ISSN (Online) : 2454 -7190 **ISSN (Print) 0973-8975**

Identification of Risk Management in Bus Rapid Transit (BRT) Project Peshawar

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https://doi.org/10.26782/jmcms.2019.04.00007

Abstract:

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 BTR 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. Risk assessment is considered in this research as a strategy that expects to distinguish and appraise those important risks which are related to design, financial and management. The common procedure of this research rest on to a great extent on the review survey which was collected from the client, consultant and contractors of projects. A careful literature review was directed to distinguish the risk issues that influence the enactment of BRTs in general. The inspection questionnaire was designed to investigate the cross sectional behavioral arrangement of construction risks related to the BRT Peshawar. This research wants to classify and evaluate the risks and to improve a hazard supervision framework which the clients/ consultants/ contractors can implement when tightening BRT work in Pakistan.

Key Words : BRT, Risk Identification, Risk Assessment.

I. Introduction

Millions of 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.

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. BRT provides high-quality services with reasonable price customer care transportation that is responsible for providing standard and unique services to the urban peoples [III]. 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 [V].
BRT contains similar features like a light rail or metro system, due to its virtue it is consider much more consistent, suitable and faster than any customary transport service. Due to its tremendous features, BRT is capable to control the causes of delay and other related issues such as being stuck in rush hour gridlock and lining to pay on board. 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

II. 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].

III. 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 Pre-Feasibility 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].

Figure 1. BRT Feeder Route reach 2

IV. Features of BRT Peshawar

The east-west corridor of Trans Peshawar is from Chamkani to Hayatabad which are the extreme.

IV.a. Route:

The system will have total of Thirty-one stations. The line will contain 3.5 km of tunnels. The entire bus way will be properly confined in such a way to prevent the entrance of unauthorized pedestrian and also to prevent the aggregation of vehicles from traffic.

IV.b. Buses:

The Buses will be comfortable and capacious and will provide easy entry and easy egress from the doorways. Free Wi-Fi service will be available for all passengers, while stations will have washroom facilities. During the mobility of passengers' peak time, buses schedule will be three minutes, and at the interval of five minutes in normal situation. In addition, the buses will have hybrids system Diesel-Electric which will save enough fuel and will emit lower emissions. Accusing stations will also be set up to allow for refreshing automobile batteries.

TABLE 1. IMPORTANT BRT PESHAWER FEATURES

IMPORTANT BRT PESHAWER FEATURES		
1	Twenty-six Km Main Corridor	Fifteen Km at Grade
2	Eight Km Flyover	Three 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 Chamkani, Hayatabad, and Dabgari)		

V. Objectives:

The following objectives have been set for the study of BRT Peshawar.

a. Views of clients/consultants/contractors
b. Barriers to Risk management
c. Risk analysis techniques

VI. Literature Review:

A broad assessment of National international Project risk assessment and management was conducted during the initial phase of the study work. Formerly researches recommends that manufacture activities are mainly issue to more risks than other industry accomplishments because of its convolution; structure projects usually require a assembly of folks with altered skills and benefits and the management of a wide range of dissimilar, yet consistent, Accomplishments. Such Difficulties are more compounded by the exclusive Features of a project and many other external Uncertainties. And also, in Common, there is a Lack of literature that has motivated on the practices, effects or enlargement of risk assessment and management methods for Pakistani Production projects.

Va. Risk:

In the middle of 1700 AC English language/literature picked the famous word “RISK” from French language, which is actually “risqué” in French. The assurance contract started using Anglicized meaning in 2nd sector of 18th century [V] and allowing to [VII] risk is concern to the happening of random future events whose careful probability and result is unsure but possible affect purposes of given situation in some way.

Vb. Risk Management:

It is explained as the systematic procedure and proper arrangement which is related to the competent management for achieving possible opportunities and undesirable impacts [X]. According to [VII] it is to be the practice of proactively functioning with shareholders to ease the danger and increase the chances related with project conclusions.

Vc. Risk Identification:

The procedure of framing what can occur, why and how ([X] and as per [XI] it is the proper development of locating properly which potential hazards have the capacity to effect scheme objective/goals.

Vd. Risk Analysis:

An organized procedure of using in hand existing info’s to Identify how frequently detailed events may happen and the size of their results [X] and as per [VII] it involves the systematic recording of identified risks and opportunities.

Ve. Qualitative And Quantitative Risk Analysis:

Qualitative includes examination of task risks and chances by using qualitative gages (ordinal) such as high level risk, standard level risk and low level risk, whereas quantitative involves analysis of risks and opportunities by using appropriate mathematical values. Quantitative is usually directed on risks and prospects which appear as mostly essential from qualitative study and somewhere dependable data for examination is accessible [VII].

