

**Project Management**  
**Prof. A. Ramesh**  
**Department of Management Studies**  
**Indian Institute of Technology Roorkee**  
**Week: 4**  
**Lecture 18 : Project Risk Management**

Dear students, today we are going to cover another topic called the problem of the problem of a project risk management. The previous lecture, I have discussed about estimating project budget. Now I am going to discuss about project risk management. The agenda for this lecture is, I am going to define what is project risk management. Then I am going to discuss about risk management planning. Next, I will be discussing about risk identification.

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## Agenda

- Project risk management
- Risk Management Planning
- Risk Identification
- Qualitative Risk Analysis
- Quantitative Risk Analysis
- Risk Response Planning
- Risk Monitoring and Control
- The Risk Register

Then I will discuss about qualitative risk analysis and quantitative risk analysis. Then I will talk about risk response planning, then I will discuss about risk monitoring and

control. Finally I will discuss about risk register. Project risk management, there has been great leap of interest in risk management in the last few years.

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## Project risk management

- There has been a great leap of interest in risk management in the last few years
- The managers' most difficult task was identifying metrics for project success that included nonfinancial aspects such as customer satisfaction, meeting requirements and objectives, and project value.



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## Project risk management

- Secondary problems related to communicating with external stakeholders and finding the right definition of the project objectives.



The managers most difficult task was identify matrix for project success that included non-financial aspect such as customer satisfaction, meeting requirements and objectives and project value. Secondary problems related to communicating with external stakeholders and finding the right definition of project objectives. Since project success is not able to measure correctly, then there is a chance for risk whether the project has met the expected objective or not. The second factor is still probably the central element in risk management because since we are not able to predict the behavior of the human being, so that is the important factor for risk management. As described in PMBOK, “project management body of knowledge”, the risk attitude for both organization and individual stakeholders can be influenced by their risk appetite, tolerance and threshold.

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## Project risk management

- Human factor is still probably the central element in risk management.
- As described in PMBOK, the risk attitudes of both organisations and individual stakeholders can be influenced by their risk appetite, tolerance and threshold
- Their risk attitude can be influenced by their perceptions, biases, and tolerances



Their risk attitude can be influenced by their perception, biases and tolerances. Then what is project risk management? So PMBOK states that project risk management includes the process of conducting risk management planning, identification, analysis, response planning and monitoring and controlling. Now we will discuss about various process, various steps of project risk management. The first step is risk management planning. Here deciding how to approach and plan the risk management activities for a project.

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## Project risk management

- PMBOK® states that project risk management includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring and controlling

The second step is after planning, the second step is risk identification. Here determining which risk might affect the project and documenting their characteristics. The third step is qualitative risk analysis. That is performing a qualitative analysis of risk and conditions to prioritize their impact on the project objectives. After that the fourth step is quantitative risk analysis.

## Process of Project risk management

### 1. Risk Management Planning

- deciding how to approach and plan the risk management activities for a project.

### 2. Risk Identification

- determining which risks might affect the project and documenting their characteristics



## Process of Project risk management

### 3. Qualitative Risk Analysis

- performing a qualitative analysis of risks and conditions to prioritise their impacts on project objectives.

### 4. Quantitative Risk Analysis

- estimating the probability and consequences of risks and hence the implications for project objectives.



## Process of Project risk management

### 5. Risk Response Planning

- Develop procedures and techniques to enhance opportunities and reduce threats to the project's objectives.

### 6. Risk Monitoring and Control

- Monitoring residual risks, identifying new risks, executing risk reduction plans, and evaluating their effectiveness throughout the project life cycle.



Here estimating the probability and consequences of risk and hence the implication for project objectives. The fifth step in project risk management is risk response planning. So here what we will be doing here? We develop procedures and techniques to enhance opportunities and reduce threats to the project's objectives. The next step is risk monitoring and control. And monitoring residual risk, identifying new risk, executing risk reduction plan and evaluating their effectiveness throughout the project life cycle.

