



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 4, April 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com



Study and Analysis Risk Associated in Real Estate Projects

Miss. Sonal Bharat Kumbhar¹, Prof. S. S. Chavan²

PG Student, Dept. of Civil Engineering, Tatyasaheb Kore of Institute of Engineering and Technology, Warnanagar, India¹

Professor, Dept. of Civil Engineering, Tatyasaheb Kore of Institute of Engineering and Technology, Warnanagar, India²

ABSTRACT: Every business, including the building sector, entails some level of risk. The majority of management issues in a project are brought on by project-related variables. India's economy, which is ruled by significant initiatives across the nation, is the second quickest expanding in the globe. The housing business makes a significant contribution to the country's GDP, economic sphere, and overall development. Compared to other sectors, real estate initiatives have lengthier project lifecycles, more complex clearance procedures, and unpredictable revenue flow. The need for risk management in Indian real estate ventures is discussed in this research. In a real estate project, this research shows how to apply risk detection in the early phases of the project life cycle. A description of the risk management practices used by the sector is provided. Through a review of the literature, this research seeks to determine the present risk factors and risks in real estate initiatives. By performing a poll that was completed by specialists in housing projects, all danger variables are ranked in order of importance. According to survey findings, danger variables' respective weights can be used to determine their precedence. Additionally, using case studies, discovered risk variables were evaluated on the real estate project, and results regarding project success in terms of risk management were acquired. For real estate ventures, a risk indicator has been created to evaluate the degree of risk management. The answers from the case study performance have been used to create relationships between the different types of hazards. On the basis of the case studies' risk scores, recommendations for improved risk evaluation have been given.

KEYWORDS - Project Management, Risk Management, Risk Identification, Real-Estate Projects.

I. INTRODUCTION

Space, money, and labor are the three most common components that are used to describe real estate. In this respect, a specific utilization is assigned to a specified place, which in turn generates an anticipated revenue flow over the course of a certain amount of time. The purpose of real estate development is therefore to recognize the prospective opportunities for increases in worth or future revenue flows that are intrinsic in property or real estate, and to utilize these by appropriate measures. In other words, the purpose of real estate development is to capitalize on these opportunities. The fact that a building is constructed on an uninhabited tract or that a condemned property is rehabilitated does not exclusively result in the additional value that is created by the developer; rather, the value that is created by the developer may also be dependent on other measures that increase the utilization of the property and the productivity of space. This includes, in particular, the structural utilization of currently underused space on a plot of land or within a property, as well as converting / reconstructing measures, such as changing supplementary space into rentable space. In addition, this includes the utilization of currently underutilized space on a plot of land or within a property.

The conceptual understanding makes stronger reference to the production factors of location, project idea, and capital, which constitute the beginning point of real estate development and whose successful combination results in a particular investment. This is because the starting point of real estate development is the location of the land on which the development will take place. This addresses the macroeconomic as well as the microeconomic impact level of the development of real estate. Real estate, as the end result of the development process, must be able to satisfy public demand in order to satisfy the requirements of macroeconomics, while on the microeconomic level, it must be competitive,



profitable, and sustainable in order to satisfy the requirements of the free market. There is a wide range of opinion when it comes to the specific description of the word "real estate development," which is also referred to as "property development." These opinions, which can be found in specialized literature, partially conflict with one another. The majority of descriptions discuss the need for an imaginative mindset as well as concentration and collaboration in order to successfully actualize real estate assets. Real estate refers to any territory, as well as the air above and the ground below it, as well as any buildings or other constructions that are located on that property. In some circles, it is also known as the term "reality." It encompasses residential dwellings, commercial workplaces and dealing spaces such as theaters, motels, and restaurants, shopping locations, industrial structures such as workshops, and government buildings. Investing in real estate entails the acquisition, selling, and development of property as well as the construction of residential and commercial structures. Landlords, developers, constructors, real estate brokers, renters, purchasers, and others make up the majority of the market participants in the real estate industry. The operations of the building and construction sectors are included in the real estate sector's activities. A risk is an 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 following a particular course of action. Risks can be described as an exposure to the possibility of economic and financial loss or gain, physical damages or injury, or delay. One more way to describe risk is as the accumulation of all the uncertainties that, when taken together, pose a threat to the accomplishment of the project's goals. According to the statute that defines real estate, "Development means the carrying out of building or other operations in, on, over, or under land, or the making of any material change in the use of any buildings or other land," (Development means the carrying out of building or other operations in, on, over, or under land). This description continues to see widespread adoption because it accurately captures the operational aspects of real estate development.