VI. Research Methodology:

A comprehensive questionnaire was developed after studying literature review for the purpose of survey method. Pilot study was accompanied to form the reliability and validity of the questionnaire by taking tree respondents from each group such as client, consultant and contractor. All the Respondents were chosen with more than 10 years of road/building production allied knowledge. On the basis of their feedback modified and final questionnaire was developed and distributed to thirty respondents of each group i.e. client, consultant and contractor.

Furthermore four sections were included in questionnaire such as Section one: Risks Importance, Section 02: Risk Management techniques applications, Section 03: Risk Management system status and finally fourth section is the risk management barriers. Identification of 25 risks major in nature were including section number one. Two questions were adopted from [XII] related to the risk management status of respective organization. Risk management barriers were identified, in total of 10 numbers 06 were adopted from [XII], while remaining were adopted from feedback of pilot survey and from research of [VII]. Three number of groups containing consultants, contractors and clients were made as a respondents. All of three groups were equally provided with 30 questioners each (consultants: 30, contractors: 30 and clients: 30) having total of 90. Telephonically or through email all the respondents were contacted. To distribute and collecting the questionnaires followed by the interviews were conducted through filed work approach. In these 90 respondents 30 % having experience of 3-10 years while remaining 70% having experience of more than 10 Years in their relative fields of construction. To know the response of respondent on importance of 25 risks, it was scale from 1 to 5 where 1 showed risk of insignificant nature while 5 showed risk with catastrophic nature. As per the output result of Shapiro-Wilk & Kolmogorov-Smirnov test, normal distribution was not followed in obtained data. This denoted one side view either on upper or lower side and found data was not normal.