## Project risk management

### 7. The Risk Management Register

- creating a permanent register of identified risks, methods to mitigate or resolve them, and the results of all risk management activities.

But another step is that risk management register. Here creating a permanent register of identified risk, methods to mitigate and resolve them and the result of all risk management activities. So 6 plus 1, there are 7 steps for managing project risk. The first we will study about risk management planning. It is never too early in the field of project to begin managing risk.

### Step 1: Risk Management Planning

- It is never too early in the life of a project to begin managing risk.
- A sensible project selection decision cannot be made without knowledge of the risks associated with the project.
- Therefore, the risk management plan and initial risk identification must be carried out before the project can be formally selected for support.



A sensible project selection decision cannot be made without knowledge of the risk associated with the project. Therefore the risk management plan and initial risk identification must be carried out before the project can be formally selected for support. The risk management group must therefore start work as soon as the potential project is

identified. Then consolidate the risk management task for all projects at the portfolio level rather than at the project level. We can classify the risk.

## Step 1 : Risk Management Planning

- The risk management group must, therefore, start work as soon as a potential project is identified
- Consolidate the risk management tasks for all projects at the portfolio level rather than the project level



## Step 1 : Risk Management Planning

- Classification of Risk
  - Preventable risk
  - Strategy risk
  - External risk
    - Economic
    - Legal
    - Natural
    - Political
    - Competitive



So some risk are classified as a preventable risk which can be easily identified and eliminated. The risk which are happening inside the organization is the preventable risk. You have control over to mitigate the risk. Second category of the risk is strategy risk. Suppose you are involving into new venture, launching a new product, so if you are making a strategic decision, there may be a chance that that may not work well.

So that is the strategy risk. The third type of risk is external risk. You do not have any control over that. For example, economic conditions, legal conditions, natural conditions,

political and competitiveness. So the second step in the project risk management is risk identification.

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## Step 2: Risk Identification

- The risks a project faces depend on the technological nature of the project and the many environments (economic, cultural, etc.) in which the project exists.
- Indeed, how the process of risk management is conducted depends on how one or more environments impact the project



First we have prepared a plan for managing risk. Second we have to identify the risk. The risk a project faces depends on the technological nature of the project and the many environment factors like economic, cultural factors in which the project exist. Indeed how the process of risk management is conducted depends on how one or more environments impact the project. Some of the techniques for identifying the risk is Delphi method.

## Step 2 : Risk Identification

- The Delphi method is proper when identifying project risks and opportunities for risk analysis models
- The Delphi method is commonly used when a group must develop a consensus concerning the importance of technological risk, an estimate of cash flows, a forecast of some economic variable, and similar uncertain future conditions or events.



So the Delphi method is a proper when identifying project risk and opportunities for risk analysis model. The Delphi method is commonly used when a group must develop a consensus concerning the importance of technological risk and estimate of cash flows, a forecast for some economic variable and similar uncertain future conditions or events.

Another method for identification of the risk is brainstorming. Then you can go for checklist, then attribute listing or you can use some creative idea generation methods for identifying the risk. The another tool for identifying the risk is cause and effect diagram.

## Step 2 :Risk Identification

- Brainstorming
- Checklists
- Attribute listing, and
- Other such creativity and idea-generation methods



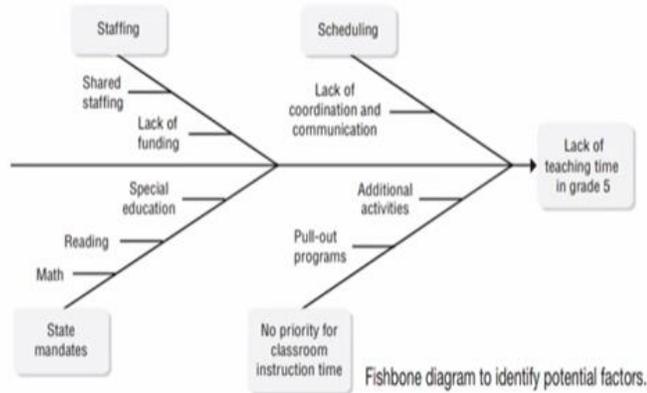
## Step 2 : Risk Identification

- Cause–effect (“**fishbone**”) diagrams
- Flow charts
- Influence diagrams
- SWOT analysis,
- The flexibility of cause–effect diagrams makes them a valuable tool in many situations.



