IQRA NATIONAL UNIVERSITY PESHAWAR

DEPARTMENT OF CIVIL ENGINEERING

M.S TRANSPORTATION

Submitted To:

Instructor:

Engr.Yaseen Mahmood

Course:

Risk & Disaster Management in Construction

Submitted by:

Engr.Muhammad Riaz

ID # 15170

M.S (T.E)

0332-2882828

Q1. Considering the Bus Rapid Transit (BRT) Peshawar, what were the risks involved during construction associated with technical aspects of the project? Support your answer with logical and factual arguments along with references. State how we could counter the risks associated with the technical aspects.

Answer:

Risks during Construction associated with the Technical Aspects of the project:

Around the world, governments at all levels take part very important roles in organizing the safety and comfort of public transportation systems in the form of BRTs. Huge Construction projects such as BRT are initiated in intricate and dynamic conditions bringing about conditions of high vulnerability and risk, which are compounded by challenging phase restrictions. Constructions of BRT's have reformed suggestively from the past numerous years. It is a structure obsessed primarily by govt./ Sponsors. It is exposed against the several specific and trade risks that habitually speak to more remarkable publicities than those that are conventional. In this manner risk assessment requires develops. Risk taxation is an apparatus to classify those hazards in a task and direct it as requirements be with suitable management.

For every project especially Mega projects feasibility study, proper planning, designing, Risk management & its proper implementation is required. There are certain essential requirements for Mega Project must be consider as Huge Money of Govt or Public Private is involved among which one Risks management.

The following major points for Risk Management for any Mega project be followed.

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

BRT History:

The first Bus rapid transit system in the world was launched in the name of Rede Integrated Transport (RIT), in Curitiba an urban of Brazil, in 1974. Supreme of the parts that are linked now with BRT are the revolutions of Curitiba Mayor Architect Jaime Lerner1974. At the start main arterial roads of a city were chosen for bus lanes, again the Curitiba city administration introduced a new transport structure in the name of feeder bus system and inter sector connections in 1980, and in 1992 they added new features in the system such as fare collection through counter, protected or separate stations, and platform-level boarding. Canada launched its first BRT system in 1973 with the introduction of the following features such as separate bus lanes along the major roads through the city Centre, with plat formed stops. But due to some reasons related to political issues and construction problems, bus ways did not start function until 1983. In the USA, BRT was introduced in 1977, in the name of Pittsburgh's South Bus way [VI] operating on 6.9 km of exclusive lanes.

After the success of this first project they were further motivated for another project, the new project in the name of Martin Luther King Jr. East Bus way in 1983, a more full BRT arrangement of a specifically designed bus way of 14.6 km launched. In January 2004 the world largest and Asia first BRT (TransJakarta) started in Jakarta, Indonesia. It is 210 kilometers long. Africa's first BRT framework was released in Lagos, Nigeria, in March 2008 however is measured as a bright BRT framework by numerous folks [V].

Peshawar BRT:

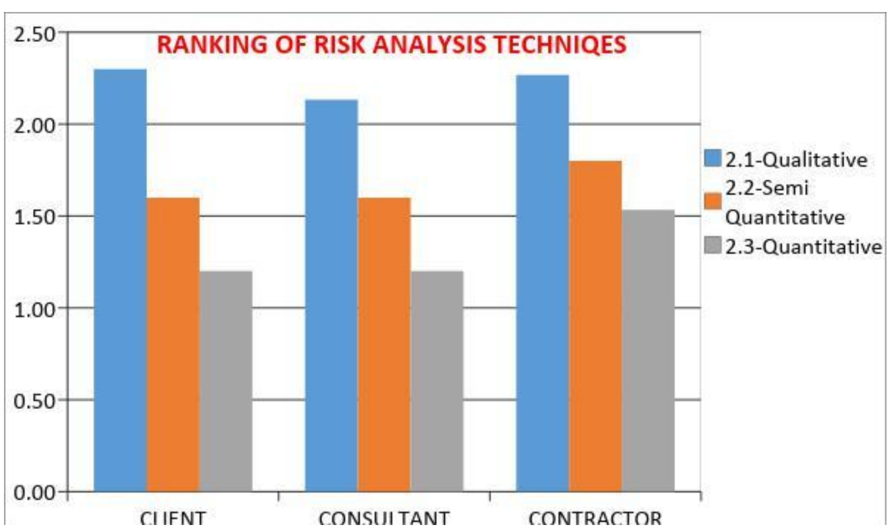
The first BRT (Trans Peshawar) system of KPK- Khyber Pakhtunkhwa which is right now under building by the supervision of PDA (Peshawar Development Authority) in the main city of Peshawar, a capital of province KPK - Pakistan. The project has divided into two distinct phases, in the main phase of the 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. It is worth mentioning that the Government of Khyber Pakhtunkhwa in 2013 submitted a request for maintenance from the Cities Development Initiative for Asia (CDIA) to develop Peshawar’s urban transportation network which is badly disordered and mismanaged in all the way. CDIA entertained this request and quickly finished the Town Transport PreFeasibility Study that planned a 20-year city transport strategy, with a 10-year act plan. The CDIA thoroughly considered the aspect two passageways, a north-south passageway and an east -west passageway, and finalized has recommendations that the east-west passageway should be constructed first. Construction started under the supervision of PDA on 29 October 2017 [XIV].

IMPORTANT BRT PESHAWER FEATURES

1	Twenty Six KM Main Corridor	15 KM at Grade
2	Eight KM Flyover	03 KM Underpass
3	Thirty-one Stations	Avg. distance between station 850m
4	Three Park and Ride Facility	Complete refurbishment of Footpaths
5	Bicycle-lane	Complete refurbishment of Footpaths
6	Safe	Well-Organized
7	Fast Journey	Relaxed
8	Trustworthy	Cost operative
9	Third Generation	Eight Feeder routes
Depots (Should be represented in info graphics at TChamkani, Hayatabad, and Dabgari)		

Risk analysis techniques:

To identify the frequency of usage of 3 risk analysis techniques, respondents were required to use scale from 1 to 5. Where scale 1 show “never used” and scale 5 show “always used”. The results of Shapiro-Wilk & Kolmogorov-Smirnov show that normal distribution was not followed by the data as shown in figure below. The risk identification overall ranking was based on mean responses, are qualitative, Semi quantitative and quantitative having means 2.23,1.67 and 1.31 respectively. The result of Kruskal-Wallis test showed about specific risk analysis techniques that do not differ in case of perception of group. The clients, contactors and consultants were agree on same ranking as per spearman correlation.

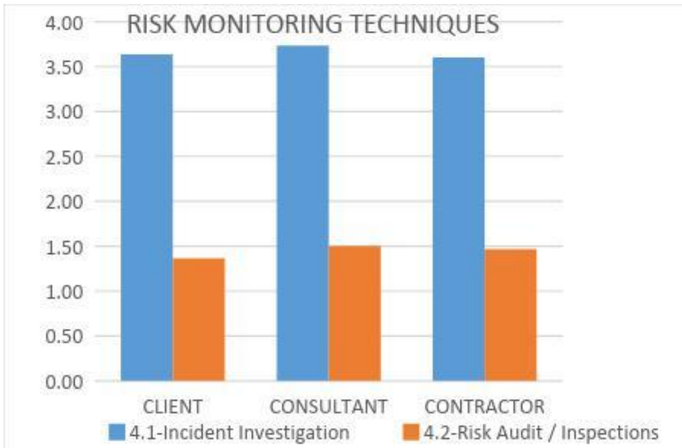


Ranking of Risks Response Techniques:

