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QUALITATIVE RISK ASSESSMENT AND MITIGATION MEASURES FOR REAL ESTATE PROJECTS IN MAHARASHTRA

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Abstract— The success rate of real estate project is decreasing as there is large scale of project and participation of entities. It is necessary to study the risk factors involved in the project. This paper focused on types of risks involved in the project, risk factors, risk management tools & techniques. Identification of risk of the project in terms of the total cost of the project has been divided under Technical, Financial, Socio-political and Statutory cost centers. Large real estate projects have to tackle the following issues: land acquisition, skilled-labour shortage, non-availability of skilled project managers, and mechanization of the construction process to cater to the growing demands. Non- availability of supporting infrastructure, political issues like instability of the government leading to regulatory issues, social issues, marketing forms an important part in these projects as this is a onetime investment and the purchase cycle is long , long development period makes the same project be at different points in the real estate value cycle.

This paper leads to an analysis part of risk management on the basis of several analysis techniques, checklists, risk register, expert view etc. Qualitative & Quantitative assessment is carried out for risk involved in project. This study is useful for analyzing large scale real estate projects in Maharashtra; also suggest mitigation steps for different categories of risks.

Keywords: Mitigation, Real Estate, Risk, Risk management.

I. INTRODUCTION

The term real estate stands as land, including the air above and the ground below it and any buildings or structures on it. It is also referred to as reality. It covers residential housing, commercial offices trading spaces such as theatres, hotels and restaurants, retail outlets, industrial buildings such as factories and government buildings[9]. Real estate involves the purchase, sale, and development of land, both residential and non-residential buildings. The main players in real estate market are the landlords, developers, builders, real estate agents, tenants, buyers, etc. the activities of real estate sector encompasses the housing and construction sector.

A risk can be defined as exposure to the possibility of economic and financial loss or gain, physical damages or injury, or delay as a consequence of the uncertainties associated with pursuing a particular course of action. Risk can also be defined as coalescence of all the uncertain factors which will have a combined negative effect on the objectives of the project.

Large scaled real estate projects can be defined as the projects which are large scale, ranging from integrated townships to large commercial developments, IT Parks and SEZ projects with project duration varying from 3 to 20 years. Government of India recognizes that knowledge based activities will be the economic drivers in the future. This includes IT and IT Enabled services such as Knowledge Process Outsourcing and Business Process Outsourcing. It also includes emerging technology areas such as Biotech, energy related research, financial services, contract research and host of such other activities. Knowledge based industries require high end commercial and residential built environment along with high quality infrastructure. Since these sectors are manned by the younger population, availability of good quality health services, educational institutions and modern entertainment facilities will drive such development.

Project encounter risks at every phase of project. Stakeholders involve in projects are facing following risks.

A. Lender's Perspective of Risks

This is mainly associated with the bankability of the project. They are as follows:-

a) Clear legal basis and clearances of approvals for the project
b) Control over revenue stream
c) Certainty over Project Costs
d) Monitoring of Project costs
e) Participation of major stakeholders.
f) Adequate risk allocation

B. Developer's Perspective of Risks

a) Ability to implement the project in a commercially viable manner
b) Certainty of costs
c) Return on investment
d) Distribution and management of risks
e) Control over revenue stream

C. Government's Perspective of Risks

This perspective is a broader and more importance is given to the impact to society:-

a) To prevent unjust enrichment by the Developer
b) Prevent Abuse of monopoly
c) Environmental issues and impact
d) Rehabilitation and Resettlement
e) Social impact of the project

D. Contractor's perspective of Risks

a) Financial solvency of the developer
b) Policies and framework of the developer's Firm
c) Contractual liabilities
d) Mobilization Advances
e) Incentives and bonuses if any and penalty clauses.