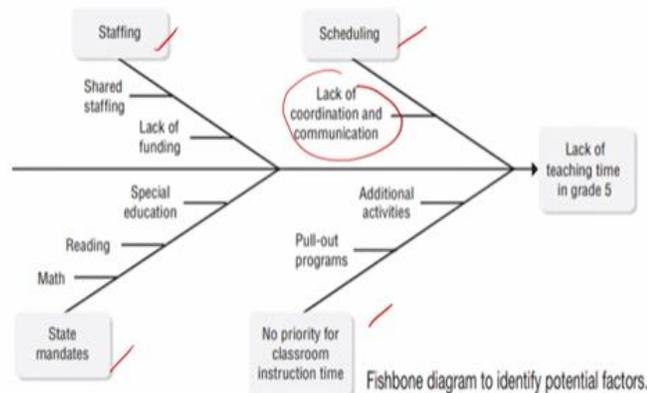
Otherwise it is called fishbone diagram. The next slide I will show you. Then we can do the flow chart. So if you draw the flow chart of the process, you can identify in which part of the flow chart there is a risk. Then we can use influence diagram to identify the risk.

## Step 2 : Risk Identification



You can use SWOT analysis, strength, weakness, opportunities, threat analysis. So the flexibility of cause and effect diagram, for example fishbone diagram is that it makes them a valuable tool in many situations. So this is an example of a fishbone diagram. For example, the effect is lack of teaching time in grade 5. So what are the reasons for that? That may be due to staffing, that may be due to scheduling, that may be due to no priority for classroom instruction time, then that may be due to state mandates.

## Step 2 : Risk Identification



So we can identify what are the factors. For example scheduling, lack of coordination and communication. So this is the one risk. So that will affect the scheduling. So that in turn will affect the teaching time in grade.

So this is the fishbone diagram. See this is the shape is looking like a fish. Another approach to identify the risk is to watch the yearly warning signs as the project begins and progress through the completion. We can see some signs of the project where there

is a possible risk. The next step for managing the risk in the project is qualitative risk analysis.

We have identified, then we are going to analyze the risk. We are going to use some qualitative tools. That is why it is called qualitative risk analysis. The purpose of qualitative risk analysis is to prioritize the identified risk in the previous step. So attention can be directed to the most important one.

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### Step 3 : Qualitative Risk Analysis

- The purpose of qualitative risk analysis is to prioritise the risks identified in the previous step so attention can be directed to the most important ones.
- The qualitative nature makes it quite flexible, useful, and quick to apply
- It can be used for both threats and opportunities.



The qualitative nature makes it quite flexible, useful and quick to apply. It can be used for both threats and opportunities. One way to identify, analyze the qualitative risk analysis, a subjective estimate of the probability of the risk. So the probability value need not be precise and for that matter could just rank 1 to 5 scale, maybe low, medium, high. This is the way to use qualitatively assess the risk.

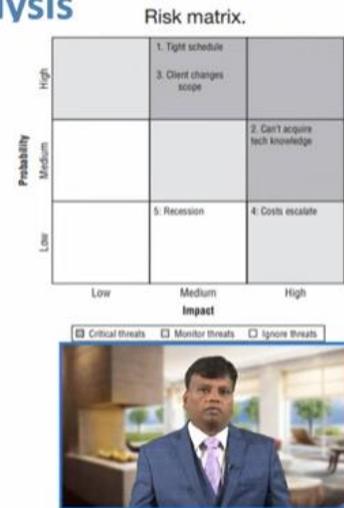
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### Step 3 : Qualitative Risk Analysis

- A subjective estimate of the probability of the risk
- The probability values need not be precise and, for that matter, could just be a rank on a 1 to 5 scale or even simply “low,” “medium,” or “high.”

