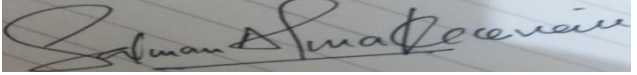




# IQRA NATIONAL UNIVERSITY

Phase-1 Phase 2 Hayatabad, Peshawar, Khyber PakhtunKhwa



|                            |  |
|----------------------------|--|
| <b>PAPER</b>               | <b>MID TERM</b>  |
| <b>COURSE TITLE</b>        | <b>RISK &amp; DISASTER MANAGEMENT IN CONSTRUCTION</b>                                |
| <b>SUBMITTED TO</b>        | <b>SIR ENGR.YASEEN MEHMOOD</b>   |
| <b>SUBMITTED BY</b>        | <b>SALMAN AHMAD KHATTAK</b>  |
| <b>REGISTRATION NO</b>     | <b>14043</b>   |
| <b>DEPARTMENT</b>          | <b>CIVIL ENGINEERING</b>   |
| <b>MODULE</b>              | <b>MS(CEM)</b>   |
| <b>DATE</b>                | <b>25-04-2020</b>  |
| <b>CANDIDATE SIGNATURE</b> |  |

Handwritten Arabic calligraphy in a highly stylized, cursive script. The text is arranged in a dense, overlapping pattern, likely representing a specific phrase or name. The characters are thick and black, set against a white background. The overall appearance is that of a decorative or artistic rendering of Arabic text, possibly a signature or a specific religious or literary phrase.

**Q1. 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 factual arguments along with references. State how we counter the risks associated with technical aspects.**

## **INTRODUCTION:**

Construction activities in Nigeria which are mostly carried out by Government, consultants and contractors normally face different kinds of risks (e.g Management, Design, Finance, Construction, Political and External) during construction. However, most of them do not predict risks when they are considering bids and tenders. Construction risk is generally perceived as events that influence project objectives, i.e, cost, time, and quality. Some of the risks associated with the construction process are fairly predictable or really identifiable; others may be totally unpredictable. In project management terms, the most serious effects of risk can be summarized as follows:

- Failure to keep within the cost estimate
- Failure to achieve the required completion date
- Failure to achieve the required quality and operational requirements

In recent years, intensive research and development have focused on project risk management. Risk management may be described as “a systematic way of looking at areas of risk and consciously determining how each should be treated. It is a management tool that aims at identifying sources of risk and uncertainty, determining their likely hood of occurrence, their impact, and developing appropriate management responses”.

## **WHAT IS MEANT BY BUS RAPID TRANSIT?**

Bus rapid transit is a high performance public transport bus service which aims to combine bus lanes with high-quality bus 'stations', vehicles, amenities and branding to achieve the performance and quality of a light rail or metro system, with the flexibility, cost and simplicity of a bus system. Bus rapid transit is a high performance public transport bus service which aims to combine bus lanes with high-quality bus 'stations', vehicles, amenities and branding to achieve the performance and quality of a light rail or metro system, with the flexibility, cost and simplicity of a bus system. Bus rapid transit is a high performance public transport bus service which aims to combine bus lanes with high-quality bus 'stations', vehicles, amenities and branding to achieve the performance and quality of a light rail or metro system, with the flexibility, cost and simplicity of a bus system.