II. LITERATURE REVIEW

The empirical Chinese industry survey on the significance of project risks, application of risk management techniques, status of the risk management system, and barriers to risk management, as perceived by the primary project participants, was studied by Wenzhe Tang and David M. Young in [1] "Risk Management in the Chinese Construction Industry." According to the research, the majority of project risks are frequently of worry to project partners, and the industry has moved away from risk transmission toward risk mitigation.

With the aid of a questionnaire survey of general contractors and project managers, Dr. R. K. Kansal and Manoj Sharma in "Risk Analysis and Management in Construction" [2] examined how the construction industry perceives the risk associated with its operations and the extent to which the industry uses risk analysis and management techniques. The author came to the conclusion that risk management is crucial to building operations in order to reduce costs and increase revenue. Construction risk is typically understood as occurrences that affect the project's goals for expense, schedule, and quality.

By surveying the top 100 contractors, Dr. Mohammad Nayfeh in [3] suggested "Risk management of the construction stage for the construction projects in Syria" and described how big U.S. construction companies view and approach construction risk management. According to the research, freelancers have recently become more open to sharing ownership of the associated dangers and potential legal issues.

Matins In [4], Claudia Garrido and et al. proposed "Risk Identification Techniques Knowledge and Application in the Brazilian Construction," which looked at risk management strategies used by Singaporean architecture, engineering, and construction (AEC) firms when doing business in India. Having sufficient insurance coverage as well as cautious preparation and administration are examples of risk mitigation tactics.

Hamzah Abdul-Rahman and Cheng Siew Goh [5] The Malaysian construction industry's major risks are identified and managed. This research assists in identifying the risk factors related to resource distribution, purchasing, and inventory management before, during, and after building. and to analyze the risk during the planning process in order to reduce the time, expense, and improvement in the standard of building.



Maryam Farmani, M. Khanzadi, and A. Sotoodeh Gohar [6] Consistent risk management approach for construction projects was proposed in "Identifying and Evaluating Risks of Construction Projects in Fuzzy Environment." Lack of formalized risk management procedures, which facilitate more effective risk management while allowing all project participants to develop and share a great understanding of project risk for improved performance, is a persistent problem in the construction industry.

In "Identifying and Managing Project Risk: Essential Tools for Failure-Proofing Your Project," T. Kendrick [7] offered a summary of a methodical approach to taking timetable unpredictability into account and quantifying it. Construction projects are started in complicated, dynamic settings that produce situations of significant risk and ambiguity with demanding time constraints.

The Project Management Institute's project management guide was suggested in [8]. They looked over methodologies for creating risk management instruments for engineering tasks. Techniques for setting the environment, identifying risks, assessing risks, and treating risks were offered. The use of risk management instruments relies on the project's character, the organization's policy, the project management approach, the project team members' risk-taking behavior, and the resources that are available.

III. RESEARCH METHODOLOGY

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 steps:

- Step 1:** Concept and Feasibility Study Phase
- Step 2:** Fund Raising & Financial Closure
- Step 3:** Tendering, Bidding & Award Of Project
- Step 4:** Project Planning & Main Procurement
- Step 5:** Contract Execution, Monitoring And Control.
- Step 6:** Project Closure, Sale / Operations and Maintenance.