### Step 3: Qualitative Risk Analysis

- Once the probability and impact levels are found, a Risk Matrix can be constructed as in Figure
- Here, we show the simplest version with nine cells corresponding to the “low, medium, and high” categories.
- Still, a 1 to 5 range would have 25 cells to consider, and a percentage of 100 could be divided into as many cells as would be useful.

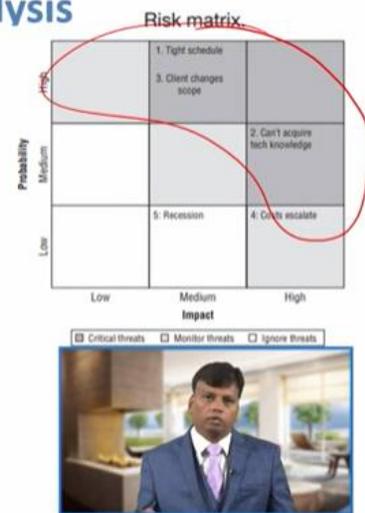


Once the probability and the impact levels are found, a risk matrix can be constructed as shown in the figure. Look at the picture on the right hand side. In the Y axis, the probability is written. That is classified as low, medium and high. In X axis, impact is written low, medium, high.

Here we show the simple version with 9 cells corresponding to the low, medium and high categories. We can still 1 to 5 range would have 25 cells to consider and a percentage of 100 could be divided into as many cells as would be useful. So scale instead of 1 to 3, we can have 1 to 5 also. Here what we can do with the help of this risk matrix. We can classify the risk into 3 category, risk which are critical, risk which has to be monitored, risk which has to be ignored.

### Step 3: Qualitative Risk Analysis

- Critical
  - high probability–medium impact, high on each, and medium probability–high impact.
- Monitor
- Ignore



source: Meredith J R, Shafer S M & Mantel Jr S J (2017) Project management: a strategic managerial approach. John Wiley & Sons

So look at the figure on the right hand side. Whenever there is a high probability or medium impact or high impact that portions, for example here, these portions are critical

risk. Other than these portions, the risk which can be monitored or the risk which can be ignored because the probability of occurrence also low, the impact also low, so that can be avoided. The next step for managing project risk is quantitative risk analysis. A quantitative risk analysis is sometime conducted after the qualitative risk analysis has identified the critical perhaps some maybe a monitor or some certain risk can be avoided.

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## Step 4: Quantitative Risk Analysis

- A quantitative risk analysis is sometimes conducted after the qualitative risk analysis has identified the critical (and perhaps some of the “monitor”) risks facing a project.
- It is more precise (using more precise quantitative data) and typically more accurate, if the data are available.



It is more precise using more precise quantitative data and typically more accurate if the data are available. We are going to study 3 techniques for managing or analyzing the risk quantitatively. One is failure mode and effect analysis. Second one is the decision tree.

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## Step 4 : Quantitative Risk Analysis

- We include here three techniques:
  1. Failure mode and effect analysis (FMEA) is a more rigorous approach to the Risk Matrix and includes an additional factor in the process
  2. Decision tree analysis using expected monetary values
  3. Simulation



Third one is simulation. This failure mode and effect analysis is more rigorous approach to the risk matrix and includes an additional factor in the process. The fifth step is risk response planning. There are 4 standard approaches for dealing with risk threats and somewhat equivalently for enhancing the risk opportunities. So what are that

4 approaches when the risk is threat? When the risk is threat, we can 4 strategy we can use. We can avoid, we can transfer, we can mitigate or we can accept.

## step 5: Risk Response Planning

- There are four standard approaches for dealing with risk threats and, somewhat equivalently, for enhancing risk opportunities.