Promoters would invest in a project only if the risks in the project are less than the reward, which the project fetches. The types of risks are as follows:-

1. Market and Revenue Risks
2. Design Risks

3. Construction Risks
4. Operating Risks Financial Risks
5. Political Risks
6. Legal Risks
7. Environmental Risks
8. Force Majeure Risks

II. OBJECTIVES OF STUDY

1. To understand the large scale real estate Projects and the growing need for same in Indian Scenario
2. To identify and analyze the various risks i.e. present and the future risks which may occur during the project construction and maintenance.
3. To prepare and recommend a checklist for identification of risks and their mitigation measures in the project under consideration

III. METHODOLOGY OF RESEARCH

This research follows a step by step methodology which started with identifying the risk area of study followed by data collection from various sources. Initially it is observed that risk of the project is more at execution stage but which is perception. Study & site survey come to a conclusion that risk involved in project can be separated by life cycle of project. For the risk calculation, life of the project divided in to following groups:

1) Concept and Feasibility Study Phase (Stage I- C1)
2) Fund Raising & Financial Closure (Stage II- C2)
3) Tendering, Bidding & Award Of Project (Stage III- C3)
4) Project Planning & Main Procurement (Stage IV- C4)
5) Contract Execution, Monitoring And Control (Stage V- C5)
6) Project Closure, Sale / Operations And Maintenance (Stage VI- C6)

The later part deals with using the facts or information that risk has to measure in *its* ***identification stage, severity, probability & impact on project***. This study conducted questionnaire survey from industry experts & professional in matrix form which contents mainly 6 phases of project & measurements of risk. Sample questionnaire is shown table 1:

Table 1

Expert/ Professional 1					
Section C1/C2/C3/C4/C5/C6					
RISK ASSESSMENT AT PROJECT LIFE CYCLE					
Sr No	Description of Main Risks likely at this Stage of Project	Can Detect this risk in advance	Rating for Severity of Loss due to this Risk on a Scale of 5	Rating for Probability of this Risk happening on a Scale of 5	Impact on Project Delays

Already available and analyzing these to make a critical evaluation of the risk with the help of certain cases. Collecting financial data from companies is difficult since it is confidential and not transparent; hence due to company policies we are not able to obtain complete details.

With this questionnaire output, from 50 industrial experts this paper further continues with analysis based on phase & counts its criticality on number scale. Identification of risk at or detection of risk is possible or not is measures on 1 to 3 point scale which emphasize on forecasting of risk in different stages. Severity is also counted on 1 to 5 number scale which examine the severity of the risk in particular phase. Probability is counted on 1 to5 scale where impact is found on 1 to 3 scales. Impact of risk mentioned by professional is varying from LOW-MEDIUM-HIGH.

Then Risk Priority Number and Risk Probability number were calculated as follows

Risk Priority Number = Probability × Impact

Risk Probability Number = Probability×Impact×Detection.

Based on Risk Probability Number the criticality of risks was found out:

0 to 2 – Low risk, 2 to 4 – Medium risk, 4 to 6 – High risk.

In all the questionnaires were distributed to 100 stakeholders, out of which 70 questionnaires were received.

While distributing the questionnaires, stakeholders were projected. All the stakeholders from contractor, site engineer, project manager and owner were taken into consideration.

Once the questionnaires were received, they were studied and out of which 50 questionnaires were selected as the information filled was found to be more relevant and proper.

IV. OBSERVATIONS & DISCUSSIONS

This study observed following observations as:

Table2

A. Concept and Feasibility Study Phase (Stage I- C1)

Sr. No.	**Description of Main Risks likely at this Stage of Project**	**Can Detect this risk in advance**	**Rating for Severity of Loss**	**Rating for Probability of this Risk happening**	**Impact on Project Delays**	**Risk Priority number**	**Effect of risk based on Risk Priority number**	**Risk Probability Number**
1.	Prefeasibility of concept not matching with the broader economic and policy trends prevalent in the country	1.64	2.08	2.08	1.46	3.03	Medium	4.98
2.	Feasibility w.r.t. specific area where the project is proposed.	1.74	2.02	1.76	1.72	3.02	Medium	5.26
3.	Constructability of Project concept not in line w.r.t. Design & Engineering capabilities in your Organization.	2.12	1.82	1.5	1.76	2.64	Medium	5.59

