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Critical Success Factors for PPP in State Highway

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Abstract*: *Inadequate infrastructure has been recognised as a major constraint on rapid economic growth. Physical infrastructure involves large investments that can put a strain on the public purse. This strain is grate for countries, especially India, whose economy is undergoing rapid development and has a great need for expanded infrastructure. Considering this, the government has embarked on a policy of promoting public private partnership (PPP) as a means of augmenting investment in infrastructure. The PPP programme in India is led by the road sector project. Over 90 present of the projects awarded on PPP mode in India are in the road sector. PPP in state highways started much later compared to the national highway. This present study tries to fill the gap by investigating the critical success factors (CSFs) for implementation of PPP in state highway sector or project in India. This study used a questionnaire that was prepared from extensive literature review on PPP implementation in different sectors in different countries. The research aim is to identify critical factors for successful implementation of PPP in state highway projects and to explore their ranking. 36 factors were identified critical through literature review and questionnaire was prepared with these factors. The target of this questionnaire was experts from both public and private sectors who were having relevant experience in handling PPP project in road sector. Respondents were asked to rate the degree of agreement regarding criticality against each of identified factors according to five-point likert scale. 112 completed questionnaires were retrieved and were analyzed using ONE WAY ANOVA. Excel was used to calculate the ranking of critical success factors based on mean of all the responses. The five most critical factors that affect implementation of PPP in state highways were: Availability of resources, Project financial Feasibility, Appropriate project Identification, Sound economic policy, Political support. These findings could be used as assessment tool for evaluation of critical success factors for PPP implementation in state highway projects.

Keywords: Public private partnership, Critical success factors, State highway.

Abbreviations and Acronyms
PPP - Public-Private Partnership
CSFs - Critical Success Factors
ANOVA – Analysis of Variance

I. INTRODUCTION

Considering that infrastructure development require huge upfront investments, the Government has embarked on a policy of promoting Public Private Partnership (PPP) as a means of augmenting investment in infrastructure. Besides supplementing the public resources. PPPs provide an opportunity to exploit the private sector efficiencies in project implementation. While measures have been taken since the mid-1990s to induct private participation in different infrastructure sectors, the PPPs gained momentum during the Tenth and Eleventh Plan periods. (NIT) Aayog report 2015). According to World Bank data on Private Participation in Infrastructure, the aggregate investment commitment in PP1 projects was highest in India during 2008-12. A World Bank Report maintained that India remained the largest market for PP1 in the developing world. In the South Asian region. India attracted over 90 per cent of regional investment (Department of Economic Affairs report 2015).

II. NEED OF STUDY

A number of prior studies have investigated the CSFs of PPP projects in different countries. PPP in state highways started much later compared to the national highways. This is mainly due to the absence of a body like NHAI and proper PPP policy at the state level. States were also apprehensive of their institutional strength to manage PPP. However, things have changed over the past few years Indian states have adopted the PPP model in the highways sector. Though some progress has been made in state highways, it has a long way to go because many states still do not have an appropriate policy, institutional framework and willingness to invite the private sector in highway development (Price Waterhouse Coopers report- 2012). Hence, this present study tries to fill the gap by investigating the CSFs for implementation of PPP in India with referring PPP in state highway sector or project. In the present work, a systematic approach has been taken to identify and analyze CSFs for PPP in state highway projects in India.