Threats	Opportunities
Avoid	Exploit
Transfer	Share
Mitigate	Enhance
Accept	Accept



Source: Meredith, J. R., Shafer, S. M., & Mantel Jr, S. J. (2017). *Project management: a strategic managerial approach*. John Wiley & Sons.

Sometime the same risk maybe an opportunity for you. That time the risk can be exploited, the risk can be shared, the risk once you know it is the risk is an opportunity, it can be enhanced or it can be accepted. We study about these 4 approaches for threats and opportunities in detail. For example, if it is threat, the first strategy what you can use, you can avoid it. Here the idea here is to eliminate the threat.

### Avoid

- The idea here is to eliminate the threat.
- This might be accomplished by using alternative resources or adding contingent resources at some cost.
- If the threat is client scope creep, up-front avoidance by adding scope change procedures to the contract might avoid the threat.



This might be accomplished by using alternative resources or adding contingent resources at some cost. So you can have some redundant resources that risk can be avoided. If the threat is client scope creep, upfront avoidance by adding scope change procedures to the contract might avoid the threat. So that is the avoiding strategy. The next strategy when the risk is threat for you is transferring the risk.

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## Transfer

- Although this approach does not eliminate the threat, it does remove the project contractor from the danger of the threat.
- The classic approach here for monetary risk is insurance, but other approaches are also available: warranties, bonding, cost plus contracting, etc

Avoid

Transfer

Mitigate

Accept



Although this approach does not eliminate the threat, it does remove the project contractor from the danger of the threat. The classic approach here for monetary risk is insurance. But other approaches are also available like warranties, bonding, cost plus contracting. So the insurance is the best example for transferring our risk to someone because that insurance people will take care our risk.

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## Mitigate

- This is a “softening” of the danger of the threat, either through reducing the likelihood it will occur, or through reducing its impact if it does happen.
- Ways to reduce the likelihood are to do research or testing to improve our understanding of the probability elements of the threat and then spend some effort (and money) on reducing the more probable threats.

Avoid

Transfer

Mitigate

Accept



The third strategy is mitigating the risk. This is softening of the danger of the threat either through reducing the likelihood it will occur or through reducing its impact if does happen. The ways to reduce the likelihood are to do a research and testing to improve our understanding of the probability elements of the threat and then spend some effort, for example money on reducing more probable threats. The last strategy is the accept. The risk is accepted because no other response is available or because the response are deemed too costly relative to the risk threat. This might be appropriate for non-critical

threats such as those in the ignore category of the risk matrix because that is not going to have much impact on you.

## Accept

- The risk is accepted because no other response is available or because the responses are deemed too costly relative to the risk threat.
- This might be appropriate for noncritical threats, such as those in the “ignore” category of the risk matrix.

Avoid

Transfer

Mitigate

Accept



So we can accept that risk as it is. Now the same risk can be an opportunity for you. So there are four ways to tackle when the risk is opportunity for you. One is exploit the risk. It is opportunity because always when there is a more risk there is a more reward. Once you come to know that this risk is opportunity for you, you have to exploit that risk.

## Exploit

- The goal here is to try to increase the probability that the opportunity will occur.
- This might be done with higher quality resources, such as equipment, materials, or human skills, again at a cost

Exploit

Share

Enhance

Accept



So the goal here is to increase the probability that the opportunity will occur. This might be done with a higher quality resources such as equipment, materials or human skills again at a cost. So if there is a risk is there when you use it, when you exploit it, it will add value to you. The second one is sharing the risk. This involves partnering with another party or parties who can better capture the value of the opportunity or at least reduce the cost of exploiting the opportunity.

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## Share

- This involves partnering with another party or parties who can better capture the value of the opportunity or at least reduce the cost of exploiting the opportunity.