4.	Lack of Clarity about legal framework and restriction under which Project is to be implemented.	2.08	2	2.22	2.14	4.75	High	9.88
5.	Uncertainty about Political policy changes adversely affecting the project at the later stages of Execution.	1.94	1.58	1.82	2.14	3.89	Medium	7.55
6.	Rejection of proposal by concerned authority.	1.88	1.14	1.5	2.14	3.03	Medium	4.98

Above table is a matrix of certain stages in phase with its average occurrence in 3 point scale, varying from LOW-MEDIUM-DIFFICULT. "***Constructability of Project concept not in line with respect to Design & Engineering capabilities in your Organization"*** can be detected with an average of 2.12 on 3 point scale. It means that more risk is involved in detection of this risk.

The severity of risk involved in at C1 is low (below 50%) and having range of 1.14 to 2.08 on 5 point rating likewise probability is also low (below 50%) and having range of 1.5 to 2.22 on 5 point scale. Factors like ***"Lack of Clarity about legal framework and restriction under which Project is to be implemented"*** are having more occurrences at an average 2.22 points. Impact of risks involved in C1 is quiet high (above 50%) except the term ***"Prefeasibility of concept not matching with the broader economic and policy trends prevalent in the country."***

The effect of risks ranges from medium to high. The term ***"Lack of Clarity about legal framework and restriction under which Project is to be implemented"*** has the highest risk and also the probability number is high. Hence special attention should be given to this activity.

B. Fund Raising & Financial Closure (Stage II- C2)

As per table 3 Risk can be detected at higher point scale in at this phage of life of project which is varying from 1.54 to 2.28 on 3 point scale. Most probably risk involved in detection is ***"various permissions to be obtained from authorities are not clearly identified"***

Severity & probability are nearly 50% & impact is more than 50% in this stage. While interviewing to professional, an important thing come to know that ***'All type of risks are originating from this phase of life'.***

The effect or risk ranges from medium to high. Factors ***"Budget Allocation and willingness of Financial Institute (Domestic and Foreign) for funding the project is not firmly established & Detailed Project Report available is not based on realistic data about demand, volume and growth prospects"*** have high risks but the factor "***Detailed Project Report available is not based on realistic data about demand, volume and growth prospects"*** has more risk probability number. Hence special attention should be given to this factor.

C. Tendering, Bidding & Award of Project (StageIII-C3)

As per table 4, Risk can be detected at higher point scale in at this phase of life of project which is varying from 1.9 to 2.54 on 3 point scale. Most probably risk involved in detection is ***"The environmental Impact Assessment is not available or clearances to be obtained as per provisions of the Law are not made clear."***

Severity, probability & impact are average in this stage. Impact at this phase is less than 50%; the professional can handle tendering clauses & modify it into situations.

The effect of risks ranges from low to high. The factor ***"Assessment of offer made without proper weightage to various factors such as expertise, experience, equipment and financial capability"*** has high risk and also its risk probability number is also high and hence special care should be taken at this stage of project.

Table3

Sr. No.	Description of Main Risks likely at this Stage of Project	Can Detect this risk in advance	Rating for Severity of Loss due to this Risk on a Scale of 5	Rating for Probability of this Risk happening on a Scale of 5	Impact on Project Delays	Risk Priority number	Effect of risk based on Risk Priority number	Risk Probability No.
1.	Budget Allocation and willingness of Financial Institute (Domestic and Foreign) for funding the project is not firmly established.	1.54	2.6	2.5	1.76	4.4	High	6.77
2.	Detailed Project Report available is not based on realistic data about demand, volume and growth prospects.	2.02	2.04	2.1	1.94	4.07	High	8.22
3.	Delay due to budget approvals from concerned authority.	2.02	1.44	1.48	1.96	2.90	Medium	5.85
4.	Various permissions to be obtained from Authorities are not clearly identified.	2.28	1.78	1.52	2.14	3.25	Medium	7.41
5.	Mobilization of finance.	2	1.46	1.86	2.12	3.94	Medium	7.88
6.	Lack of clarity in specifications and cost estimates.	1.82	2.32	1.48	2.22	3.28	Medium	5.97

