ‘**efficient legal framework**’ is also an important factor which increases the interests of Private partners to have partnership in affordable housing. By research it secured second position in the ranking. The research of Ogunsanmi Olabode Emmanuel (2014), recommends that public agencies should develop viable and robust legal and regulatory framework for PPP implementation as well as government undertaking sufficient public awareness campaign on need to pay for use of infrastructure projects on concession. **Land use Planning**’ “It could be argued that the planning system has a set of expectations on providing an adequate residential land supply, but has no effective means of ensuring that housing – affordable or otherwise – will be developed. The means, i.e. principally development capital, are held and programmed in either the private or public sector. Private developers adjust their strategies and outputs in relation to market demand signals, public sector have had relatively little money to pursue new affordable housing (capital) projects.” So, this factor got relatively higher Weightage in critical success factors of PPP implementation in affordable housing segment in India.

## V. CONCLUSION

Based on the overall respondent result the critical success factors are arranged in ascending order of their ranks; attribute with highest rank 1 indicates that it has max. Comparative weighted Impact on the success of A.H. in partnership, attribute with lowest rank indicates that it has relatively less impact than other.

Ranking	Level 2 Sub Factors	Glb Prio.
1	Stable and effective social support 0.804	7.30%
2	Efficient legal framework 0.557	6.30%
3	Effective land use planning 0.516	5.20%
4	Government guarantee 0.497	4.80%
5	Adequate Funding and its provisions 0.360	4.40%
6	Strong and good private consortium/capable pr 0.544	4.20%
7	Planning and design with fast legal approvals 0.538	4.00%
8	Environmental performance of housing facility 0.553	3.90%
9	Availability of Land 0.346	3.50%
10	Detailed risk analysis 0.461	3.40%
11	Quality Work 0.439	3.40%
12	Access to finance 0.276	3.30%
13	Action against errant developers 0.280	3.20%
14	Transparent Procurement 0.578	3.10%
15	Multi benefit objectives 0.567	2.80%
16	Project economic viability 0.219	2.70%
17	Well-organized and committed public agency 0.267	2.60%
18	Shared authority- openness and communication 0.302	2.30%
19	(Detailed) thorough and realistic assessment 0.296	2.30%
20	Use of environmental friendly materials 0.277	2.00%
21	Favorable locations/Connectivity 0.270	2.00%
22	equitable risk allocation and sharing 0.263	1.90%
23	transparent social situation 0.196	1.80%
24	Favorable legal framework 0.163	1.80%
25	Availability of suitable financial market 0.145	1.80%



26	House buyers' demand 0.192	1.40%
27	Land Finance 0.138	1.40%
28	Project profitability 0.259	1.30%
29	Adequate Latest Technology and construction 0.242	1.30%
30	Transparent political situation 0.136	1.30%
31	Environmental protection 0.170	1.20%
32	appropriate risk allocation and risk sharing 0.164	1.20%
33	Consistent monitoring 0.157	1.20%
34	Indecisiveness-compatibility and strong partn 0.154	1.20%
35	Technical competence 0.181	1.00%
36	Political Willingness/Support 0.100	1.00%
37	Profit assurance for private sector 0.174	0.90%
38	On- time Project approvals and permits 0.112	0.80%
39	<b>Project management success/Support 0.108</b>	<b>0.80%</b>

### Future Scope

The future scope includes an approach to rating system for PPP model Affordable Housing with the critical success factors from the Survey results. The purpose is to understand the issue and well establishment of the rating system. A rating system for PPP model based Affordable housing will have high credibility and acceptance by end user. The rating needs to be dynamic and changing as per the life cycle of Project. The basis for the rating and data used could be complex, but the final rating system generated should be compact & easy. In PPP, quality standard is a benchmark parameter in the concession agreement with the private builder and linked to payment and penalty. However, an independent body can be entrusted to verify and certify the quality standards. Accountability should be built in provision in the contract and the risk should be with private developers.

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