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III. RESEARCH METHODOLOGY

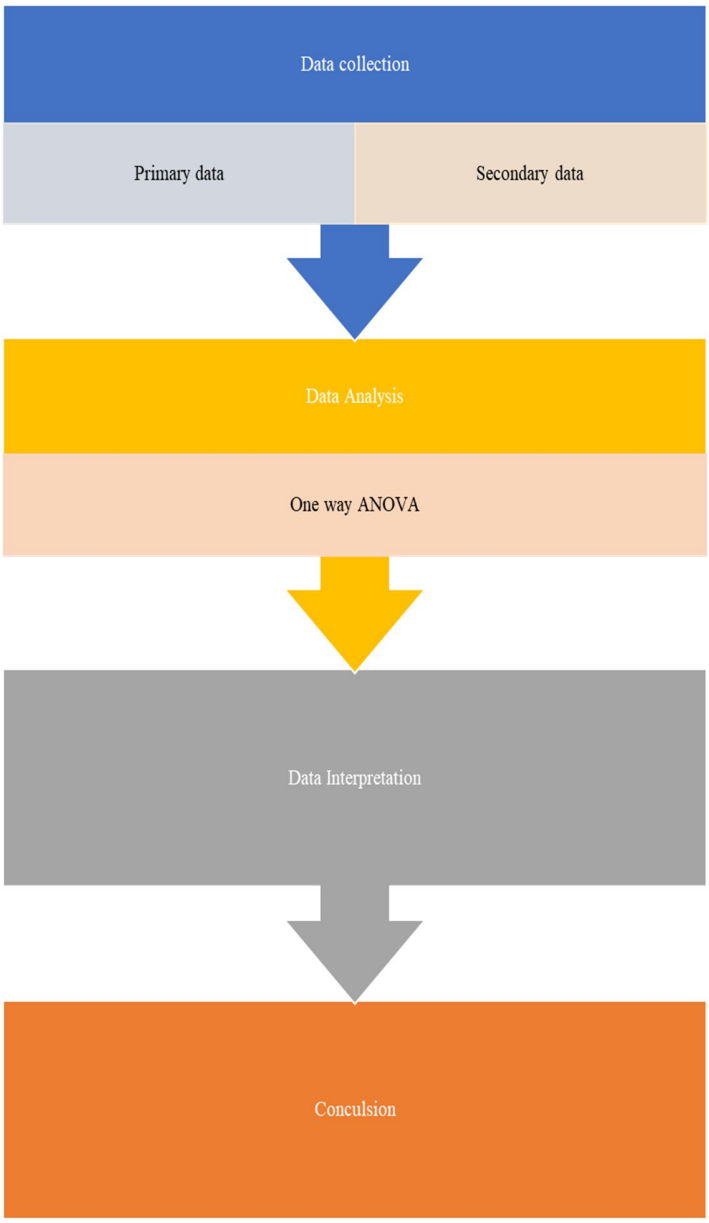
The project research is divided into two groups viz

A. Primary Data

1) To prepare a questionnaire based upon the findings of literature review.
2) To prepare a google form so that the data and responses could be collected for further study.

B. Secondary Data

1) To send the google forms to the experts from both private and public sectors to get the feedback.
2) To give rank and weight to the answers rating from 1-5.
3) To solve the given output with the help of statistical methods to know the important critical success factors.
4) Excel was used to calculate the ranking of critical success factors based on mean of all the responses.
5) Through literature review set of 36 factors were identified as important and are used in questionnaire survey.



Flowchart of project methodology

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IV. DATA ANALYSIS FOR VARIANCE (ANOVA)

The One way ANOVA test can be used when we want to compare means of more than two groups of an independent variable. Where the following parameters are taken in consideration

One-Way ANOVA Table					
Source	Degrees of Freedom DF	Sum of Squares SS	Mean Square MS	F-Stat	P-Value
Between Groups	$k-1$	SS_B	$MS_B = SS_B / (k-1)$	$F = MS_B / MS_W$	Right tail of F(k-1,N-k)
Within Groups	$N-k$	SS_W	$MS_W = SS_W / (N-k)$		
Total:	$N-1$	$SS_T = SS_B+SS_W$			

Between Groups Degrees of Freedom: DF = k − 1, where k is the number of groups
Within Groups Degrees of Freedom: DF = N − k, where N is the total number of subjects
Total Degrees of Freedom: DF = N − 1
Sum of Squares between Groups: SSB = Ski=1ni (xi − x) 2, where ni is the number of subjects in the i-th group
Sum of Squares within Groups: SSW = Ski=1(ni − 1) Si2, where Si is the standard deviation of the i-th group
Total Sum of Squares: SST = SSB + SSW
Mean Square between Groups: MSB = SSB / (k − 1)
Mean Square within Groups: MSW = SSW / (N − k)
F-Statistic (or F-ratio): F = MSB / MSW