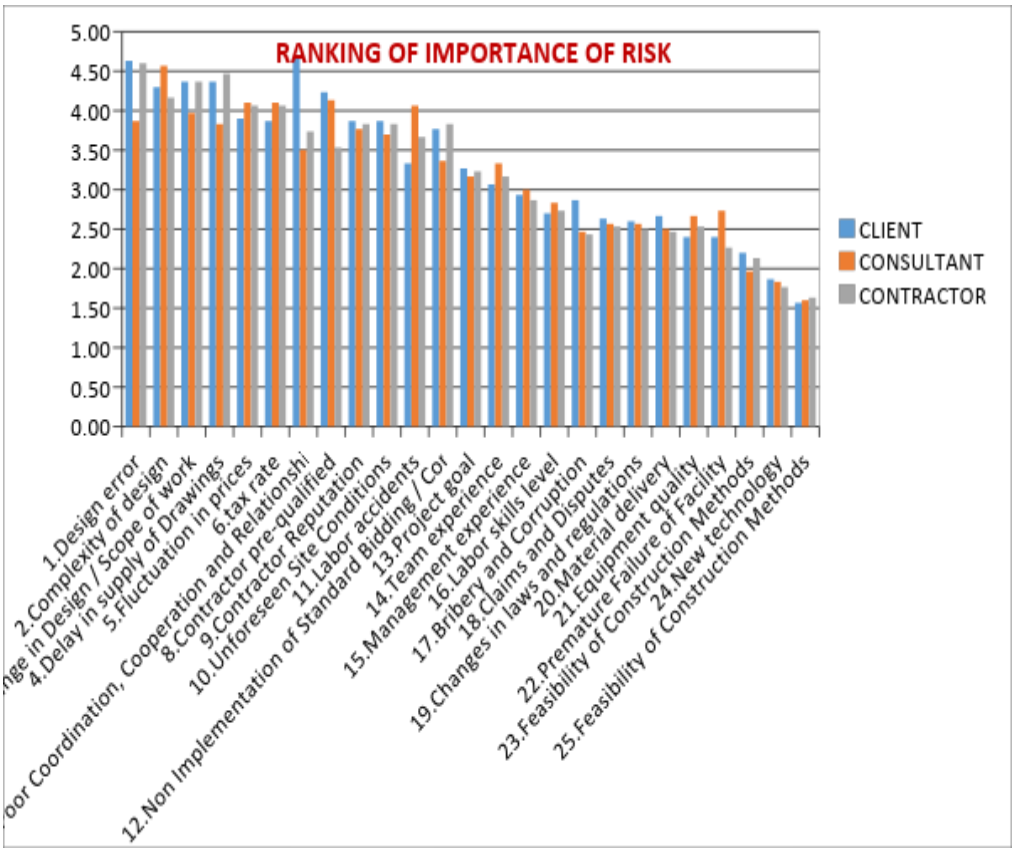

Figure 2. Ranking of importance of risk

Mean values were taken for ranking the overall risk such Error in design having mean 4.37, design complexity having mean of 4.22, Design Change of work having mean of 4.23, drawing supply delay having mean of 4.22 and reputation of contractor mean 3.82 etc. out of 25 risks 18 risks having same views provided the contractor, consultants and clients, while remaining seven results are opposite to Kruskal-Wallis test result as shown in figure 3. Different perceptions were obtained such as design error, (p=.000), Design Complexity (p=.003), Design Change (p=0.024), Drawing supply delay (p=0.004), Prices Fluctuation (p=0.031), tax rate (p = .000), Coordination, Cooperation and Relationship having poor in nature among Key Stakeholders (P=0.00). Consultant gave high ranking to design complexity (mean: 4.57) because the provision of proper design of structure was the main responsibility of Consultants. In addition, cost overturns, alteration, delays in time and any type of dispute was also associated with it. Consultants also keep safety in high ranking because of dangerous work and design complexity. Spearman rank correlation results showed positive correlation between three groups (contractors, consultants and clients) as shown figure 3.

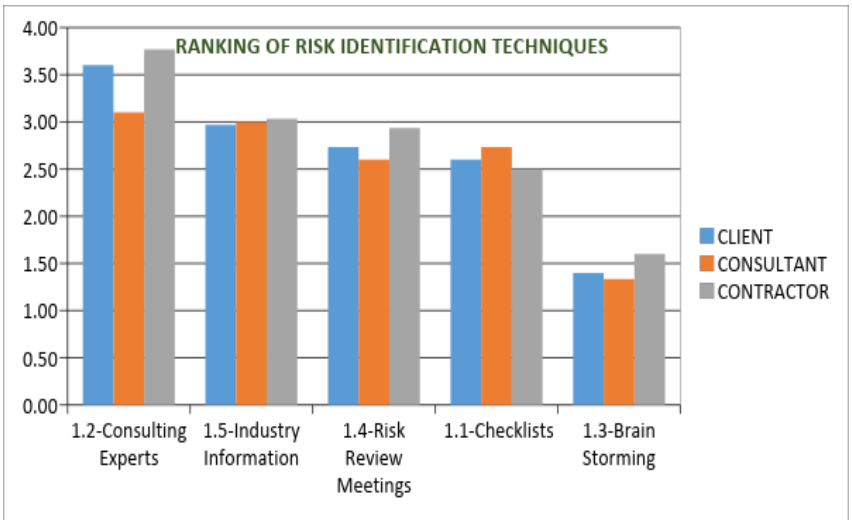

Figure 3. Ranking of risk identification techniques

VII. Ranking of 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 4. 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.

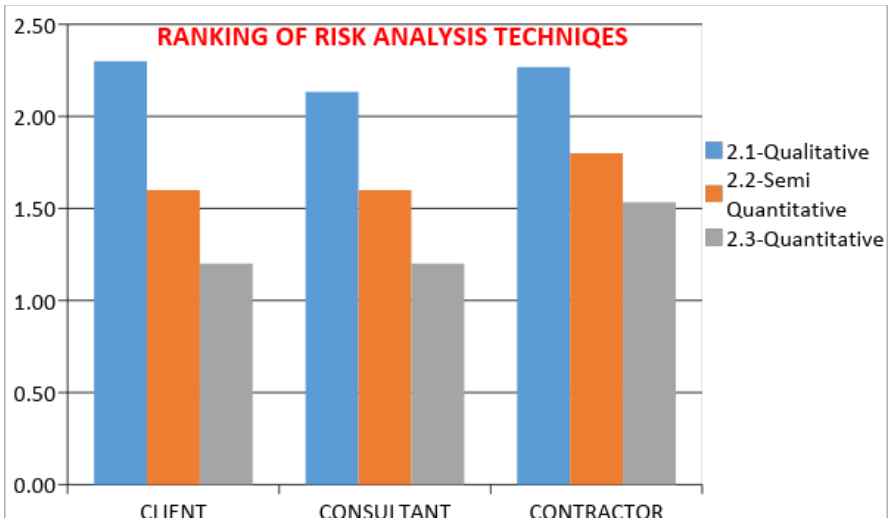

Figure 4. Ranking of risk analysis techniques

VIII. 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.

Figure 5. Ranking of risk resonse techniques

IX. 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 & Kolmogorov-Smirnov 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 Kruskal-Wallis 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

observed that there was no idea of risk inspection by respondents even incident investigation was not from risk management.