## **BRIEF HISTORY OF BUS RAPID TRANSIT:**

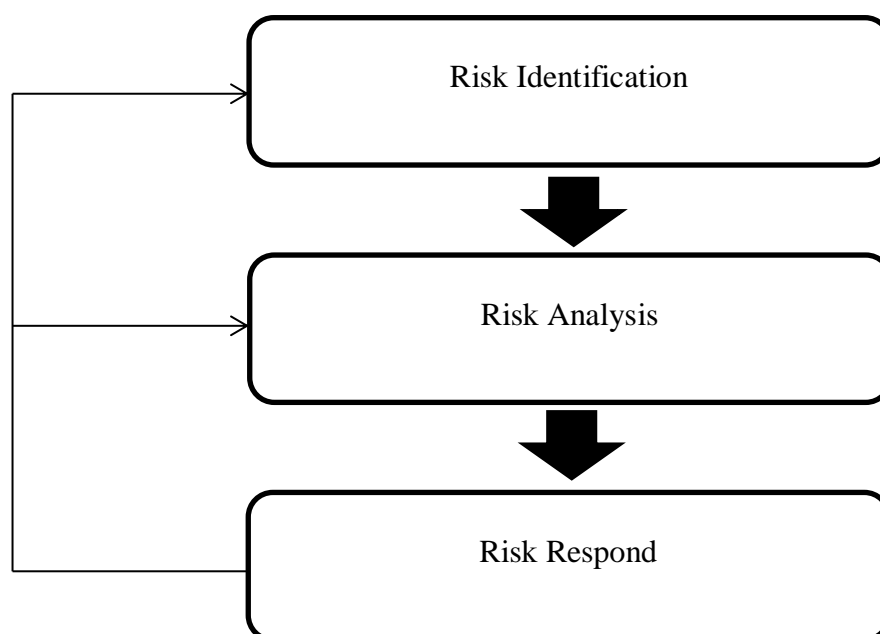
The first BRT system was the Rede Integrada de Transporte in Curitiba, Brazil which entered service in 1974, which inspired the respected TransMilenio in Bogotá, Colombia and subsequently many other systems around the world. The first BRT system was the Rede Integrada de Transport in Curitiba, Brazil which entered service in 1974, which inspired the respected TransMilenio in Bogotá, Colombia and subsequently many other systems around the world.

## **HISTORY OF BUS RAPID TRANSIT PESHAWAR:**

In 2013, the Government of Khyber Pakhtunkhwa requested technical support from the Cities Development Initiative for Asia to improve Peshawar's chaotic, mismanaged, and dilapidated urban transportation network. In 2014, the CDIA completed the Urban Transport Pre-Feasibility Study that devised a 20-year urban transport plan, with a 10-year action plan. The CDIA studied two corridors, an east-west corridor, and a north-south corridor and recommended that the east-west corridor be constructed first, along Peshawar's east-west axis along the Grand Trunk Road. Construction of the project, under the Peshawar Development Authority (PDA), began on 29 October 2017, and is being executed by the Peshawar Development Authority.

## **RISK ASSESSMENT STRATEGIES:**

Managing changes has led to the introduction of techniques for risk assessment as a major part of the planning process. Risk assessment concentrates on quantifying identified risks by using statistical analysis, since the identified risk in most cases can be either quantitatively or subjectively assessed factors. The risk management cycle (the risk assessment phase) can be viewed in three stages.



| <b>RISKS INVOLVED IN BRT PESHAWAR</b>  | <b>HOW TO COUNTER THE RISKS</b>  |
|--|--|
| <p><b>1. Public Financial Management</b></p> <p><b>a.</b> Incomplete and inaccurate financial reporting</p> <p><b>b.</b> The PMU and PIUs are unfamiliar with ADB’s policies and procedures, and there is a risk that expenditures incurred will not be in accordance with the applicable legal framework.</p> <p><b>2. Technical aspects</b></p> <p><b>a.</b> Longer preconstruction time and delayed start of civil works due to (a) the delayed preparation of bidding documents; and (b) the time required for procurement.</p> <p><b>b.</b> Delays due to the complexity of the design and implementation in the city center and cantonment area.</p> <p><b>c.</b> Public transport users do not utilize BRT at projected levels.</p> | <p><b>1. Public Financial Management</b></p> <p><b>a.</b> Both implementing agencies will adopt the FMM developed by ADB as technical back-stopping. Regular supervision missions and training by ADB will further enhance their capacity to build and establish an effective financial management system. For Trans Peshawar, PMCCB will deploy, when fully established, accounting software for cost control based on ADB’s FMM to establish a proper financial management system for the project</p> <p><b>b.</b> The FMM includes a comprehensive section providing step-by-step guidance on expenditure management, defining the service standards and requisite supporting documentation for payment processing. The PMU in the KPUMA and PIUs in Trans Peshawar and the Peshawar Development Authority will adopt the FMM.</p> <p><b>2. Technical aspects</b></p> <p><b>a.</b> Bidding documents have been prepared with the support of the PMCCB consultants hired under the PDA. EPCM consultants have completed 75% of the DED under the PDA, allowing advance procurement to be undertaken for most civil works contracts, which will be ready for award on or before loan effectiveness. A detailed procurement capacity assessment of both implementing agencies was conducted, and the procurement capacity required to undertake advance actions and contract management was built into the PIUs’ structures. In addition, the national and international consultants hired under the PDA provide oversight. The procurement plan has been designed to reduce the number of packages without compromising competition and to reduce contract management requirements.</p> <p><b>b.</b> EPCM consultants have been hired in advance under the PDA and initial surveys for both the design and relocation of utilities have been completed. Traffic management and alternate routes have been identified, and the</p> |