ANOVA for Private Sector vs. CSF's for PPP in State Highway Projects

ANOVA						
Source of variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	21.02675	35	0.600764	0.39849	0.999365	1.435792
Within Groups	1396.038	926	1.5076			
Total	1417.064	961				

ANOVA for Public Sector vs. CSF's for PPP in State Highway Projects

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	26.64286	35	0.761224	0.669386	0.929764	1.435184
Within Groups	1105.357	972	1.137199			
Total	1132	1007				

Factors ranking according to public sector

Groups	Average	Rank
1. Long term demand for the project (Importance and demand for the Services offered by the project)	3.964286	22
2. Appropriate project Identification (Choosing and defining one project-Idea out of several alternatives propose)	4.321429	3
3. Project Technical Feasibility (Technical requirements for implementation of project by using proven technology without unclear or too complex definitions)	3.892857	31
4. Project financial Feasibility (Requirements of financial conditions to produce a mutually acceptable financial offer considering present market without any risk.)	4.357143	2
5. Sound economic policy (Attractive financial package feasible for setting of long-term priorities without sharp change in mid-term)	4.214286	5
6. Transparency in the procurement process (Corruption factor. Timely and openly announced bidding procedure)	4.035714	16
7. Competitive procurement process (Bidding procedure allowing more potential bidders in order to increase competition)	4.185185	7
8. Financial capacity of the parties (Ability of all the parties to undertake liabilities and perform such liabilities on long-term basis)	4.107143	10
9. Stable macro-economic condition (Macro-economic condition includes inflation, stable exchange and interest rate etc)	3.928571	25
10. Favourable investment environment (The availability of flexible and attractive financial instruments, such as debit, equity, supplier and purchaser credit, and securities etc which favour to invest in the project.)	4.222222	4
11. Availability of resources (Long term availability of resources and material suppliers for implementation of the project)	4.37037	1
12. Enabling local companies / staff (Availability of local know-how during all stages of the project and also for developing industry)	4.111111	9
13. Multi disciplinary participants (Participants from different disciplines such as finance, insurance, banking, suppliers etc in PPP arrangement)	4.074074	12
14. Leading role by a key enterprise or entrepreneur (Importance of top-level executive such as the chief executive officer or project director as a key project champion that the government can identify with)	4.192308	6
15. Good governance (Efficient way of governing the actions and their manner of implementation for completion the project)	4.185185	7
16. Effective negotiation (Discussions between private and public sector that aimed at reaching an agreement with mutual understanding)	4	17
17. Strong and experienced private consortium (Participation of experienced private partners with proven track record)	3.962963	23
18. Political support (The political will and economic stability of the host government to support the project)	3.888889	32
19. Sound regulatory framework (A basic structure that defines the scope and possible locations for the works/services that are to be required for completion of project)	4.037037	15

20. Favourable legal framework (Reliable contractual arrangement in which every aspect of project is clearly mentioned which is enforced legally)	4.038462	13
21. Government involvement (Government involvement by providing additional guarantees, grants, tax exemptions)	3.807692	35
22. Appropriate risk allocation and risk sharing between public and private partners (Technical risk, construction risk, operating risk, revenue risk, financial risks force majeure risk, environmental risks, political risks)	3.923077	27
23. Commitment of all of the parties (Stable and intensive willingness to seek for mutually beneficial solutions of all of the parties for implementation of the project)	4.038462	13
24. Shared authority amongst the parties (Good relationship and cooperation between the parties for sharing authority with mutual concern)	3.846154	33
25. Thorough and realistic benefit/cost assessment (Assessment whether the implementation of the project does satisfy the needs of majority and gain profit to investors)	3.769231	36
26. Involvement of all of the key parties during project planning (For minimizing the possibility of some unexpected factors evolving during the implementation phase)	3.923077	27
27. Condition of existing infrastructure (Condition of existing alternate infrastructure which affects revenue generation from the project)	4	17
28. Selection of suitable subcontractor(s) (Subcontractor having appropriate technical skills with suitable management styles and is trustworthy, financially credible and experienced)	4.076923	11
29. Management control expertise (Expertise in project management using contemporary network planning techniques and computer-based project management systems)	4	17
30. Social support (General acceptance of the project by society without any agitation against the project)	3.92	30
31. Environmental impact (Environmental impacts on the project location and in associated area include effects on environment-al resources due to alterations or pollution)	3.923077	27
32. A strong monitoring and evaluation (M&E) system (Strong monitoring and evaluation teams for quality control and supervision of the project)	3.925926	26
33. Dispute management policy (Effective conflict management and dispute resolution when differences arise between parties)	3.961538	24
34. Acceptable toll / tariff levels (Acceptable levels of toll / tariff levels that are collected either from public authority on schedule basis or from end users as direct toll)	3.846154	33
35. Unforeseen conditions during project implementation (Unforeseen increase in capital and operating cost or higher than expected service delivery and maintenance cost etc)	4	17
36. Technology transfer (Willingness to share technology in order use it within the partnership and also transfer after the end of the project, if required)	4	17

