Subject: RISK AND DISASTER MANAGEMENT

Course Code: CE-604

Submitted By: **Rashid latif**

ID: 15202

Submitted To: **SIR ENGR.YASEEN MAMOOD**

Department: MS (CE)

IQRA NATIONAL UNIVERSITY PESHAWER

Dated:26-04-2020

Question 1. Considering the Bus Rapid Transit (BRT) Peshawar, what were the risks involved during construction associated with the technical aspects of the project? . Hint: You can take help from book "Risk and Insurance in Construction" by Neal G. Bunni

Introduction:

Most of the cities currently in the world are facing with serious problem of overcrowding and contamination; they are continuously searching for cost effective, efficient and reasonable source for public transports improvements. It is evident that a well-organized and cost effective/saving public transport system is vital for daily nonstop journey of peoples within big cities.

The Peshawar Sustainable Bus Rapid Transit Corridor Project (PSBRTC) will contribute to the development of a sustainable urban transport system in Peshawar. The project outcome will improve public transport in Peshawar, directly benefiting a population of at least 0.5 million. The project will consist of two interlinked outputs: (i) full restructuring of a 26-kilometer BRT corridor, including BRT dedicated lanes, 31 stations, 2 depots, mixed traffic lanes, bicycle lanes, parking, sidewalks, green areas, energy-efficient streetlights and proper drainage to climate-proof the BRT infrastructure; and (ii) effective project management and sustainable BRT operations through institutional and organizational developments. The project will provide an integrated bus rapid transit (BRT) corridor, focusing on accessibility, passenger time savings and alleviating congestion for car users, and reducing vehicle operating cost and carbon emissions, which will in turn help make Peshawar safer, more livable, and foster gender equity.

What is risk:

- **Risk - an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives.(PMBOK)**

- The concept of risk can be linked to uncertainties associated with events. Within the context of projects, risk is commonly associated with an uncertain event or condition that, if it occurs, has a positive or a negative effect on the objectives of a project.
- Risk originates from the Latin term risicum, which means the challenge presented by a barrier reef to a sailor.
- Oxford Dictionary defines risk as the chance of hazard, bad consequence, loss, and so on, or risk can be defined as the chance of a negative outcome.

Risk Associated during Construction with technical aspects of the projects:

- Safety **hazards** that lead to worker accidents and injuries.
- Management related risk
- Incomplete drawings and poorly defined scope.
- Unknown site conditions.
- Poorly written contracts.
- Unexpected increases **in** material costs.
- Labor shortages.
- Damage or theft to equipment and tools.
- Logistical Risk
- Environmental risk
- Financial risk

In most of the projects it seen that when the duration increase for project, greater chances of hazard can occur because project exposed to environment for risk occurrence. Where BRT extend from 6 month to 2.8 years. However, in certain circumstances, there are seasonal hazards which occur at specific times of the year and thus require special consideration if the period of construction is to be extended. These hazards include rainfall, temperature changes, flood, storm and wind.

To illustrate this point, the example of BRT Peshawar may be cited.it is a project in very congested area which is exposed to every type of accident such as vehicle accident, traffic jam machinery fail, girder fall and heavy rain, due to BRT Peshawar, traffic every time jam in few areas, vehicle accidents occur and also due to time extension,

BRT Bus Parking area

BRT station construction

Technical Risks Associated During Construction of BRT Peshawar.

- Incomplete Design
- Inadequate site investigation
- Improper project planning.
- Inadequate specification
- Excessive approval procedures in administrative government departments
- Tight Project Schedule
- Inappropriate time allocation
- Unsuitable construction program planning
- Plans of design are incompatible with execution
- Many modifications on designs are made during execution.
- Some materials do not arrive at the assigned site.
- Selection of material and equipment.
- Changes in material types and specifications during construction.
- Undocumented change orders.
- Designs are changed by the engineers.
- Defective design (incorrect)
- Not coordinated design (structural, mechanical, electrical, etc.)
- Rush design.
- Improper project feasibility study

Incomplete design:

During implementation the design were provided that's why the sub-contractor and workers have face the difficulties during execution.

Inadequate site investigation:

Construction of BRT project Started without proper Site Investigation, at several points Underground conditions were unknown which affected the services of the city and caused delay. Detailed and Comprehensive site investigation should have been conducted before the execution of project.

Improper project planning:

BRT project started without construction detailed planning, for project like BRT planning phase was required to be of 2 or more years prior to the field execution.

Inadequate specification:

Clarity regarding specifications and approvals affected the BRT project. Specifications should have considered the considering the completion time of the project.

Tight Project Schedule:

Project schedule was unrealistic, Realistic schedule should have been prepared.

Plans of design are incompatible with execution:

Design and drawings prepared were not in compliance with the site conditions, experts should have consulted for the issue.

Many modifications on designs are made during execution:

During execution stage revised drawings were issued asking for the modification/Changes impacted the progress cost and quality of BRT. This was highlighted and witnessed by media and general public which ultimately brought bad reputation to the execution body and the government. This could have been avoided by detail working on initial designing stage.