### **3. Political and/or organizational**

**a.** Political pressure to fast-track project implementation before the mid-2018 general elections undermines the quality of the project design and implementation.

**b.** Political competition and rivalry build on flawed comparisons between existing BRT projects in Pakistan and the proposed project,

**c.** Vested interests (existing public transport operators, shopkeepers, and others along the BRT corridor) try to undermine the project during implementation.

**d.** The delayed operationalization of the KPUMA and Trans Peshawar fails to provide necessary critical mass to implement the project and capacity building.

**e.** Limited capacity and a lack of coordination and clarity regarding the roles and responsibilities of the executing and implementing agencies

packaging and phasing of procurement and implementation have been synchronized accordingly.

**c.** The PPTA consultants estimated demand and ridership by following a proven but simplified methodology. These estimates will be further updated and confirmed through detailed additional surveys by ODBM consultants under the PDA. The actual ridership at system opening will depend on the final project design, and quality of the construction and operations management by Trans Peshawar.

### **3. Political and/or organizational**

**a.** All possible advance actions have been taken to help the provincial government deliver the main bulk of civil works before the mid-2018 elections. Large consulting teams have been mobilized ahead of loan approval under the PDA. The DED is ongoing and 75% completed. Most tender bid documents have been shared and reviewed by ADB, and the first civil works packages have been advertised in May 2017. Works are expected to start as soon as the project loan is declared effective in September 2017 (this date is tentative). Retroactive financing will be used to shift utilities ahead of loan approval.

**b.** A strong communication team has been recruited as part of the PMCCB consulting team to support the provincial government in designing and implementing a project communication strategy, and engaging with the media and various civil society stakeholders.

**c.** Existing operators: Dedicated cost and consultancy support is built into the project design to facilitate bus industry transition through negotiations and capacity building to operate the BRT system. Consultations with the existing bus operators' federation were held during the PPTA to inform the operators about the project. Under the PDA, skilled negotiators have been recruited to the ODBM consulting team, who will further discuss and develop a business model to include the existing operators as much as possible in the BRT

operations. The initial BRT fleet will be financed under the project and leased to private operators to reduce the need to mobilize capital and allow existing operators to participate in the bidding process. The project design also includes a fleet scraping program and compensation mechanism for nonparticipating existing operators. Shopkeepers' and traders' associations: The Government of Khyber Pakhtunkhwa, supported by the PMCCB communication team and ADB project team, engaged with traders' associations and other organizations (e.g., Lady Reading Hospital and the Cantonment Board) in the vicinity of and impacted by the BRT corridor, to present the project design, consider their concerns, and ensure buy-in and ownership, so that these groups do not oppose the project or ask to change the project design and alignment.

**d.** Parliament has already approved the legal framework establishing the KPUMA, and Trans Peshawar is already licensed as a Section 42 (nonprofit) public company. The government, as part of their commitment, has already approved an annual allocation for the KPUMA's operations. ADB will finance Trans Peshawar's operational expenditures for 3 years. Organograms and job descriptions for key staff for both organizations have been developed by the PMCCB consultant, who will also provide general support during staff recruitment, and build the staff's capacity.