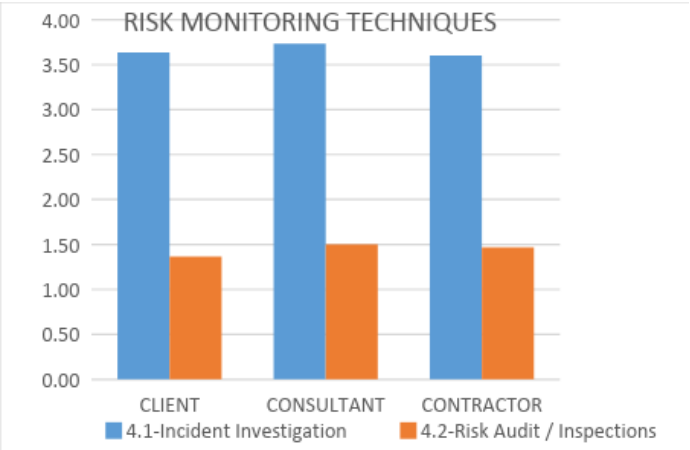

Figure 6. Risk monitoring techniques

X. 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.

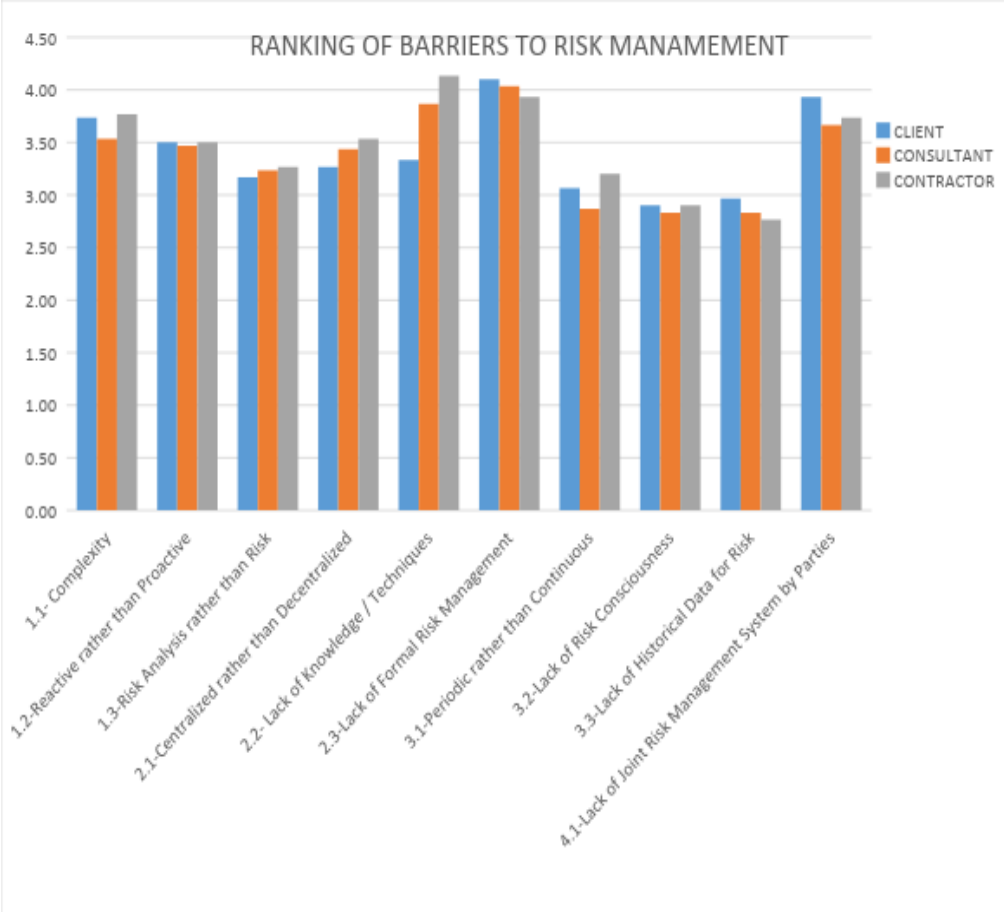

Figure 7. Ranking of barriers to risk management

XI. Conclusion and Recommendations:

To conclude, this paper has 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. The paper has 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.

The paper has also drawn some recommendations for risks related megaprojects like BRT. Some of them 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 statues 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.

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