Factors ranking according to Private sector

Groups	*Average*	Rank
1. Long term demand for the project (Importance and demand for the Services offered by the project)	4.214286	12
2. Appropriate project Identification (Choosing and defining one project-Idea out of several alternatives propose)	4.285714	8
3. Project Technical Feasibility (Technical requirements for implementation of project by using proven technology without unclear or too complex definitions)	4.071429	25
4. Project financial Feasibility (Requirements of financial conditions to produce a mutually acceptable financial offer considering present market without any risk.)	4.428571	2
5. Sound economic policy (Attractive financial package feasible for setting of long-term priorities without sharp change in mid-term)	4.392857	3
6. Transparency in the procurement process (Corruption factor. Timely and openly announced bidding procedure)	4.142857	19
7. Competitive procurement process (Bidding procedure allowing more potential bidders in order to increase competition)	4.392857	3
8. Financial capacity of the parties (Ability of all the parties to undertake liabilities and perform such liabilities on long-term basis)	4.142857	19
9. Stable macro-economic condition (Macro-economic condition includes inflation, stable exchange and interest rate etc)	4.214286	12
10. Favourable investment environment (The availability of flexible and attractive financial instruments, such as debit, equity, supplier and purchaser credit, and securities etc which favour to invest in the project.)	4.285714	8
11. Availability of resources (Long term availability of resources and material suppliers for implementation of the project)	4.535714	1
12. Enabling local companies / staff (Availability of local know-how during all stages of the project and also for developing industry)	4.178571	17
13. Multi disciplinary participants (Participants from different disciplines such as finance, insurance, banking, suppliers etc in PPP arrangement)	4.214286	12
14. Leading role by a key enterprise or entrepreneur (Importance of top-level executive such as the chief executive officer or project director as a key project champion that the government can identify with)	4.178571	17
15. Good governance (Efficient way of governing the actions and their manner of implementation for completion the project)	4.357143	6
16. Effective negotiation (Discussions between private and public sector that aimed at reaching an agreement with mutual understanding)	4.25	10
17. Strong and experienced private consortium (Participation of experienced private partners with proven track record)	4.071429	25
18. Political support (The political will and economic stability of the host government to support the project)	4.392857	3
19. Sound regulatory framework (A basic structure that defines the scope and possible locations for the works/services that are to be required for completion of project)	4.357143	6
20. Favourable legal framework (Reliable contractual arrangement in which every aspect of project is clearly mentioned which is enforced legally)	3.928571	34
21. Government involvement (Government involvement by providing additional guarantees, grants, tax exemptions)	4.035714	28
22. Appropriate risk allocation and risk sharing between public and private partners (Technical risk, construction risk, operating risk, revenue risk, financial risks force	4.142857	19