The third strategy is enhancing. Whether to mitigate, this involves either increasing the probability that the opportunity risk will occur or increasing its impact if it does. The last strategy is accept. Here the project firm is prepared to capitalize on the opportunity should it occur, but it is not willing to invest the resources to improve the probability or the impact of the opportunity occurring. So these are the four strategies to manage when the risk is opportunity for you. The next point we are going to discuss is risk monitoring and control.

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## Enhance

- Similarly, to “mitigate”, this involves either increasing the probability that the opportunity risk will occur or increasing its impact if it does.



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## Accept

- Here the project firm is prepared to capitalise on the opportunity should it occur (a contingency plan), but is not willing to invest the resources to improve the probability or impact of the opportunity occurring



There are four risk oriented measures that organization should track it because you have to keep on monitor the risk. You cannot know after the risk has happened. One is we have to track how often a risk assessment is conducted or updated. The second step is how often a risk assessment is reviewed. The third one is the number of risk initially rated as a low that later become high.

The fourth measure is the percentage of actual risk that developed that had been identified beforehand. Next we are going to discuss about the risk register. If the risk management system has no memory, the task of risk identification will be terrible. There is no point in identifying the risk that has to be properly documented, but the system can have a memory at least the individuals in the system can remember. So relying on the recollection of individuals however is itself risky.

## Risk Monitoring and Control

- Four risk-oriented measures that organisations should track:

(1) How often a risk assessment is conducted/updated

(2) How often a risk assessment is reviewed

(3) The number of risks initially rated as low that later became high

(4) The percentage of actual risks that developed that had been identified beforehand.



So for that purpose we are going to maintain a register about all the details of the risk. So that is called your risk register. So the risk management system should maintain an up to date risk register that includes, but it is not restricted to the following. One is identification of all environments that may impact the project, identification of all assumptions made in the preliminary project plan that may be the source of the risk of the project. Then a list of all risk identified by the risk management group complete with their estimated impact on the project and estimate of their probability of occurring.

## The Risk Register

- If the risk management system has no memory, the task of risk identification will be terrible.
- But the system can have a memory—at least the individuals in the system can remember.
- Relying on the recollections of individuals, however, is itself “risky.”



## The Risk Register

- The risk management system should maintain an up-to-date risk register that includes, but is not restricted to, the following
  - identification of all environments that may impact on the project
  - identification of all assumptions made in the preliminary project plan that may be a source of risk for the project
  - a list of all risks identified by the risk management group, complete with their estimated impacts on the project and estimates of their probability of occurring



This also has to be noted in the risk register and a complete list of all categories, keywords used to categorize risk, assumptions and environments so that all risk management groups can access past work done on risk management. Then the details of all qualitative and quantitative estimates made on the risk on states of the project's environment or project assumption complete with the brief description of methods used to make such estimates. So these are the points that has to be registered in the risk register. The next element of the risk register is minutes of all group meeting including all actions the group developed to deal with or mitigate each specific risk including the decision to ignore the risk. Then the next point should be noted in the risk register is the actual outcomes of identified risk and if a risk came to occur the result of action taken to mitigate or transfer the risk or involve the contingency plan.

## The Risk Register

- A complete list of all “categories” and “keywords” used to categorize risks, assumptions, and environments so that all risk management groups can access past work done on risk management
- The details of all qualitative and quantitative estimates made on risks, on states of the project’s environment, or project assumptions, complete with a brief description of the methods used to make such estimates



## The Risk Register

- Minutes of all group meetings including all actions the group developed to deal with or mitigate each specific risk, including the decision to ignore a risk.
- the actual outcomes of identified risks and, if a risk came to occur, the results of actions taken to mitigate or transfer the risk or invoke the contingency plan



So in this lecture I have discussed about project risk management. Then I discussed about various steps in the project risk management like risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis. Then I discussed about risk monitoring and control.

## Summary

- Project risk management
- Risk Management Planning
- Risk Identification
- Qualitative Risk Analysis
- Quantitative Risk Analysis
- Risk Response Planning
- Risk Monitoring and Control
- The Risk Register

Finally I have discussed about risk register. Thank you. Thank you.