Table 4

Sr. No.	Description of Main Risks likely at this Stage of Project	Can Detect this risk in advance	Rating for Severity of Loss due to this Risk on a Scale of 5	Rating for Probability of this Risk happening on a Scale of 5	Impact on Project Delays	Risk Priority number	Effect of risk based on Risk Priority number	Risk Probability No.
1.	Non-availability of correct details of scope of work without any ambiguity along with necessary drawings and applicable standards	1.94	2.76	2.48	1.5	3.72	Medium	7.21
2.	Properly prequalified contractors participating in the competitive bidding process is not assured.	2.02	1.82	1.5	1.94	2.91	Medium	5.87
3.	Availability of Professional Consultant for Designing and Project monitoring at Client's side is not established.	1.9	2.16	1.54	2.34	3.60	Medium	6.84
4.	Appropriate selection of type of contract and balanced contract conditions are not provided.	2.22	1.58	1.3	2.32	3.01	Medium	6.69
5.	Assessment of offer made without proper weightage to various factors such as expertise, experience, equipment and financial capability.	1.98	2	2.04	2.2	4.48	High	8.88
6	Various permissions to be obtained from Authorities are not clearly identified	2.5	0.92	1.32	2.46	3.24	Medium	8.11
7	The environmental Impact Assessment is not available or clearances to be obtained as per provisions of the Law are not made clear.	2.54	0.8	0.74	2.5	1.85	Low	4.69
8.	Comprehensive Insurance provisions against various Risk and Force Majeure conditions are not clearly specified	2.42	1.12	1.56	2.24	3.49	Medium	8.45

D. Project Planning & Main Procurement (Stage IV-C4)

As per table 5, Risk can be detected at higher point scale in at this phase of life of project which is varying from 1.78 to 2.5 on 3 point scale. Most probably risk involved in detection is ***"Procedure for payment of imported components is not properly established including the risk of foreign currency exchange rates."***

Severity, probability & impact are average in this stage. Impact at this phase is more than 50%. The effect of risks ranges from medium to high. The factor ***"Key procurement items are not properly identified and are not available in appropriate time frame"*** has high risk and the risk probability number is also high and hence special attention has to be given in this stage.

Table 5

Sr. No.	Description of Main Risks likely at this Stage of Project	Can Detect this risk in advance	Rating for Severity of Loss due to this Risk on a Scale of 5	Rating for Probability of this Risk happening on a Scale of 5	Impact on Project Delays	Risk Priority number	Effect of risk based on Risk Priority number	Risk Probability No.
1.	Site is not made available to contractor with suitable access without encumbrances.	1.78	2.32	2.4	1.66	3.98	Medium	7.02
2.	Full details of Mobilizations are not clear and possible in specified time.	1.8	1.78	1.88	1.7	3.19	Medium	5.7
3.	Basic layout designs are not available and detailed drawing is not approved in time.	1.9	1.82	1.82	2.14	3.89	Medium	7.40
4.	Key procurement items are not properly identified and are not available in appropriate time frame.	2.16	1.06	1.9	2.18	4.14	High	8.94

