SUBJECT: RISK AND DISASTER MANAGEMENT

I.D No: 14816

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Question 1: Considering the Bus Rapid Transit (BRT) Peshawar, what were the risks involved during construction associated with the technical aspects of the project? Support your answer with logical and fictioual arguments along with references. State hpw we could counter the risks associated with the technical aspects.

ANSWER)

1. Introduction:

Many cities the world are currently 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. Public transport is now dream for the peoples, proper Government transport system is not available in Pakistan and all the system has gone into the hand of private sector transportation whose management is flop and not coordinating with public demand. BRT system is now getting worldwide recognition as a unique system which provide best and optimal solutions for giving high standard mobility services with reasonable/affordable prices to the urban peoples in developed and as well as under developed countries in the world. The purpose of BRT is to reduce traffic congestion; it is built on corridors - a separate and safe way. Future planner prefers those places for BRT where they expect more traffic congestion in future BRT contains similar features like a light rail or metro system, due to its virtue it is considered much more consistent, suitable and faster than any customary transport service. BRT camber defined as inelastic, rubber tired, rapid transit means that combines locations, automobiles, facilities and ITS origins into a unified arrangement with solid progressive identity that summons an extraordinary picture. The concept of (BRT) is basically based on public transport system within a specific city, planned to improve mobility/ journey capacity and consistency with the view to improve the deficiencies of a conventional or traditional transportation system

2. PESHAWAR BRT

The first BRT (Trans Peshawar) system of KPK- Khyber Pakhtunkhwa which is right now under construction by the supervision of PDA (Peshawar Development Authority) in the main city of Peshawar, capital of province KPK - Pakistan. The project has divided into two distinct phases, in the main phase of the BRT system east -west corridor will be focused where 31 stations will be constructed with an initial deployment of 383 buses; Asian Development Bank has initially provided 88% of funding.

WHAT IS RISK?

- 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.

Risks involve during construction associated with the technical aspects of the project are:

1. Technical Complexity and innovation in design requiring new methods of construction and or erection.
2. Dangerous substances and items during construction and or commissioning.
3. Defective material and workmanship.
4. Inadequate site management.
5. Subsidence.
6. Vibration and oscillation.
7. Corrosion.
8. Extended duration of construction.
9. Removal of support.
10. Defective design.
11. Mechanical and electrical breakdown.
12. Ground movement.
13. Explosion and fire.
14. Defective temporary works.
15. Collapse.

3. 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

A few important ones are discussed as follows.

3.1. Incomplete Design:

Design phase is an important part of project life, Design should have been completed before the execution of Construction at BRT project.

3.2. 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.

3.3. 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.

3.4. Inadequate specifications:

Clarity regarding specifications and approvals affected the BRT project.

3.5. Tight Project Schedule:

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

3.6. 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.

3.7. 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.

3.8. 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.

3.9. Undocumented change orders:

As per the information provided by employees of BRT project many changes were instructed by the political and NO technical authorities during the execution which were not recorded as per the SOP.

3.10. 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.

3.11. 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.

4. Sources & References:

- [**The K-P government started the project in October last year with the former chief minister Pervez Khattak claiming that the project would be completed within six months. The first deadline set for the completion was April 20 which was extended to May 20. The then Project Director BRT and Director General of Peshawar Development Authority Israrul Haq then told media that the project's civil work would be completed by June 20 which too has been unachievable**].reference: Peshawar BRT launch further delayed till end of the year By Sohail Khattak
  Published: June 29, 2018

- **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 meters.**

"It is disappointing that the directional arrows are entirely missing from the implementation. As a remedy, it will not be acceptable to merely place taped arrows on the surface," the ADB correspondence read.

In yet another glaring deviation, the curb interface between the vehicle and the platform does not meet the Kassel curb design mandated in the detailed design of the project.

"The lack of an effective curb means that the docking process will be slow, inefficient and potentially damaging to the vehicle tires," the lender observed. The width of the lane, against the requirement of a at least 6.5 meters, is generally below the minimum threshold at many stations, which the ADB noted "causes concern over the safety and efficiency of the operations".