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 steps of project & measurements of risk.

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 different 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 to 5 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.

Risk rating

A Likert scale of 1-5 was used in the questionnaire. A Likert scale is a type of psychometric response scale questionnaire, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The scale is named after Rensis Likert, who published a report describing its use.



The respondents were required to indicate the relative critically/effectiveness of each of the probability of risk factors and their impact to the management.

IV. DATA COLLECTION AND ANALYSIS

Based on the understanding of theoretical aspects of risk assessment in commercial real estate project, a detailed case study (qualitative approach) were carried out at one of the sites in Pune city, Maharashtra.

Project Details

Project Name: SHIVAM AANGAN

Developer/owner/client: SHIVAM DEVELOPERS

Main Contractor: SAI DEVELOPERS

Architect: DASNURKAR ASSOCIATES

Structural Designer/RCC Consultant: G A BHILARE

Address: Ambegaon Budruk, Pune

Type of project: RESIDENTIAL/COMMERCIAL PROJECT

Project Area: 1 ACRE

Site Details: 10 STOREYED LATER PERMISSION GIVEN FOR 12 STOREYED

TWO WINGS A & B

1/2BHK FLATS- 80 NOS LATER 96

EACH WING HAS 4 FLATS /FLOOR

Commercial shops basement and ground

Floor Amenities: CHILDRENS PLAY PARK

CLUB HOUSE

RAIN WATER HARVESTING

FIRE FIGHTING

LIFTS

GENERATOR BACKUP

LANDSCAPRE GARDEN

SHOPS

About the Locality

Located on the well-known section of Singhad Road in Pune that links Swargate with Anandnagar, ManikBaug, Vadgaon Phata, Dhayri Phata, and Nanded City, Ambegaon Budruk is a neighborhood that is quickly expanding. The region has experienced extreme population development as a result of the nearby areas' rapid growth, making it one of the most crowded places in the country. The Japanese-themed park Pu La Deshpande Udyan, also known as Okayama Friendship Garden, has established itself as one of the main sights nearby that draws many tourists from nearby locations. Singhad Road runs adjacent to both the gracefully running Mutha River and the Mutha Right bank water channel. At the Wadgaon-Dhayri Flyover, people can easily transfer from this well-known route to the Mumbai-Bangalore Highway. One of the most populated areas is this one, according to reports. This location has a number of reputable schools, clinics, banks, ATMs, and retail malls in addition to other essential businesses that make life easier for locals.



High priority risks were found based on the online poll performed on Risks Associated with Commercial Real Estate Projects by using a Probability-Impact Matrix.

TABLE 1: Probability Impact Matrix

| Probability of occurrence | RISK SCORE | Very High 5 | High 4 | Medium 3 | Low 2 | Very Low 1 |
|---------------------------|--------------|-------------|----------------|------------------|--------------------|------------|
| | Very high 5 | | | | | |
| High 4 | Legal Risk | | Market Risk | | | |
| | Quality Risk | | Financial Risk | | | |
| Medium 3 | | | Social Risk | Political Risk | Design Risk | |
| | | | HSE Risk | Management Risk | Geographic Risk | |
| | | | Execution Risk | | Technological Risk | |
| Low 2 | | | | Procurement Risk | | |
| Very Low 1 | | | | | | |

Every other risk, according to the analysis above, has its own impact on probable occurrence of those risks. But, the risks that have medium impact can be controlled easily. Hence, risks that have to be paid more attention, so as to reduce the adverse effects of those risks on the project are discussed in detail here. Mitigating measures of the above found risks have been included at the end of this chapter.

