Risk Management on Construction Project

M. Manojkumar, R. Venkateshwaran, S. Yukesh, S. Rajiv Gandhi

Abstract*: *There is an increase in the number of construction project experiencing extensive risks leading to exceeding the initial time and cost budget. Managing risks in construction project has been recognized as a very important management process in order to achieve the project objectives in terms of time, cost, quality, safety and environmental sustainability. To implement construction project, a proper planning and scheduling is of vital important in order for the project to be executed and run smoothly. The software tool Microsoft Project Planner is used for planning, scheduling and controlling. The activities required to complete the building structure excluding the interiors was identified and was fed as an input to Microsoft along with their durations. We have made a study about the risk management and identified the risk involved in the building and found out the causes for the risk occurred throughout the construction work. Finally we have provided the suggestions to avoid that risk. Apart from that we have made a study of journals about risk management on various buildings (hospital, commercial, etc.) and listed out the risk occurring during construction work and provided solution to avoid those risks.

Index Terms:* *Microsoft Project, (hospital, commercial, etc.), software, management

I. INTRODUCTION

The overall aim of this project report is to let everyone know what are the risks that occurs during construction and realizes the procedure of risk management in construction project. A deeper study on the application of risk management during construction period, therefore, a better project output and better value for both clients and constructors were studied

II. OBJECTIVE

1. To assess the most major and common risks which cause bad effect on construction period.
2. To figure out reasonable solutions

III. DESCRIPTION OF RISK AND RISK MANAGEMENT

***RISK*:**

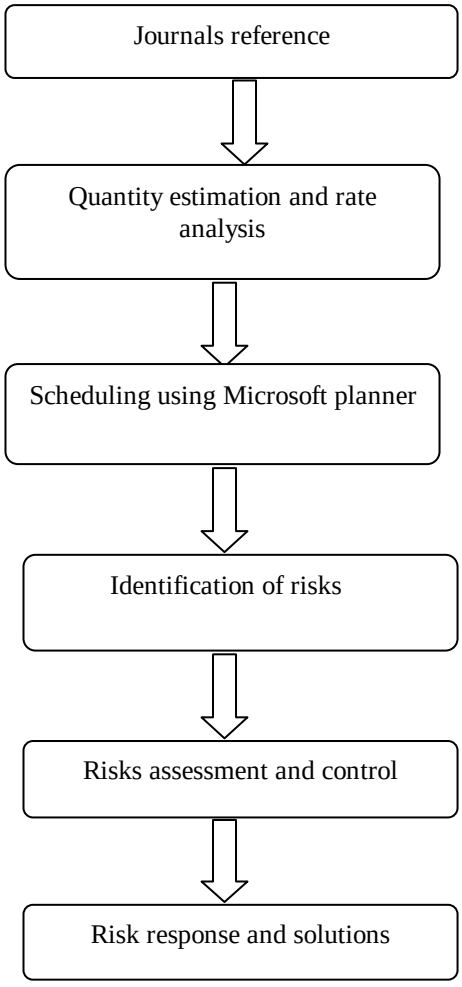
Risk is usually defined as a positive or negative deviation of a variable from its expected value.

***RISK MANAGEMENT*:**

Risk management is the discipline of identifying, monitoring and limiting risks. Risks can come from accidents, natural causes and disasters as well as deliberate attacks from an adversary.

Risk management applied in the field of construction currently, has been on the agenda for about 25 years. More recently, risk management has started to influence an increasing number of companies and not only the largest projects.

METHODOLOGY



III. SCHEDULING

INTRODUTION TO PLANNING AND SCHEDULING

Project planning is the process of identifying all the activities necessary to successfully complete a project. Project scheduling is the process of determining the sequential order of the planned activities, assigning realistic durations to each activity and determining the start and finishes the dates for each activity.

SOFTWARE USED: Microsoft Project is a project management software program, developed and sold by Microsoft, which is

Manuscript Received on April 2015.