Design were provided during the execution stage:

On BRT project design was provided during the execution of work, which affected the cost quality and time of the project. Changes in material types and specifications during construction.

Undocumented change orders:

As per the information provided by employees of BRT project many changes were instructed by the political and Non technical authorities during the execution which were not recorded as per the SOP.

Not coordinated design (structural, mechanical, electrical, etc.):

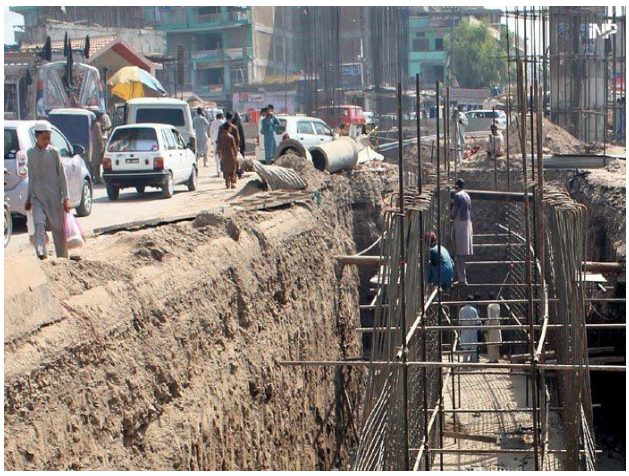
At many locations of BRT project contradiction of structural and electrical design were witnessed, which came in notice during execution stages. Extra rework was carried for the correction.

Improper project feasibility study:

BRT project was started prior to the feasibility study, no emphasis was made on detail study of the project. It is rumored that project was selected for execution by the concerned authorities by viewing the graphic video of the project. No technical expertise was considered for the approval of the project. This entire project would have been different today had higher authorities emphasized on detail feasibility report.

Inadequate site management:

The inadequacy of site management not only delay the project but also sometime casause the main failure of whole project.see the following paragraph about BRT peshawar Considering his position at the BRT as an assistant engineer, Gohar went on to say, "The contractor has not yet submitted any schedule for the completion of BRT project nor progress report has been submitted to any concerned department. "The contractor of the project has [sublet] the entire project to different non-technical people who don't even know about construction." He further claimed that the site inspector did not have any "drawings and specifications of the project" with him to help guide the engineers. "The engineers were found just to visit the site without any drawing and specifications."



Inediquite Site mangment of Peshawer BRT

Refrence:ADB finds 'deadly flaws' in Peshawar BRT project By Shahbaz Rana

Published: July 7, 2019

Khyber-Pakhtunkhwa (K-P) government significantly deviated from the original, agreed design and used inferior quality material in the Rs70 billion Peshawar metro bus project putting lives and assets at risk in the process, according to the Asian Development Bank's (ADB) findings.

The ADB has warned in clear words that BRT buses could collide at stations number 10, 12, 15 and 26 during operations because the lane width is less than the minimum requirement of 6.5 metres.

Critical deficiencies:

- The ADB has identified 22 "critical" deviations from the detailed project design at the implementation stage, which not only compromised its quality but could also cause injuries to passengers.
- The lender has asked the provincial authorities to change the pit design of the Chamkani depot and station number 1 to provide adequate drainage. It has also objected to the change of sub-contractors for signage work, observing that it could compromise the quality of work.
- Construction of drainage is a big issue because during existing structure and heavy traffic flow the construction of drains is very difficult fault.

Defective design:

- The ADB has warned in clear words that BRT buses could collide at stations number 10, 12, 15 and 26 during operations because the lane width is less than the minimum requirement of 6.5 metres.
- The lack of an effective curb means that the docking process will be slow, inefficient and potentially damaging to the vehicle tyres," the lender observed.
- The ticketing kiosks are also of inferior quality where corrugated steel has been used. "This is not acceptable for the effort and investment made into the Peshawar system; this will generate a very negative view of the system both [on a] national [level] and internationally," the lender warned.

Workmanship and quality control:

- The ADB stopped the provincial government from making future payments to contractors because of the poor quality of work. The ADB loan will not be disbursed further until the provincial government introduces changes in the design to address "critical" deficiencies.
- The provincial authorities also used "inferior material" that both harm system functionality as well as deliver an aesthetically inferior product, according to the correspondence.
- While compromising on the safety of passengers, the provincial authorities have used slippery floor tiles. The lender has asked the authorities to replace these tiles. The safety signaling yellow tiles are also missing even though they were included in the design.

Refrence:ADB finds 'deadly flaws' in Peshawar BRT project By Shahbaz Rana

Published: July 7, 2019

Support your answer with logical and factual arguments along with references. State how we could counter the risks associated with the technical aspects.

Managing Risks:

Once you've identified the potential risks to your project, you now need to sit down and assess each risk based on the probability of becoming reality and the impact they will have on the project if they occur.

Rank the impact and probability of each risk as high, medium, or low.