V. RESULTS AND DISCUSSION

Risks can be prioritized for further quantitative analysis and planning risk responses based on their risk rating. Ratings are assigned to risks based on their assessed probability and impact. Evaluation of each risk’s importance and priority for attention is typically conducted using a look-up table or a probability and impact matrix. Such a matrix specifies combinations of probability and impact that lead to rating the risks as low, moderate, or high priority. Descriptive terms or numeric values can be used depending on organizational preference. Each risk is rated on its probability of occurrence and impact on an objective if it does occur. The organization should determine which combinations of probability and impact result in a classification of high risk, moderate risk, and low risk. In a black-and-white matrix, these conditions are denoted using different shades of gray. Specifically the dark gray area (with the largest numbers) represents high risk: the medium gray area (with the smallest numbers) represents low risk, and the light gray area (with in-between numbers) represents moderate risk. Usually, these risk-rating rules are specified by the organization in advance of the project and included in organizational process assets. Risk rating rules can be tailored in the Plan Risk Management process to the specific project. The risk score helps guide risk responses. For example, risks that have a negative impact on objectives, otherwise known as threats if they occur, and that are in the high-risk (dark gray) zone of the matrix, may require priority action and aggressive response strategies. Threats found in the low-risk (medium gray) zone may not require proactive management action beyond being placed in the risk register as part of the watch list or adding a contingency reserve. Similarly for opportunities, those in



the high-risk (dark gray) zone, which may be obtained most easily and offer the greatest benefit, should be targeted first. Opportunities in the low-risk (medium gray) zone should be monitored.

Probability and Impact Matrix

| Probability | Threats | | | | | Opportunities | | | | |
|-------------|---------|------|------|------|------|---------------|------|------|------|------|
| | 0.90 | 0.05 | 0.09 | 0.18 | 0.36 | 0.72 | 0.72 | 0.36 | 0.18 | 0.09 |
| 0.70 | 0.04 | 0.07 | 0.14 | 0.28 | 0.56 | 0.56 | 0.28 | 0.14 | 0.07 | 0.04 |
| 0.50 | 0.03 | 0.05 | 0.10 | 0.20 | 0.40 | 0.40 | 0.20 | 0.10 | 0.05 | 0.03 |
| 0.30 | 0.02 | 0.03 | 0.06 | 0.12 | 0.24 | 0.24 | 0.12 | 0.06 | 0.03 | 0.02 |
| 0.10 | 0.01 | 0.01 | 0.02 | 0.04 | 0.08 | 0.08 | 0.04 | 0.02 | 0.01 | 0.01 |
| | 0.05 | 0.10 | 0.20 | 0.40 | 0.80 | 0.80 | 0.40 | 0.20 | 0.10 | 0.05 |

Impact (ratio scale) on an objective (e.g., cost, time, scope or quality)

Figure 2: PROBABILITY – IMPACT MATRIX

Questionnaire for Risks Associated with Commercial Real Estate Projects

Questionnaire preparation forms a strong basis for the research. This particular research paper focuses on the research gap of not having many research papers on risk management of commercial real estate projects pertaining to IT parks, shopping malls and office spaces. Hence, this would provide us the primary data required for the research and thereby, add value to the same.



Table2: Questionnaire on Risks Associated with the Commercial Real Estate Projects

| Questionnaire on RISKS ASSOCIATED WITH THE RESIDENTIAL REAL ESTATE PROJECTS | | | |
|---|--|-------------------------------------|------------|
| Name: | | | |
| Company Name: | | | |
| Designation: | | | |
| The parameter were considered while looking at risk associated with Residential real estate project at project management life cycle. | | | |
| PARAMETER | PROBABILITY (1-lowest; 5 highest) | IMPACT (1- lowest; 5 highest) | RISK SCORE |
| Financial Risk | | | |
| Market Risk | | | |
| Management Risk | | | |
| Legal Risk | | | |
| Social Risk | | | |
| Political Risk | | | |
| Design Risk | | | |
| Quality Risk | | | |
| Health Safety And Environmental(HSE) Risk | | | |
| Execution Risk | | | |
| Procurement Risk | | | |
| Geographic Risk | | | |
| Technological Risk | | | |



Using SPSS tools, the total risk variables are determined. (Statistical Packages of Social Studies). This managerial instrument aids in the study of the five-scale Likert component analysis. The mean number for each risk factor is to be determined in order to rate the risk factors. The classification of risk factors present in the building sectors will be revealed by this online poll. The highest risk categories are environmental risk, design risk, financial risk, physical risk, and market risk.