Student M.Manojkumar M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal (dt).
Student R.Venkateshwaran M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal (dt).
Student S.Yukesh M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal(dt)
Student S. Rajiv Gandhi M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal (dt).

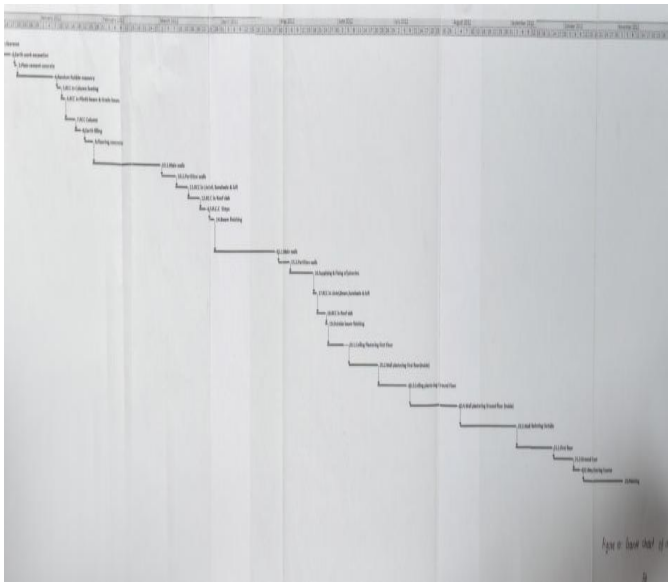
designed to assist a project manager in developing a plan, assigning resources to tasks, tracking progress, managing the budget, and analyzing workloads.

The application creates critical paths schedules, and critical chain and event chain methodology third-party add-ons also are available. Schedules can be resource leveled, and chains are visualized in a Gantt chart.