5.	Client–contractor, progress reporting mechanism is not established, based on suitable software.	2.22	1.84	1.42	1.9	2.69	Medium	5.98
6	Client's decision on major procurement and technical decisions not available in time.	2.12	0.82	1.36	2.32	3.15	Medium	6.68
7	Procedure for payment of imported components is not properly established including the risk of foreign currency exchange rates.	2.5	0.8	1.36	2.6	3.53	Medium	8.8
8.	Mechanism for Dispute settlement in case of claims is not clearly established	2.42	0.88	1	2.3	2.3	Medium	5.5
9.	Provision for changes in Legislation or statutes are not provided in the contract, regarding cost impact.	2.34	0.36	1.76	2.3	4.0	Medium	9.47
10	Provision for escalation of cost of Material, Labor, Equipment and fuel etc is not properly established.	2.14	1.1	1.68	1.98	3.32	Medium	7.11
11.	Geological and Hydrological site data by client not matching with site conditions	2.3	1.34	1.16	2.34	2.71	Medium	6.24

E. Contract Execution, Monitoring and Control (Stage V-C5)

An overview of table 6 says that most risks are involved in it. Implementation involves more of headcounts and number of types of personnel. Execution stage deals with the risk related to quality, safety, equipment, material, manpower, uncertainties, scope variation, methodology and suspension due to quality nonconformance.

Detection is more than 50% at this stage which means detection is quiet difficult at implementation stage and is a big challenge. Impact is also more especially at the stage of ***"Lack of safety precautions resulting into serious accidents."***While discussion with expert, a generalized view is ***'safety is a headache in the construction which involves much hidden costs, mental imbalance and legalities.'***

Effect or risk ranges from low to high. Most number of high risks is seen in this stage. But the factor **"Non–availability of materials & proper subcontractors which are affecting the progress of work"** has high risk and also its probability number is very high and hence proper attention should be given.

F. Project Closure, Sale / Operations and Maintenance (Stage VI-C6)

As per table 7, Detection of risk is higher at this stage varying from 2 to 2.54 with the point ***"Competitive facility coming up at later date affecting the revenue projections of your projects"*** carrying most points. Impact is also high (more than 50%) in this stage.

The effect of the risks ranges from low to high. There are three factors carrying high risks but the factor "**Support service of contractor during defect liability period not available and retention guarantee not settled"** carries most points which require most attention.

Table 6

Sr. No.	Description of Main Risks likely at this Stage of Project	Can Detect this risk in advance	Rating for Severity of Loss due to this Risk on a Scale of 5	Rating for Probability of this Risk happening on a Scale of 5	Impact on Project Delays	Risk Priority number	Effect of risk based on Risk Priority number	Risk Probability No
1.	The Contractor's Equipment for construction is having spare part and maintenance problems	1.7	2.74	2.88	1.82	5.24	High	8.9
2.	Land acquisition necessary for Project is not complete or not available in suitable stages.	1.86	1.44	2.54	1.92	4.87	High	9.070
3.	Non–availability of materials & proper subcontractors which are affecting the progress of work	2.2	1.6	2.84	2.08	5.90	High	12.99
4.	Changes in client's design are not clear and matching, cost and time changes are not agreed.	2.02	1.4	1.78	2.28	4.05	Medium	8.19
5.	Proper setting up of Quality Control and Testing mechanism is not established.	2.3	1.18	1.5	2.08	3.12	Medium	7.17
6	Approval of construction method	2.2	0.92	0.84	2.34	1.96	Low	4.32

	statements by client is not achieved in time with differences of opinion.							
7	Unforeseen Force Majeure conditions are not well understood and compensation mechanism is not developed.	2.16	0.94	1.12	2.26	2.5312	Medium	5.467
8.	Foreseen and controllable Force Majeure conditions are not identified for prevention and control.	2.3	1.22	1.74	2.16	3.7584	Medium	8.64
9.	Scope variation mechanism is not established for carrying out amendment with compensation	2.22	1.28	1.56	2.12	3.3072	Medium	7.34
10	Suspension of Work due to reasons under Client's control is not properly understood.	2.4	0.92	1.46	2.3	3.358	Medium	8.05
11.	Lack of safety precautions resulting into serious accidents.	2.32	0.66	0.76	2.54	2.71	Medium	6.24