After completing overall survey we calculate the below parameters

- 1) **Legal Risk** = (Probability× Impact) ÷ (Total No of site visit)
Legal Risk = $394 \div 20 = 19.7 \approx 20$
- 2) **Financial Risk** = (Probability× Impact) ÷ (Total No of site visit)
Financial Risk = $328 \div 20 = 16.4 \approx 16$
- 3) **Quality Risk** = (Probability× Impact) ÷ (Total No of site visit)
Quality Risk = $392 \div 20 = 19.6 \approx 20$
- 4) **Market Risk** = (Probability× Impact) ÷ (Total No of site visit)
Market Risk = $316 \div 20 = 15.8 \approx 16$
- 5) **Social Risk** = (Probability× Impact) ÷ (Total No of site visit)
Social Risk = $239 \div 20 = 11.95 \approx 12$
- 6) **Political Risk** = (Probability× Impact) ÷ (Total No of site visit)
Political Risk = $187 \div 20 = 9.35 \approx 9$
- 7) **Design Risk** = (Probability× Impact) ÷ (Total No of site visit)
Design Risk = $123 \div 20 = 6.15 \approx 6$
- 8) **Health Safety And Environmental(HSE)** = (Probability× Impact) ÷ (Total No of site visit)
HSE = $234 \div 20 = 11.7 \approx 12$
- 9) **Execution Risk** = (Probability× Impact) ÷ (Total No of site visit)
Execution Risk = $244 \div 20 = 12.2 \approx 12$
- 10) **Procurement Risk** = (Probability× Impact) ÷ (Total No of site visit)
Procurement Risk = $316 \div 20 = 15.8 \approx 16$
- 11) **Geographic Risk** = (Probability× Impact) ÷ (Total No of site visit)
Geographic Risk = $126 \div 20 = 6.3 \approx 6$
- 12) **Technological Risk** = (Probability× Impact) ÷ (Total No of site visit)
Technological Risk = $120 \div 20 = 6$
- 13) **Management Risk** = (Probability× Impact) ÷ (Total No of site visit)
Management Risk = $186 \div 20 = 9.3 \approx 9$

Based on the above analysis, it is clear that, there are four major risks that affect a commercial real estate projects on a large scale. They are:

- 1) Legal Risk
- 2) Quality Risk
- 3) Market Risk
- 4) Financial Risk

For the evaluation we have calculated a different risk factor given matrices (probability * impact). Around 13 type of different risk as calculated in whole work these are below



Table 3: Risk rating factor

| S. No. | Type of Risk Factor | Probability * Impact | Result |
|--------|--------------------------------------|----------------------|----------|
| 1 | Legal Risk | 394÷20 | 19.7≈20 |
| 2 | Financial Risk | 328 ÷20 | 16.4≈16 |
| 3 | Quality Risk | 392÷20 | 19.6≈20 |
| 4 | Market Risk | 316÷20 | 15.8≈16 |
| 5 | Social Risk | 239÷20 | 11.95≈12 |
| 6 | Political Risk | 187÷20 | 9.35≈9 |
| 7 | Design Risk | 123÷20 | 6.15≈6 |
| 8 | Health Safety And Environmental(HSE) | 234÷20 | 11.7≈12 |
| 9 | Execution Risk | 244÷20 | 12.2≈12 |
| 10 | Procurement Risk | 316÷20 | 15.8≈16 |
| 11 | Geographic Risk | 126÷20 | 6.3≈6 |
| 12 | Technological Risk | 120÷20 | 6 |
| 13 | Management Risk | 186÷20 | 9.3≈9 |