Similarly as well as per above techniques in this analysis techniques to identify the frequency of usage of six risk analysis techniques, respondents were required to use scale from 1 to 5. Where scale 1 show "never used" and scale 5 show "always used". The results of Shapiro-Wilk & Kolmogorov-Smirnov show that normal distribution was not followed by the data. The risk identification overall ranking was based on mean responses are risk avoidance, completely transfer the risk, likelihood occurrence reduction, consequences reduction, sharing the risk and completely retain risk having means of 4.16, 4.30, 3.83,3.83, 3.61 and 3.64 respectively. The result of Kruskal-Wallis test showed about specific risk analysis techniques that are identical in case of perception of group. The clients and consultants were agree on same ranking about risk response as per spearman correlation while contactor differ the opinion form both contractor and client. The risks are mostly divided into client and contractors because in most case consultants represent client.

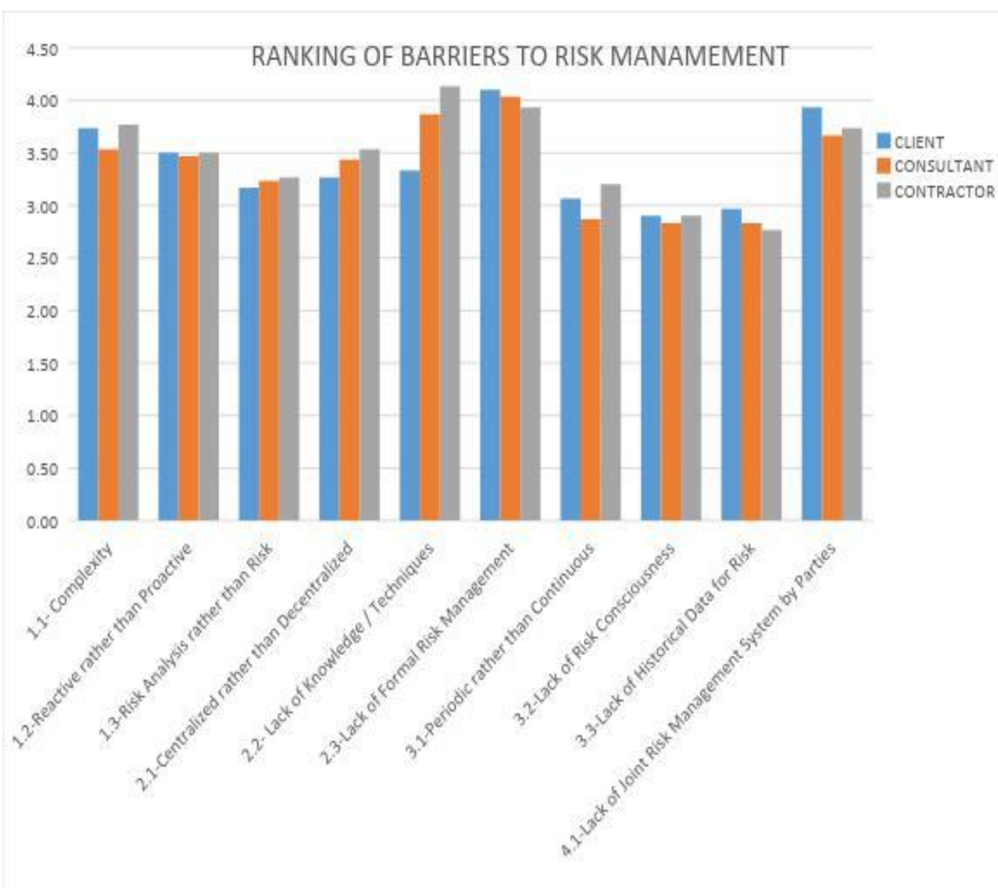
Risk Monitoring Techniques:

To identify the frequency of usage of two risk monitoring techniques, respondents were required to use scale from 1 to 5. Where scale 1 show "never used" and scale 5 show "always used". The results of Shapiro-Wilk & KolmogorovSmirnov show that normal distribution was not followed by the data as figure6. For risk monitoring risk investigation having mean 3.66 used most importantly followed risk inspection (mean=1.44) and result presented in figure 6. The result of KruskalWallis test showed about risk monitoring techniques that are identical in case of perception of group (p=0.773 and 0.561). The clients, contractors and consultants were agree on same ranking as per spearman correlation. More ever the interviewer Copyright reserved © J.Mech.Cont.& Math. Sci., Vol.-14, No.2, March-April (2019) pp 87-99 96 observed that there was no idea of risk inspection by respondents even incident investigation was not from risk management.