**e.** An assessment of additional capacities required by the executing and implementing agencies, including national and international consultants and incremental staff (PMU and PIUs), was included in the project scope. Consultants required by the executing and implementing agencies have been hired under the PDA and are fully mobilized. The government approved advance funding for the PMU and PIUs, and staff are currently being hired. The KPUMA's board of directors will act as the project steering committee and will guide, oversee, and coordinate among the different entities implementing the project. The

#### **4. Governance**

**a.** Pakistan's score for control of corruption, government effectiveness, and regulatory quality remains low.

**b.** Due to potential for corruption and political interference (notably with regard to appointments of the ombudsman and chairperson of the NAB), oversight institutions are not perceived to be impartial.

**c.** Lack of transparency and disclosure of project activities, especially procurement.

PMU, supported by the PMCCB consultants, will report to the KPUMA, provide dedicated coordination support, and be responsible for overall management of the project. The roles and responsibilities of the executing and implementing agencies are outlined in the PAM.

#### **4. Governance**

**a.** Federal and provincial governments have initiated reforms to strengthen governance. The Right to Information, the Ehtasab Commission (which was established in 2014 to promote accountability), and the Citizens' Right to Public Services have all been operationalized in Khyber Pakhtunkhwa. In addition, several federal-level anti-corruption watchdogs (e.g., the NAB and ombudsman) comprise provincial divisions. Khyber Pakhtunkhwa is also working on a 10-year governance program for long-term systemic reform. The initiative includes training citizens and establishing effective public grievance redress mechanisms. The project will also be ring-fenced by the institution of a mechanism to redress project-based grievances, corruption control, and the periodic review of regulatory compliance.

**b.** Several partners, including the DFID, EU, GIZ, and World Bank, are providing support for legal and judicial anti-corruption reforms. The projects will be effectively insulated from corruption risks in accordance with ADB's Anticorruption Policy by the building of compliance requirements into the financing agreements and close monitoring of their implementation.

**c.** Project design and implementation arrangements have included several measures to bring more accountability and transparency to procurement. A proper system of procurement planning, tracking of various procurement actions, and complaints monitoring will be implemented. This includes support from a team of experienced procurement and financial consultants already hired under the PDA. The KPUMA will maintain a website to show the updated



**5. Social and Environmental Risk**

- a. Unemployment of existing private bus drivers and other workers.
- b. High traffic congestion leading to delays in vehicular movement (including ambulances), along with an increased risk of accidents during the construction phase of the project
- c. Noise levels from construction activities near sensible receptors exceeding local and international noise limits, and leading to disturbance and significant adverse impacts.
- d. Interruption and outage of utilities (e.g., electricity and telephone poles, underground gas, and water and sewerage lines) due to excavation and construction works at sites along the project corridor could significantly disturb sensitive receptors.
- e. Delayed land acquisition for depots, no-objections from railways, and the relocation of utilities by relevant agencies may delay civil works.
- f. The security situation deteriorates and impairs project implementation and future BRT operations.

procurement status. The number of contracts to be procured will be limited, using ICB procedures in most cases, and supervised by international consultants to minimize risks. In addition, direct payment procedures will be used.

**5. Social and Environmental Risk**

- a. The project design includes dedicated cost and consultancy support to facilitate the bus industry transition through capacity building to operate the BRT system. This includes training existing drivers and bus industry workers, who will be given employment preference to operate the BRT system. The BRT system is expected to generate around 4,000 jobs directly.
- b. EPCM consultants under the PDA are currently developing a detailed and comprehensive traffic management plan that will ensure the utilization of alternative routes to minimize traffic congestion and reduce traffic and pedestrian movement along the proposed project corridor construction sites. In addition, a comprehensive set of mitigation measures to manage traffic related issues during construction is being developed and will be implemented and monitored.
- c. Noise barriers shall be placed at different strategic locations at work sites along the project corridor to ensure that all key receptors (e.g., educational institutions, healthcare facilities, and residences) are shielded from any high noise levels generated during construction. In addition, the EIA prepared for the project outlines a comprehensive set of mitigation measures to be implemented to minimize the impacts, if any, of high noise levels.
- d. Effective pre-planning is being conducted with all concerned utility departments to minimize any possible impact(s) on different utilities in each section of the project corridor. Alternative arrangements will also be made wherever the outage of a particular utility is unavoidable. The duration of the utility outage will be minimized as much as possible. All