majeure risk, environmental risks, political risks)		
23. Commitment of all of the parties (Stable and intensive willingness to seek for mutually beneficial solutions of all of the parties for implementation of the project)	4.25	10
24. Shared authority amongst the parties (Good relationship and cooperation between the parties for sharing authority with mutual concern)	4.107143	23
25. Thorough and realistic benefit/cost assessment (Assessment whether the implementation of the project does satisfy the needs of majority and gain profit to investors)	4.214286	12
26. Involvement of all of the key parties during project planning (For minimizing the possibility of some unexpected factors evolving during the implementation phase)	4.214286	12
27. Condition of existing infrastructure (Condition of existing alternate infrastructure which affects revenue generation from the project)	4.142857	19
28. Selection of suitable subcontractor(s) (Subcontractor having appropriate technical skills with suitable management styles and is trustworthy, financially credible and experienced)	4.071429	25
29. Management control expertise (Expertise in project management using contemporary network planning techniques and computer- based project management systems)	4	30
30. Social support (General acceptance of the project by society without any agitation against the project)	4.035714	28
31. Environmental impact (Environmental impacts on the project location and in associated area include effects on environment-al resources due to alterations or pollution)	4	30
32. A strong monitoring and evaluation (M&E) system (Strong monitoring and evaluation teams for quality control and supervision of the project)	4.107143	23
33. Dispute management policy (Effective conflict management and dispute resolution when differences arise between parties)	3.928571	34
34. Acceptable toll / tariff levels (Acceptable levels of toll / tariff levels that are collected either from public authority on schedule basis or from end users as direct toll)	3.785714	36
35. Unforeseen conditions during project implementation (Unforeseen increase in capital and operating cost or higher than expected service delivery and maintenance cost etc)	3.964286	32
36. Technology transfer (Willingness to share technology in order use it within the partnership and also transfer after the end of the project, if required)	3.964286	33

V. INFERENCES

Results of ANOVA for "Private Sector vs. CSFs" conclude that "All the factors having significance greater than 0.05 are said to be failed to reject null hypothesis. From above table it can be observed that the respondents of Privet Sector agree upon 36 factors." Results of ANOVA for "Public Sector vs. CSFs" concluded that "All the factors having significance greater than 0.05 are said to be failed to reject null hypothesis. From above table it can be observed that the respondents of Public Sector agree upon 36 factors."

VI. RESULT AND DISCUSSION

All the factors having significance greater than 0.05 are said to be failed to reject null hypothesis which means these factors are having agreement in opinions.

From above table it can be observed that the respondents of Public and Private Sector agree upon 36 out of 36 factors.

Thus overall it has failed to reject the null hypothesis and so conclusion can be drawn as there is no significant difference among construction professionals of public and private sector in opinion for CSFs for PPP state highway projects.

The top five CSF's among respondents of public sector is (1) Availability of resources (mean. 4.37), (2) Project financial Feasibility (mean. 4.42), (3) Appropriate project Identification (4.39), (4) Favorable investment environment (4.39), (5) Sound economic policy

(4.21). The top five CSF's among respondents of private sector is (1) Availability of resources (mean. 4.53), (2) Project financial Feasibility (mean. 4.42), (3) Sound economic policy (4.39), (4) Competitive procurement process (4.39), (5) Political support (4.39). It is seen that most influential factor for implementation of PPP in state highway projects is "Availability of resources".
In public sector "Thorough and realistic benefit/cost assessment" (mean. 3.76) is the factor having least agreement on opinions
In private sector "Acceptable toll / tariff levels" (mean. 3.78) is the factor having least agreement on opinions.

VII. CONCLUSION

In chapter includes the conclusions and recommendations that improve implementation of PPP in state highway projects. The main contribution of this study is to identify most important factors that affect PPP implementation in state highways.
In this study, an attempt was made to investigate CSFs for PPP in state highway projects. With focus on different aspects of this topic, various factors were considered from literature. Finally 36 CSFs were identified as important and they were considered in preparing questionnaire survey. This questionnaire survey was distributed to 100 construction professionals who are having good experience in handling PPP in highway projects. These construction professionals comprise of both public and private sector. Of them, 52 questionnaires (52% response rate) were completed and returned back. For analysis of these responses ONE WAY ANOVA was used. Analysing these responses, factors ranking was obtained based on mean of all the responses. The top five CSF's among respondents of public sector is (1) Availability of resources (mean. 4.37), (2) Project financial Feasibility (mean. 4.42), (3) Competitive procurement process (4.39), (4) Competitive procurement process (4.39), (5) Sound economic policy (4.21). The top five CSF's among respondents of private sector is (1) Availability of resources (mean. 4.53), (2) Project financial Feasibility (mean. 4.42), (3) Appropriate project Identification (4.39), (4) Favourable investment environment (4.39), (5) Political support (4.39). One way ANOVA test was undertaken in order to see whether there was a consistency in opinions among the construction professionals from different organizations on every particular factor. From this ANOVA test it was found that there was no significant difference among construction professionals of public and private sector in opinion for CSFs for PPP state highway projects.