Table 7

Sr. No.	Description of Main Risks likely at this Stage of Project	Can Detect this risk in advance	Rating for Severity of Loss due to this Risk on a Scale of 5	Rating for Probability of this Risk happening on a Scale of 5	Impact on Project Delays	Risk Priority number	Effect of risk based on Risk Priority number	Risk Probability No.
1	Non Settlement dispute about reasons of delays and time extension needed to complete the project	2.14	2.98	2.82	1.82	5.13	High	8.91
2	Delays in settlement of pending claims and contract closer with final payments.	2	1.8	2.88	2	5.76	High	9.07
3	Support service of contractor during defect liability period not available and retention guarantee not settled.	2.36	1.84	3.16	1.98	6	High	12.99
4	Non co-operation of end users for proper use and payment of services.	2.48	1.16	1.36	1.92	2.61	Medium	8.19
5	Support of local and state level bodies in smooth functioning of the infrastructure assets, is not available.	2.5	1.38	1.46	2.24	3.27	Medium	7.17
6	Support of law and order authority for the maintaining peace and smooth working is not provided.	2.46	0.62	1	2	2	Low	4.32
7	Growth in end users numbers not in line with projections due to interest rate fluctuations rising inflation levels etc.	2.04	1.22	1.46	2.34	3.41	Medium	5.46
8	Competitive facility coming up at later date affecting the revenue projections of your projects.	2.54	1.64	0.86	2.34	2.01	Medium	8.64
9	Cost overruns of maintenance expenses reducing the income margins for the contractor.	2.44	1.36	1.1	2.26	2.48	Medium	7.34
10	Delay in payment.	2.32	1.38	0.66	2.56	1.68	Low	8.05

V. CONCLUSION

1. Large real estate projects in Maharashtra have been understood and its current scenario has been studied.
2. Various risks have been identified according to life cycle of projects and have been classified.
3. At Concept and Feasibility Study Phase, severity & probability is low but impact is high ranging from 1.46 to 2.14 and the risk '**Lack of Clarity about legal framework and restriction under which Project is to be implemented'** is the most critical risk.
4. At fund raising & Financial closure Phase, Severity & Probability are nearly 50% & Impact is more than 50%. The "**Detailed Project Report available is not based on realistic data about demand, volume and growth prospects"** is most critical.
5. At Tendering, Bidding & Award of Project Phase, severity & probability are average. Impact is less than 50%. The risk **"Assessment of offer made without proper weightage to various factors such as expertise, experience, equipment and financial capability"** is most critical.
6. At project planning and main procurement Phase, Severity & Probability are average. Impact is more than 50%. The risk **"Key procurement items are not**

properly identified and are not available in appropriate time frame" is most critical.

7. At Contract Execution, Monitoring and Control Phase, Detection & Impact of risks is more than 50%. This stage includes most number of highly critical risks. The risk **"Non–availability of materials & proper subcontractors which are affecting the progress of work"** is most critical.
8. At Project Closure, Sale / Operations and Maintenance Phase, Detection & Impact of risks is more than 50%. The risk "**Support service of contractor during defect liability period not available and retention guarantee not settled"** is most critical.
9. Following are the measures to mitigate risks:

1. CONCEPT AND FEASIBILITY STUDY PHASE (STAGE I- C1)			
Sr.No.	**Description of risk**	**Criticality of risk**	**Strategy to mitigate risk**
1.	Prefeasibility of concept not matching with the broader economic and policy trends prevalent in the country	Medium	Finalize and lock project scope.
2.	Feasibility w.r.t. specific area where the project is proposed.	Medium	Thorough feasibility studies should be carried prior to project.
3.	Constructability of Project concept not in line w.r.t. Design & Engineering capabilities in your Organization.	Medium	The project scope should be defined properly and according to it the design should be carried out.
4.	Lack of Clarity about legal framework and restriction under which Project is to be implemented.	High	To provide an enabling legal & statutory framework. The tender documents should be standardized by the government and documents should be made available to various implementing agencies for use.
5.	Uncertainty about Political policy changes adversely affecting the project at the later stages of Execution	Medium	To do full study about the political policies of the region & to make provisions if any changes occurs
6.	Rejection of proposal by concerned authority.	Medium	Prevention measures should be there.
2. FUND RAISING & FINANCIAL CLOSURE (STAGE II- C2)			
Sr.No.	**Description of risk**	**Criticality of risk**	**Strategy to mitigate risk**
1.	Budget Allocation and willingness of Financial Institute (Domestic and Foreign) for funding the project is not firmly established.	High	Detailed estimation and secured sources of financing. Have proper budget allocation.
2.	Detailed Project Report available is not based on realistic data about demand, volume and growth prospects.	High	To do a detailed survey on the present and past scenario.
3.	Delay due to budget approvals from concerned authority.	Medium	Complete all approvals well in advance
4.	Various permissions to be obtained from Authorities are not clearly identified.	Medium	Timely completion of all required permits.
5.	Mobilization of finance.	Medium	Detailed estimation and secured sources of financing
6.	Lack of clarity in specifications and cost estimates.	Medium	Have watch on market and legal aspects. Forecast future requirements and bulk purchase.
3. TENDERING, BIDDING & AWARD OF PROJECT (STAGE III-C3)			
Sr.No.	**Description of risk**	**Criticality of risk**	**Strategy to mitigate risk**
1.	Non-availability of correct details of scope of work without any ambiguity along with necessary drawings and applicable standards	Medium	Finalize and lock project scope and have contractual provision for the same.
2.	Properly prequalified contractors participating in the competitive bidding process is not assured.	Medium	Decide prior to project the required level of qualification and assure.
3.	Availability of Professional Consultant for Designing and Project monitoring at Client's side is not established.	Medium	Hire specialized Consultant with proper and required experience in the respective field.
4.	Appropriate selection of type of contract and balanced contract conditions are not provided.	Medium	To study properly which type of contract should be adopted to have minimum losses and all the contract conditions should be properly verified by the experienced people.
5.	Assessment of offer made without proper weightage to various factors such as expertise, experience, equipment and financial capability.	High	Proper weightage should be given to the companies depending upon their expertise and experience so that their will not be any issues in carrying out the work in required manner
6.	Various permissions to be obtained from Authorities are not clearly identified	Medium	Timely completion of all required permits.
7.	The environmental Impact Assessment is not available or clearances to be obtained as per	Low	Try to minimize losses and make provisions for the same.