S.No	Task Name	Scheduled Duration	Actual Duration	Scheduled Start	Scheduled Finish	Actual Start	Actual Finish	Variance
	GROUND FLOOR							
1	Site clearance	2 days	2 days	Wed 12/7/11	Thu 12/8/11	Wed 12/7/11	Thu 12/8/11	0
2	Earth work excavation	6 days	8 days	Fri 12/9/11	Fri 12/16/11	Fri 12/9/11	Tue 12/20/11	2
3	Plain cement concrete	1 day	1 day	Sat 12/17/11	Sat 12/17/11	Wed 12/21/11	Wed 12/21/11	0
4	Random Rubble masonry	14 days	14 days	Mon 12/19/11	Thu 1/5/12	Thu 12/22/11	Tue 1/10/12	0
5	RCC in Column footing	2 days	6 days	Fri 1/6/12	Mon 1/9/12	Wed 1/11/12	Wed 1/18/12	4
6	RCC in Plinth beam & Grade beam	2 days	3 days	Tue 1/10/12	Wed 1/11/12	Thu 1/19/12	Mon 1/23/12	1
7	RCC Column	3 days	5 days	Thu 1/12/12	Mon 1/16/12	Tue 1/24/12	Mon 1/30/12	2
8	Earth filling	3 days	2 days	Mon 1/16/12	Wed 1/18/12	Tue 1/31/12	Wed 2/1/12	-1
9	Flooring concrete	4 days	4 days	Thu 1/19/12	Tue 1/24/12	Thu 2/2/12	Tue 2/7/12	0
10	Brick work							
10.1	Main walls	24 days	20 days	Wed 1/25/12	Mon 2/27/12	Wed 2/8/12	Tue 3/6/12	-4
10.2	Partition walls	5 days	5 days	Tue 2/28/12	Mon 3/5/12	Wed 3/7/12	Tue 3/13/12	0
11	RCC in Lintel, Sunshade & loft	4 days	5 days	Tue 3/6/12	Fri 3/9/12	Wed 3/14/12	Tue 3/20/12	1
12	RCC in Roof slab	4 days	8 days	Sat 3/10/12	Wed 3/14/12	Thu 3/22/12	Mon 4/2/12	4
13	R.C.C Steps	3 days	6 days	Thu 3/15/12	Mon 3/19/12	Tue 4/3/12	Tue 4/10/12	3
14	Beam finishing	2 days	3 days	Tue 3/20/12	Wed 3/21/12	Wed 4/11/12	Fri 4/13/12	1
	FIRST FLOOR							
15	Brick work							
15.1	Main walls	20 days	20 days	Thu 3/22/12	Wed 4/18/12	Sat 4/14/12	Thu 5/10/12	0
15.2	Partition walls	4 days	8 days	Thu 4/19/12	Tue 4/24/12	Fri 5/11/12	Tue 5/22/12	4
16	Supplying & Fixing of joineries	9 days	10 days	Wed 4/25/12	Mon 5/7/12	Tue 5/22/12	Mon 6/4/12	1
17	RCC in Lintel,Beam,Sunshade & loft	2 days	8 days	Thu 4/26/12	Fri 4/27/12	Tue 6/5/12	Thu 6/14/12	6
18	RCC in Roof slab	3 days	3 days	Sat 4/28/12	Tue 5/1/12	Fri 6/15/12	Tue 6/19/12	0
19	Outside beam finishing	1 day	2 days	Wed 5/2/12	Wed 5/2/12	Wed 6/20/12	Tue 7/17/12	1
20	Plastering							
20.1	Ceiling Plastering First Floor	7 days	10 days	Thu 5/3/12	Fri 5/11/12	Wed 7/18/12	Tue 7/31/12	3
20.2	Wall plastering First floor(Inside)	12 days	15 days	Sat 5/12/12	Mon 5/28/12	Thu 8/2/12	Wed 8/22/12	3
20.3	Ceiling plastering Ground Floor	12 days	18 days	Tue 5/29/12	Wed 6/13/12	Thu 8/23/12	Mon 9/17/12	6
20.4	Wall plastering Ground floor (Inside)	20 days	20 days	Thu 6/14/12	Wed 7/11/12	Tue 9/18/12	Mon 10/15/12	0
20.5	Wall plastering Outside	23 days	26 days	Thu 7/12/12	Mon 8/13/12	Tue 10/16/12	Tue 11/20/12	3
21	Floor Finish							
21.1	First floor	15 days	19 days	Tue 8/14/12	Mon 9/3/12	Wed 11/21/12	Mon 12/17/12	4
21.2	Ground floor	7 days	10 days	Tue 9/4/12	Wed 9/12/12	Tue 12/18/12	Mon 12/31/12	3
22	Weathering Course	4 days	4 days	Wed 9/12/12	Mon 9/17/12	Wed 1/2/13	Mon 1/7/13	0
23	Painting	17 days	25 days	Wed 9/12/12	Thu 10/4/12	Tue 1/8/13	Wed 2/11/13	8

The above mentioned date format is MONTH/DATE/YEAR.
Negative sign - work completed before scheduled .
Positive sign -work continued beyond scheduled.

Table 3 : schedule of work



IV. IDENTIFICATION OF RISK

GENERAL RISKS ON CONSTRUCTION PROJECTS:

Risks in construction projects may be classified in a number of ways. One form of risks classification is as follows.

Socioeconomic factors

1. Environmental protection
2. Public safety regulation
3. Economic instability
4. Exchange rate fluctuation

Organizational relationships

1. Attitudes of participants
2. Communication
3. Contractual relations

Technological problems

1. Design assumptions
2. Site conditions
3. Constructions Procedures
4. Constructions occupational safety

IDENTIFICATION OF RISKS

There are many influencing factors and various risks result in different consequences.

Risks identification is an organized, through approach to finding real risks associated with a project.

Risks identification cannot be assessed or, managed until they are identification and described in an understandable way. We should grasp the major factors among multiple factors and then analyze the severity of input-output caused by the risks.