Internal disputes within public authorities and a lack of prior expertise for public authorities in a large-scale project were recognized as risks associated with a dearth of permits assistance. Parties with conflicting interests can occasionally be found within the same authority, which runs the risk of slowing down the permits procedure. Such a danger could exist because public bodies typically have their own private political processes. These factors must be constantly studied in order to comprehend each player's impact zone and carry out the required advocacy in order to reduce this risk. If public officials haven't previously approved a large-scale project, they will need to go through a learning process before doing so, which will lengthen the time needed for ultimate approval. The development manager must be aggressive in offering solutions for problems that are not addressed by current laws, stressing both the public and private advantages of these solutions in order to mitigate this risk. The development manager can speed up the training process in this manner, which also speeds up the clearance process.

Large-scale development initiatives occasionally rely on legislative assistance, such as tax breaks or the provision of specific public amenities, to carry out their business plans. The endeavor will be at significant danger if such assistance is postponed. The date of the implementation of such rewards must be expressly mentioned in the deal with the government, along with fines in case of delays, in order to mitigate this risk.

VI. CONCLUSION

The Real Estate market has always been and continues to be risky. Yet owners and contractors spend little time and effort on assessing and strategically planning for known, probable, or even unknown risks. Without a proactive risk management process, problems that occur on a project are likely to increase delays and costs. Basically, as all commercial Real Estate projects are unique; the risks associated with them are also unique. Hence, one particular risk mitigation strategy or a format cannot be advised to the victim. The strategies or mitigation process formats change from risk to risk and project to project; it should also depend on the probability of occurrence and severity of risk. The decision taken widely depends on the experience and knowledge of the Project Manager. Except for the existing methods of risk assessment, the need for a model is critical, and this research presents a method for filling the knowledge gap.



Identifying, allocating, and managing risks at the front end of the project planning process can improve project performance. Commercial Real Estate project risk assessment and planning is a process that assists all project participants to handle risks before they become significant problems. Although a project can be divided into a number of separate phases and the risks assessed and managed as such, there is a need to manage risks as a continuum over the project life cycle. Some risks remain constant while others arise and diminish as projects progress. Improvements in project performance can be achieved by recognizing which risks occur across the entire project life cycle and giving them due consideration. Within the project life cycle, optimal risk identification and assessment procedures and timing, as well as the identification of the most favorable decision points need to be outlined.

The research provides a structured approach for evaluating the risk indicators involved in a Commercial Real Estate construction operation. It is designed to examine specifically Commercial Real Estate Project and can be used as a tool to qualify and quantify the risks involved.

Four main results are obtained from the analysis: (1) High-risk indicators (2) the Impact (3) Probability of occurrence (4) Overall project risk severity

Another possible use of the research is in analyzing different risks with respect to a specific project and in comparing different types of projects (such as industrial, residential, commercial, and infrastructure projects). Using this several times over a defined period can also facilitate monitoring of risk associated with the types mentioned above with respect to the macro, market, and project levels.

A plot of risk assessment data over several years will indicate the trend of risk indicators. This data could also be used for simulation studies to determine the trends of risks and for conducting relationship between the risks at the macro, market, and project levels. The analysis conducted in this research is not only useful at the preliminary stage of a project/country evaluation, but can also be used during the planning and execution stages. However, it should be noted that although the research provides types of risk and their mitigation strategies for analyzing the risk indicators, the input provided by the user is largely subjective in nature and depends on the information available and the reliability of the sources. Although a variety of techniques and practices exist to identify and assess risks that occur in Commercial RE projects, there is no standard technique or practice specifically targeted for such projects. Decisions on project-specific risks are often made by top management and separated from other business, technical and operation risks of the project. Few project participants have a complete understanding of the portfolio of risks that happen on such projects, and a life cycle view of risks is uncommon. Contract and Contract Language are often viewed as the most important method to control and allocate risks in Commercial RE project; but few organizations understand how risks should be allocated by contract. Misconceptions and assumptions about who owns and controls the risks are common.