"There is significant concern of corridor lane widths at turns near BS10, BS12, BS15 and BS26. Over the course of operations, the current design may well result in collisions between BRT vehicles," according to the ADB correspondence reference: [Asian Development Bank finds 'deadly flaws' in Peshawar BRT project

By Shahbaz Rana

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- **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**

  The provincial authorities also used "inferior material" that both harm system functionality as well as deliver an aesthetically inferior product, according to the correspondence [Peshawar BRT project: ADB]

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- **The stair step height varies "considerably", which presents a safety problem. "The mild steel flooring material utilized for the ramps and stairs is of an unacceptable quality," the ADB noted.**

  At many places, pillars or stairways "do not align properly". At certain stations, the stairs and escalators have been built in the middle of the stations, obstructing walking space. "The footpaths are blocked by the placement of the public toilets and stairways," according to the correspondence. Reference: [ADB finds 'deadly flaws' in Peshawar BRT project]

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- **The ADB noted that there were "significant design deviations from the agreed detailed design that impede or degrade system performance.**

  The provincial authorities also used "inferior material" that both harm system functionality as well as deliver an aesthetically inferior product, according to the correspondence.

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2nd Part of the Question:

1. 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.

1.1. 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.

1.2. 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.

1.3. Mitigate the Risk:

Eliminating, reducing and accepting risks takes careful planning. Break down each risk into actionable items. 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.

1.4. 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.

Final Thoughts on Construction Risk Management:

Good risk management requires a high level of collaboration and communication with all parties involved. Keeping everyone on the same page and working together will allow you to identify and manage risks before they become a problem. Remember, risks can lead to great rewards when effectively managed.

Looking to avoid the risk of having issues with subcontractors and suppliers? Construct Connect has the tools to manage your bids and evaluate and choose the best companies to bid on your projects.

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.

Answer)

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)

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

Probability category	A	L	M	M	H	H	H
	B	L	L	M	M	H	H
	C	L	L	L	M	M	H
	D	L	L	L	L	M	M
	E	L	L	L	L	L	M
	F	L	L	L	L	L	L
		VI	V	IV	III	II	I
	Consequence category						

Figure 2.1 Risk Matrix (L: Low, M: Medium, H: High)

Given data:

ID NO=14816

If event occur, the cost of the loss will be “45275000US$”

NOTE: {by referring table 2.1 and 2.2}

Requirement:

Identify the risk level in risk matrix in fiq: 2.1

Solution:

First to find out the annual probability from above mentioned statement.

Annual probability value=ID/6585200----------1

Where ID=14816

Putting the value in equation 1

Annual probability value=14816/6585200

=0.00225 or 1/442.85

To select likelihood category 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)

From table we can determine that Category is C.

To select the consequence category in table 2.2 for a risk matrix in monetary amount**.**

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 given table it show “category “IV” “significant loss” will occur.

To find out the risk level in the risk matrix Fig.2.1

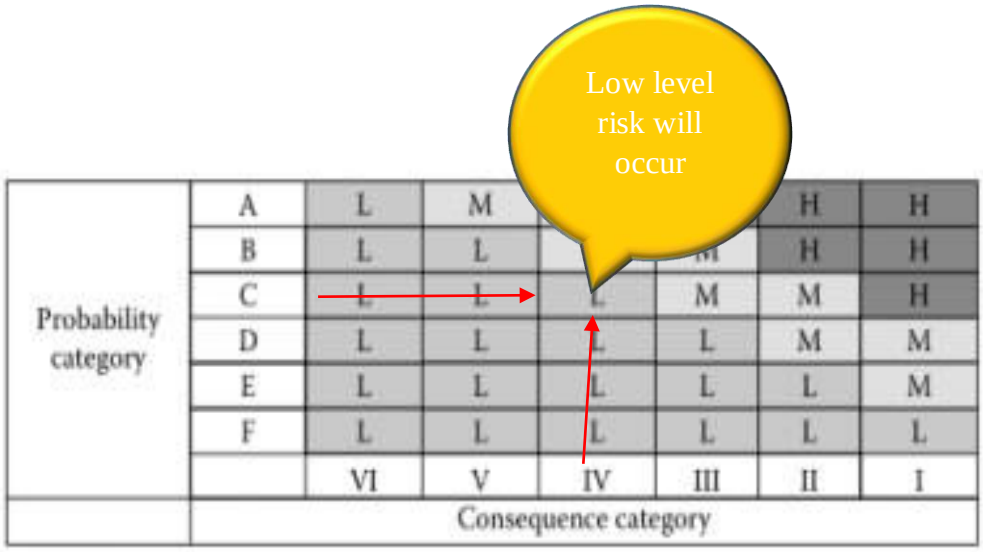

Figure 2.1 Risk Matrix (L: Low, M: Medium, H: High)

Conclusion:

From the above value, this shows that the risk is low level.