THE COMMON METHODS ARE:

1. Expert interviews
2. Documentation reviews

RISKS OBSERVED IN THAT BUILDING:

Earth work excavation

Soil strata were hard and ordinary equipment's were used for excavation work so it

consumed more man power and time.

RCC Column Footing:

Labor availability was not sufficient, due to poor detailing of structural elements labor's the work.

RCC Slab:

1) Availability of materials was a major problem, space availability restricted the completion of work within time.
2) Transportation of material to roof level consumed more time.

Brick work:

1) Availability of masons delayed the work.
2) Brick work was done 2 times because of error construction.

Plumbing and electrical fixation:

Changes in the electrical plan caused delay, disputes between contractor and electrician so they altered the electrician.

Plastering exposed to surface:

1) Due to rainy weather condition the labors were unable to complete the work within time.
2) Plastering work was repeated again.

Floor finish:

1) Lack of availability of materials and labor.
2) Area was not available for storage of materials so materials were transformed immediately.
3) Due to insufficient electricity supply floor finish work was delayed.

Painting:

Purchased materials was not sufficient to complete the work so again they ordered, it delayed the process.

Design changes:

1) Alteration in the prepared design due to clients requirements
2) Improper design causes reconstruction of work so construction also increased.

Delayed payment of contractors:

Money transaction between the owner and client was not in correct sequence so the work was stopped for some duration.

Material price hike:

Due to rate increase of materials work was stopped for certain duration .This is because of improper storage of materials.

Paving materials:

Client changed the paving material in between so the contractor ordered for the new material which they suggested, it caused delay for the supply of material they need and also the rate of newly ordered material was more than the previous one it increased the time and cost.

VI. SOLUTION TO RISK

MEASURES TO AVOID RISK

If risks become big threats that the enterprise could hardly bear and to control the project, we should give up the contract and the project definitely to avoid Greater losses.

MEASURES TO REDUCE RISK

We can reduce the incidence of risks or the damage when risks occur. For the known risk, we can use project resources to cut down , for the predictable or unpredictable risk, we should change it to know risk through assumptions and limited conditions and then take measures to reduce the possibilities risk happen to a level which risk can be accepted.

MEASURES TO PREVENT RISK

Implement technical supporting and effective control planning to prevent risk. The aiming id to prevent new risk factors; reduce existing risk factors; reduce The incidence of risk events.

MEASURES TO TRANSFER PROJECT RISK

Spread the risk to other objects, including owners, subcontractors, partners, investors, suppliers etc…

MEASURES TO RISK RETENTION

If the damage caused by known risks is not serious, sustain it on one's own and one should have the ability, have emergency measures, back –up actions and financial reserve.

SUGGESTION TO AVOID RISK:

Earth work excavation

1) Soil profile reports to be verified starting of excavation mean time if required dig a sample pit for convenience.
2) Modern equipment's like breakers can be arranged while starting the activity.

Brick work up to lintel

1) Stocking of the materials should be nearer to be site.
2) Shifting of the sand and the cement can by done be proving hoist or mechanical lifted could avoid the delay.
3) Scaffolding for the brick work has to be preplanned before the day of execution.

Ceiling and wall plastering

1) Shifting of the sand and cement done using hoist or mechanical lifter could avoid the delay.
2) Scaffolding for the plastering has to be preplanned before the day of execution.

Electrical fixation

1) The drawing to be received min 25 days from the activity starts.
2) Since it is not in the critical path it hasn't affected the progress.

RCC column footing and slab

Detailed plan must be collected and checked carefully before starting the work itself to avoid mistake or changes during construction.

Floor finish:

Storage of required type of flooring material will avoid cost overruns because rate of materials varies from time to time so keeping of that required material can avoid cost overruns.