	provisions of the Law are not made clear.		
8.	Comprehensive Insurance provisions against various Risk and Force Majeure conditions are not clearly specified	Medium	To make a proper & legal contract for getting insurance for Force Majeure conditions.
4. PROJECT PLANNING & MAIN PROCUREMENT(STAGE IV-C4)			
Sr.No.	**Description of risk**	**Criticality of risk**	**Strategy to mitigate risk**
1.	Site is not made available to contractor with suitable access without encumbrances.	Medium	Propose convincing compensation considering future threats and benefits.
2.	Full details of Mobilizations are not clear and possible in specified time.	Medium	Complete all approvals well in advance.
3.	Basic layout designs are not available and detailed drawing is not approved in time.	Medium	Timely completion of all required designs & drawings and to keep a follow up for approving.
4.	Key procurement items are not properly identified and are not available in appropriate time frame.	High	Don't rely on single supplier and forecast future requirements well in advance.
5.	Client–contractor, progress reporting mechanism is not established, based on suitable software.	Medium	Every detail on site should be properly reported by the contractor to the client by use of suitable software and keep the client updated so that there will not be any disputes.
6.	Client's decision on major procurement and technical decisions not available in time.	Medium	Timely completion of all the needed procurement and keeping the follow up with client.
7.	Procedure for payment of imported components is not properly established including the risk of foreign currency exchange rates.	Medium	Establishment of Foreign Contract. Have proper contractual process or Find local supplier.
8.	Mechanism for Dispute settlement in case of claims is not clearly established	Medium	To establish a proper Dispute Resolution Board and to make clear in the contract the measures to be taken if such a condition occurs.
9.	Provision for changes in Legislation or statutes are not provided in the contract, regarding cost impact.	Medium	Necessary Provisions should be provided in Contract
10.	Provision for escalation of cost of Material, Labor, Equipment and fuel etc is not properly established.	Medium	Have watch on market and legal aspects. Forecast future requirements and bulk purchase
11.	Geological and Hydrological site data by client not matching with site conditions	Medium	To do a proper and detailed survey of the site with proper experiments and tests.
5. CONTRACT EXECUTION, MONITORING AND CONTROL(STAGE V-C5)			
Sr.No.	**Description of risk**	**Criticality of risk**	**Strategy to mitigate risk**
1.	The Contractor's Equipment for construction is having spare part and maintenance problems	High	Identify critical equipment exposures. Ensure proper routine maintenance. Include equipment breakdown contingencies in the contract.
2.	Land acquisition necessary for Project is not complete or not available in suitable stages.	High	Propose convincing compensation considering future threats and benefits
3.	Non–availability of materials & proper subcontractors which are affecting the progress of work	High	Have watch on market and legal aspects. Forecast future requirements and bulk purchase. Also forecast the requirement of subcontractors. Do not rely on single contractor, Divide different activities to different contractor.
4.	Changes in client's design are not clear and matching, cost and time changes are not agreed.	Medium	Lock designs or Have provisions.
5.	Proper setting up of Quality Control and Testing mechanism is not established.	Medium	A suitable and proper Quality Control Department should be established.
6.	Approval of construction method statements by client is not achieved in time with differences of opinion.	Low	Timely completion of all required permits.
7.	Unforeseen Force Majeure conditions are not well understood and compensation mechanism is not developed.	Medium	Try to minimize losses and make provisions for the same.
8.	Foreseen and controllable Force Majeure conditions are not identified for prevention and control.	Medium	Forecast should be done of the controllable force majeure conditions and provisions should be made for the same
9.	Scope variation mechanism is not established for carrying out amendment with compensation	Medium	Finalize scope and have contractual provision for the same.
10.	Suspension of Work due to reasons under Client's control is not properly understood.	Medium	All such circumstances should be studied and understood prior.

11.	Lack of safety precautions resulting into serious accidents.	Medium	Safety rules should be decided and should be mandatory to each person on site. Misuse should lead to strict disciplinary action
6. PROJECT CLOSURE, SALE / OPERATIONS AND MAINTENANCE (STAGE VI-C6)			
Sr.No.	**Description of risk**	**Criticality of risk**	**Strategy to mitigate risk**
1.	Non Settlement dispute about reasons of delays and time extension needed to complete the project	Medium	Effective planning monitoring by project Management team.
2.	Delays in settlement of pending claims and contract closer with final payments.	Medium	Effective planning monitoring by project Management team.
3.	Support service of contractor during defect liability period not available and retention guarantee not settled.	Medium	Compensation clause should be included in contract.
4.	Non co-operation of end users for proper use and payment of services.	Medium	Keeping proper communication with the end users.
5.	Support of local and state level bodies in smooth functioning of the infrastructure assets, is not available.	Medium	Feasibility studies should be done prior and all these points should be taken into account.
6.	Support of law and order authority for the maintaining peace and smooth working is not provided.	Medium	Effective planning monitoring by project Management team.
7.	Growth in end users numbers not in line with projections due to interest rate fluctuations rising inflation levels etc.	Medium	Have necessary provisions.
8.	Competitive facility coming up at later date affecting the revenue projections of your projects.	Medium	Keeping updates about the latest trends in market.
9.	Cost overruns of maintenance expenses reducing the income margins for the contractor.	Medium	The work should be of quality at first so as to reduce maintenance.
10.	Delay in payment.	High	Have necessary clauses in contract for compensation.

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