High impact, high probability risks should be handled first, while risks with a low probability and low impact can be tackled last.

Factor in the amount of time, money, and work each risk will require to effectively manage.

Now that you've ranked each risk, carefully review each one and determine if you can avoid, eliminate, reduce, transfer, or accept each risk.

Avoid the Risk:

This may mean turning down a project or negotiating the contract to remove the risks. There's no shame in walking away from a project if the risks outweigh the potential rewards.

Transfer the Risk:

Your company might not be the right fit to manage a particular risk. Work with the other stakeholders to determine who on the project team is best suited to assume each risk.

Discuss with the client what risks they will assume and which ones you will be responsible for managing.

Work with your insurance provider to determine which risks are covered under your current policies along with other options for protecting your company against risks.

Mitigate the Risk:

Eliminating, reducing and accepting risks takes the appropriate planning.

Break down each risk to sub components.

Don't overcommit your resources to handling multiple risks.

You may need to bring in additional resources, such as hiring more workers or renting additional equipment, to manage all your risks effectively.

Accept the Risk:

Agreeing to accept a risk is a decision that shouldn't be taken lightly.

It might be fine to accept a few low probability, low impact risks.

Agreeing to accept a high probability, high impact risk without any type of management or mitigation could be detrimental to the project and your bottom line.

Question 2. You are going to initiate a construction project. During the project, annual probability of occurrence of a hazardous event is (ID/6585200). If the event occurs, then the cost of the loss will be 45,275,000 US$ (consequence). By referring to Table 2.1 & Table 2.2, identify the risk level in the risk matrix shown in Figure 2.1. Hint: You can take help from Lecture and book "Risk Analysis in Engineering and Economics" by Bilal M. Ayyub.

Solution:

Given data:

Annual probability of occurrence of a hazardous event is (ID/6585200)

Rashid latif ID =15202

First to find the annual probability range values.

- 15202/6585200=0.0023

To select the likelihood categories for risk matrix

From table 2.1

Table 2.1

Likelihood Categories for a Risk Matrix

Category	Description	Annual Probability Range
A	Likely	≥0.1 (1 in 10)
B	Unlikely	≥0.01 (1 in 100) but <0.1
C	Very unlikely	≥0.001 (1 in 1,000) but <0.01
D	Doubtful	≥0.0001 (1 in 10,000) but <0.001
E	Highly unlikely	≥0.00001 (1 in 100,000) but <0.0001
F	Extremely unlikely	<0.00001 (1 in 100,000)

Putting values in 2.1

So referencing 2.1 table

.001> 0.0023 < 0.01

So category C very unlikely is the right one.

Now to select the consequences category for the risk in table 2.2

Table 2.2

Example Consequence Categories for a Risk Matrix in Monetary Amounts (US$)

Category	Description	Cost (US$)
I	Catastrophic loss	≥10,000,000,000
II	Major loss	≥1,000,000,000 but <10,000,000,000
III	Serious loss	≥100,000,000 but <1,000,000,000
IV	Significant loss	≥10,000,000 but <100,000,000
V	Minor loss	≥1,000,000 but <10,000,000
VI	Insignificant loss	<1,000,000

So from table 2.2

45275,000 > 100,000,000

But

45275,000 < 100,000,000

So it is in category four IV (Significant

So put the value in

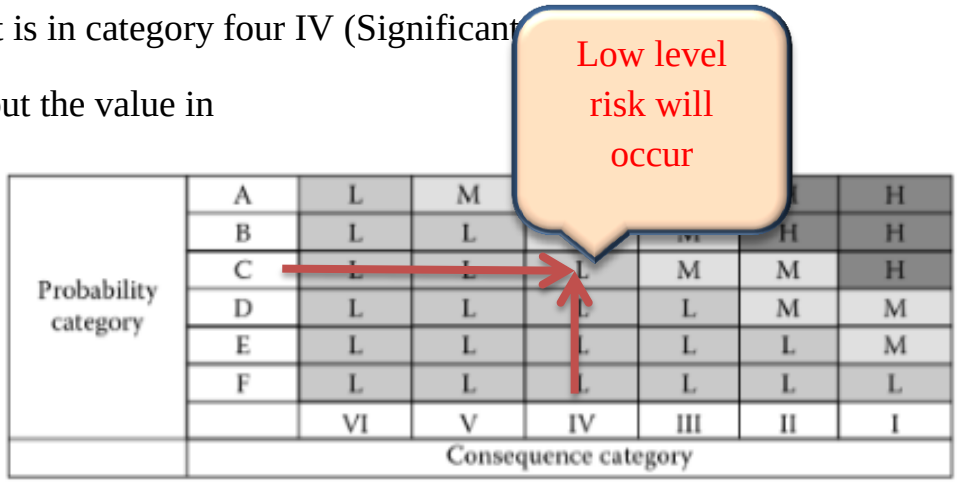


Fig 2.1 Risk matrix,(L:Low ,M:Medium ,H: High)

Conclusion: The above result show that risk calculated is low level risk.