Ranking of Barriers to Risk Management:

There are many barriers associated to risk management system such as formal risk management system absence, Learning strategies absence, multifaceted nature, absence of risk identification, Parties joint risk management system absence, less Risk historical data, less risk knowledge and reactive than proactive. But formal risk management system and Parties joint risk management system absence are the most important barriers in implementing the effective risk management system.



Conclusion and Recommendations:

To conclude, in view of above contributed to the construction industry of Pakistan as it has exposed and identified the risks involved in mega projects. Moreover, it has highlighted the adopted risk management practices and resource allocation methods implemented by different stakeholders of the construction industry of Pakistan. Stakeholders like Project manager, Planner, supervisor and key stake holders will be able to get information regarding different aspects of risk management associated to different construction activities. This revealed that risk management system is less problematic instead of its implementation as per interviewer's exposures. Few mangers faced resistance to change as maintaining previous practices when tried to develop and implement the risk management system in their current organizations. Due to existing practice it was difficult to change the practices so early because of taking long time to change the culture adoptability. Therefore for developing and implementing it is essential to educate all stake holders. It is concluded that important project related risk on bases of priority are Error in design, Design Complexity, Prices Fluctuations, Tax rate, Poor Coordination, Pre-qualification and reputation of contractor, Key stakeholder relationships, Side condition unforeseen and finally delay or change in drawings supply.

References:

I. Anuj Jaiswal,et,al (2012) "BUS RAPID TRANSIT SYSTEM: AMILESTONE FOR SUSTAINABLE TRANSPORT: A CASE STUDY OF JANMARG BRTS, AHMEDABAD, INDIA"

II. American National Standard. (2004). "Project management body of knowledge."ANSI/PMI 99-001-2004, USA.

III. Edward Thomas, at the Institute of Transportation Engineers Annual Meeting, Chicago, IL, August 2001.

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

V. Levinson, H., Zimmerman, S., Clinger, J., Rutherford, S., Cracknell, J., and Soberman,R. "Case Studies in Bus Rapid Transit - Preliminary Draft Final Report" TCRP A-23, prepared for the Transportation Research Board, National Research Council, Washington, D.C., May 2002

Q2. 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 occur, then the cost of the loss will be 45,275,000 US$ (consequences) by referring to table 2.1 and table 2.2, identify the risk level in the risk matrix shown in the figure 2.1.

Answer:

Risk Matrices or Heat Maps:

Risk matrices, also called heat maps, are basically tools for representing and displaying risks by defining ranges for consequence and likelihood as a two-dimensional presentation of likelihood and consequences. According to this method, risk is characterized by categorizing probabilities and consequences on the two axes of a matrix. Risk matrices have been used extensively for screening of various risks. They may be used alone or as a first step in a quantitative analysis.

Hazardous Event = 15170/6585200
= 0.00230

A) Likelihood categories for risk matrix (Ref: table 2.1)

Category	**C**
Description	**Very unlikely**
Annual Probability Range	**≥ 0.001 (1 in 1000) but < 0.01**
	(0.00230)

B) Consequences Categories for a Risk Matrix in Monetary Amounts (US$) (Ref: table 2.2)

Category	**IV**
Description	**Significant Loss**
Annual Probability Range	**≥ 10,000,000 but < 100,000,000**
	(45,275,000)

C) Risk Matrix

Refer to Figure 2.1, and Data from above **A** and **B**, reveal that probability category to consequence category as **Low (L)**.

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)