REFERENCES

- [1] Wenzhe Tang; Maoshan Qiang; Colin F. Duffield; David M. Young and Youmei Lu. 2007. Risk management in the Chinese construction industry Journal of construction Engineering and Management ASCE.
- [2] Dr. R. K. Kansal, Manoj Sharma. 2012. Risk Assessment Methods and Application in the Construction Projects. International Journal of Modern Engineering Research (IJMER). 2(3): 1081-1085, ISSN: 2249- 6645.
- [3] Dr. Mohammad Nayfeh. 2012. Risk management of the construction stage for the construction projects in Syria. Damascus University Journal. 28(1).
- [4] Matins Claudia Garrido, Morano Cassia Andra Ruotolo, Fereira Miguel Luiz Riberio and Haddad Assed Naked. 2011. Risk Identification Techniques Knowledge and Application in the Brazilian Construction. 2(11): 242-252.
- [5] Cheng Siew Goh and Hamzah Abdul-Rahman. 2013. The Identification and Management of Major Risks in the Malaysian Construction Industry. Journal of Construction in Developing Countries. 18(1): 19-32.
- [6] A. Sotoodeh Gohar, M. Khanzadi, Maryam Farmani. 2012. Identifying and Evaluating Risks of Construction Projects in Fuzzy Environment: A Case Study in Iranian Construction Industry. Indian Journal of Science and Technology. 5(11), ISSN: 0974-6846.
- [7] Kendrick, T. 2009. Identifying and Managing Project Risk: Essential Tools for Failure-Proofing Your Project. 2nd Edition. New York: AMACOM Div. American Management Association.
- [8] Project Management Institute. 2004. A Guide to the Project Management Body of Knowledge. Newtown Square, Pennsylvania: PMI.



- [9] R.C.Walke et al. “An approach to risk quantification in construction projects” International Journal of Engineering Science and Technology Vol. 3 No. 9 September 2011 .pp 6846-6855.
- [10] L. Y. Shen,¹ George W. C. Wu,² and Catherine S. K. Ng³. Risk assessment for construction joint venture in china Journal of construction Engineering and management Vol. 127 No. 1 January/ February 2001 pp. 76-81.
- [11] Wenzhe Tang¹; Maoshan Qiang²; Colin F. Duffield³; David M. Young⁴; and Youmei Lu⁵. Risk management in the Chinese construction industry. Journal of construction Engineering and Management ASCE/ DECEMBER 2007
- [12] Dr Patrick. X.W. Zou¹, Dr Guomin Zhang² and Professor Jia-Yuan Wang³ ¹ and ²: Faculty of Built Environment, University of New South Wales, Sydney 2052, Australia;³: College of Architecture and Civil Engineering, Shenzhen University, Shenzhen, P.R. China. Identified Key Risks in Construction Projects: Life Cycle and Stake Holder Perspectives.
- [13] Akintoye A.S and MacLeod, M.J. (1997). Risk analysis and management in construction, International Journal of project Management. Vol 15, February 1997, pages 31-38.
- [14] Ossama A.Abdou (Asst.Prof. Dept. of Civil and Arch. Engg.Drexel University) Managing Construction Journal of Architectural Engineering, Vol 2, No.1 March 1996, pp. 3- 10.
- [15] Matins Claudia Garrido, Morano Cassia Andra Ruotolo, Fereira Miguel Luiz Riberio and Haddad Assed Naked. Risk Identification Techniques Knowledge and Application in the Brazilian Construction Vol. 2(11), pp. 242-252, November 2011.



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.423



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 6381 907 438 ijirset@gmail.com



www.ijirset.com

Scan to save the contact details