Painting

1) Avoid painting during monsoon season
2) To avoid unwanted confusion better discus

with the client about paint selection before 20 days of starting painting work to avoid delay

Design changes

1) This depends upon the skill of the designers care must be taken while designing work to avoid errors.
2) Work in the field depends on this data hence it must be checked properly to avoid mistakes during construction work

Delayed payment of contact

1) It entirely depends upon the client pavement must be made in correct sequence so that contractor can carry out the without any delay
2) Contractor must also do a satisfactory work so the client will have a mindset to amount as u need.

Rebar placing

1) The drawings to be received minimum 25 days before the day of activity starts.
2) Required labor strength to be calculated before starting of the activity.
3) Work front and hygienic social environment for the labors needs to be preplanned to ensure the labor strength.

Form work

1) No of repayments of the shutting material to be calculated without affecting the progress
2) Shutting material stocking to be done properly
3) Quality of the material to be checked while arriving to the site

Team members leave or become sick

Ensure the plan has contingency built into it to allow for less than expected resource availability.

Back filling on the footing pits

Excavated soil shall be stocked near to the site where ever is possible shall be do by mechanically

Back filing on the basement

Gravel supply should be stocked nearer to the site.

VII. RISK CONTROL

Controlling risk is the active influencing of the risks determined in the context of the risk analysis. Measures of dealing with risk can be differentiated between cause related and effect related measures.

Strategies of controlling risk are accordingly the following:

1. Avoidance
2. Reduction
3. Passing on the risk
4. Bearing the risk by oneself

To provide a most effective risk control the following relative measures can be done:

1) Try to make sure that the project gets up to a high standard on processing operation, organizational structure, the qualification of contractor etc..
2) Raise legal consciousness: we must comply with the law when we sign contracts, claim indemnity, protect rights, operate, withstand risks, financing and settle accounts etc..
3) Implement talent strategy, impart knowledge of construction project management, risk management, contract management, economy, finance, insurance, operation control etc..
4) Set specification on construction management, prepare the manuals and planning by total contractor, in addition, build up their own risk management system.
5) Take Active technical counter measures including risk avoidance.

VIII. CONCLUSION

Effective risk management must permeate all areas, functions and processes of the project. The goal therefore must be to negotiate risks, assess these or even make these marketable and reduce them emphatically. In this a decisive factor in its success is in end the interaction of all elements represented.

Risk management successfully installed in the project offers the change to gain a clear understanding of the goals, duties and contents of the service and the feasibility of the project. It provides an information basis for the quantitative data, sorted according to size, for the purpose of supporting decisions. The construction work was deviated for 4 months from the actual date of completion. Then we have listed out the causes for the deviation and suggested solution to avoid that risk on future construction works. Risk management can therefore only be implemented and enforced effectively if communication channels in the enterprise are created, which guarantee the direction of the information to the places concerned in each case. Through the risk management used, the overall risk of the project is broken down in each project residual risks remain. It remains a strategic decision whether these risks are taken and can be borne if they occur.

REFERENCES

1. Cost And Schedule-Control Integration Issues And Needs:by William J.Rasdorf and Osama Y.Abudayyeh
2. A Risk Management System For Preconstruction Phases Of Large Scale Development Projects In Developing Countries by Mohammad Baydoun, Project Manager, Millennium Development International & DBA Candidate, Grenoble Ecole de Management.
3. Construction Delays Causing Risk On Time And Cost- A Critical Review by Chidambaram Ramanathan, SP Narayanan and Arazi B Idrus.
4. Risk Management in Construction Project Management by Martin Schieg.
5. Methodology of Risk And Uncertainity Management In Construction's Technological And Economical Problems by Darius Migilinskas, LeonasUstinovicius
6. Risk Management In Building Projects by AdanEnshassi, Jaser Abu Mosa

AUTHOR PROFILE

Student M.Manojkumar M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal(dt).
Student R.Venkateshwaran M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal(dt).
Student S.Yukesh M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal(dt)
Student S. Rajiv Gandhi M.E.Construction Engineering and Management, K.S.R college of Engineering,Tiruchengode, namakkal(dt).