|  |   |
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|  | <p>associated possible mitigation measures, such as keeping communities informed of planned outages, will be conducted to enable them to prepare and plan in advance.</p> <p><b>e.</b> Close coordination has been established with the BOR, and land transfer funds have already been approved by the government and transferred to the BOR. Work will be phased to start in sections that do not require land acquisition. A separate PC-I for the relocation of utilities has been approved, and funds are being transferred to these utilities in advance, along with location maps of the utilities to be removed. This will be closely coordinated by the Peshawar Development Authority, which has a well-established coordination mechanism in place with all major utilities to ensure timely removal.</p> <p><b>f.</b> The provincial government has committed to provide security to the project site through its Home Affairs Department and local law enforcement agencies. Bidders are instructed to include provisions for security at the camp site. The project design includes measures such as metal detectors in all BRT stations, and security agents in all BRT vehicles.</p> |
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Some other recommendations for risks related megaprojects like **BRT** are as under:

- a.** To reduce/eliminate the barriers against risk management system, formal risk management system and Parties joint risk management system should be improved through conduction of study in local environments.
- b.** For Pakistani industries, international standards should be utilized to develop the risk management system for Pakistan.
- c.** Property developers risk management practices and their efficiency to local environment is to be studied and investigated.
- d.** According to Risk management level audit tool of Project management Institute (PMI), most organizations can described their current statuses of risk management system and adequacy level between level 1 and 2 if measured. Local organization Maturity level should be improved through this study further.

## **REFERENCES:**

**I.** Flanagan, R., and Norman, G. (1999). "Risk management and construction." Blackwell Science Ltd, Oxford, UK.

**II.** Lotshaw. (20 Jun 2011). Profiles of American BRT: Pittsburgh's South Busway and East Busway.

**III.** "Risk & Insurance in construction" by Neal G. Bunni.

**IV.** Shou Qing Wang, Mohammed Fadhil Dulaimi & Muhammad Yousuf Aguria 2004 "Risk management framework for construction projects in developing countries".

**V.** American National Standard. (2004). "Project management body of knowledge." ANSI/PMI 99- 001-2004, USA. Terry Lyons and Martin Skitmore (2004), "project risk management in the queens land engineering construction industry: a survey".

**Q2. You are going to initiate a 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 & 2.2, identify the risk level in the risk matrix shown in Figure 2.1.**

Table 2.1

Likelihood Categories for a Risk Matrix

| Category | Description        | Annual Probability Range                     |
|----------|--------------------|--|
| A        | Likely             | $\geq 0.1$ (1 in 10)                         |
| B        | Unlikely           | $\geq 0.01$ (1 in 100) but $< 0.1$           |
| C        | Very unlikely      | $\geq 0.001$ (1 in 1000) but $< 0.01$        |
| D        | Doubtful           | $\geq 0.0001$ (1 in 10,000) but $< 0.001$    |
| E        | Highly unlikely    | $\geq 0.00001$ (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       | $\geq 10,000,000,000$                       |
| II       | Major loss         | $\geq 1,000,000,000$ but $< 10,000,000,000$ |
| III      | Serious loss       | $\geq 100,000,000$ but $< 1,000,000,000$    |
| IV       | Significant loss   | $\geq 10,000,000$ but $< 100,000,000$       |
| V        | Minor loss         | $\geq 1,000,000$ 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:**

Probability of Occurrence = ID/6585200 (Annual)

ID = 14043

LOSS (Cost) = 45,275,000 US\$

**To Identify:**

Risk Level=?

**Solution:**

1. From Table 2.1: Likelihood categories for risk matrix

Annual Probability = ID/6585200

$$= 14043/6585200$$

$$= 0.002$$

As probability is greater than 0.001 and lesser than 0.01

So,

Category **C (Very Unlikely)** from given table

Now

2. Consequence (Given) = 45,275,000 US\$

Consequence Category = IV = Significant Loss from given table because consequence is greater than **10,000,000** but lesser than **100,000,000**

**Now Finding Risk Level:**

From the intersection of category **C** and category **(IV)**

**The Risk Level is “L” (Low)**