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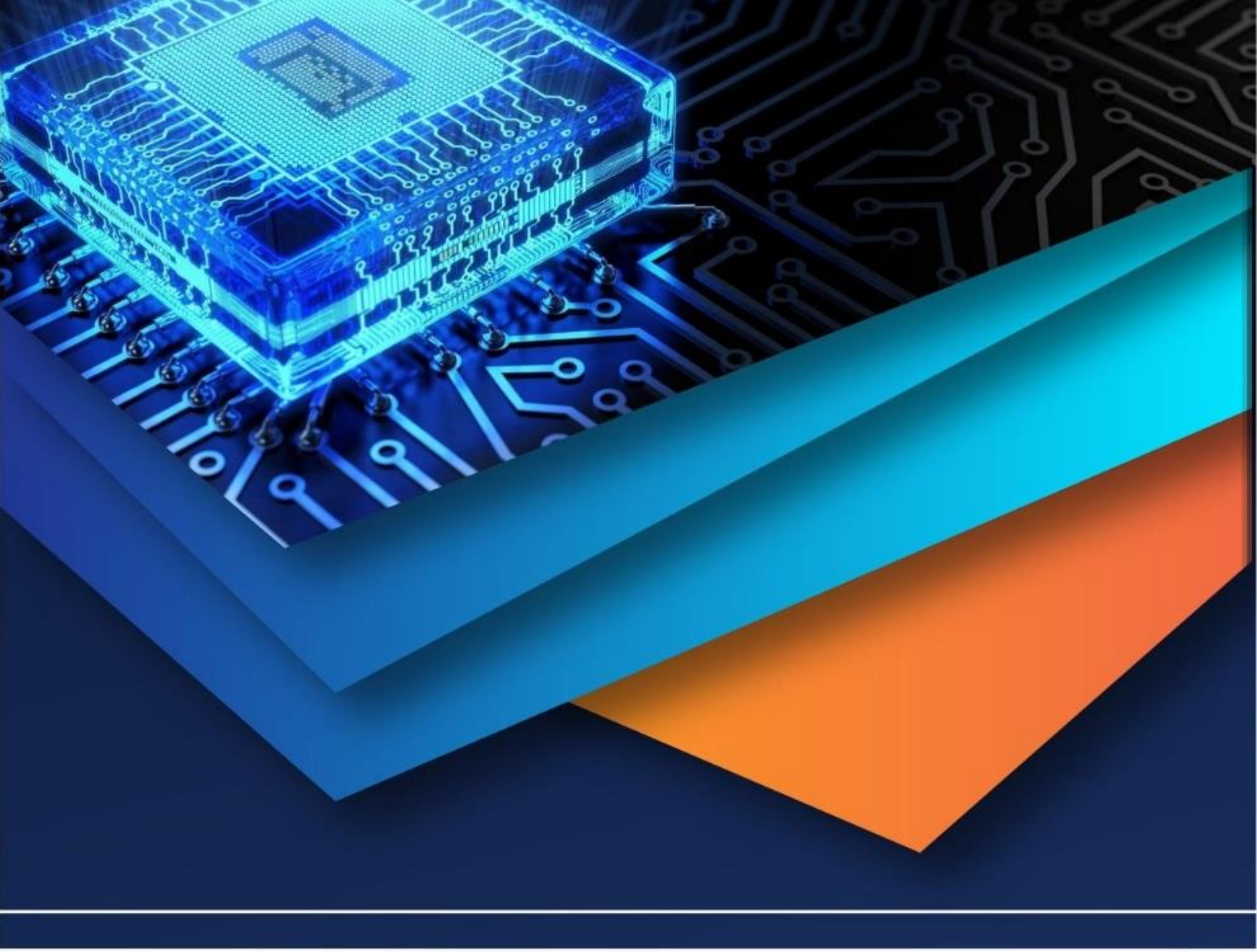

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