Analysis of Risk Management in Construction of bin Qasim Industrial Park, Karachi.

Areeba Asif Baig[1], Quratulain Khalid[2], Muhammad Mutasim Billah Tufail[3]

[1]Department of Management Studies, Bahria University Karachi campus, Pakistan
[2]Department of Management Studies, Bahria University Karachi campus, Pakistan
[3]Department of Management Studies, Bahria University Karachi campus, Pakistan

Abstract
With ongoing globalization and trade liberalization, most economies are now focusingon export-led development strategies. In this framework, industrial parks are consideredto be essential resources for local industrial development. Clustering businesses withinindustrial parks offer various benefits for small, medium, and large enterprises. These advantages include access to public infrastructure, cost-saving opportunities through shared facilities, and enhanced access to research and vocational/technical resources, among other essential inputs (Abuja and Eaton, 2010). This in turn makes their products competitive in the domestic and international markets. A project Bin Qasim Industrial Park (BQIP) is an initiative in this regard an urban area. The project has been delayed for almost 2 years due to multiple reasons and not a well-controlled risk management process. Therefore,the business objectives have been reduced but somehow, the project is successful because the long-term goal has been achieved and still, organizations get some revenue.In this research, SWOT analysis has been revised against the need for such industrial parks in urban areas. An effort has also been made against findings of potential risks involved in establishing such large-scale industrial parks, risk identification, riskassessment, and their mitigation or response. Therefore, it has been summarized that awell-planned Industrial Zone for all categories especially an automotive-based industrial zone could cater to the needs of its potential investors and hence encouragesthem to invest capital in setting up industries suitable to the area. This study helps in risk management and the establishment of such projects.

Keywords: industrial development; sez; pakistan industrial development corporation; swot analysis; risk identification andautomotive based industrial zone

1. Introduction:

The regional integration in the aftermath of the establishment of China PakistanEconomic Corridor (CPEC) could be a game changer for Pakistan if an enabling environment for the promotion of the industrial sector could be guaranteed. TheMinistry of Industries and Production is, therefore, attaching high importance to the development of industrial parks with state of art facilities to channel investments in theindustrial sector. Many industrial parks are being developed and planned to promote value addition in the country.

2. Literature Review:

2.1. Special Economic Zone:

The special economic zone (SEZ) is an area in which the business and trade laws are different from the rest of the country. SEZs are located within a country's national borders, and their aims include increased

trade balance, employment, increased investment, job creation, and effective administration. To encourage businesses to set up in the zone, financial policies are introduced. These policies typically encompass investing, taxation, trading, quotas, customs, and labor regulations. Additionally, companies may be offered tax holidays, where upon establishing themselves in a zone,they are granted a period of lower taxation. The fiscal benefits under the SEZ law in Pakistan include a one-time exemption from custom duties and taxes for all capital goods imported into Pakistan for the development, operations, and maintenance of a SEZ (both for the developer as well asfor the zone enterprise) and exemption from all taxes on income for ten years.

2.2 Bin Qasim Industrial Park (BQIP)

Bin Qasim Industrial Park (BQIP) is a fully developed Special Economic Zone (SEZ) situated near the seaport of Karachi, the largest city of Pakistan, BQIP has the potentialto emerge as a Financial Hub of Karachi in the future. Currently, there are many large/medium-scale industrial companies operating in the area such as Kia Lucky Motors, Yamaha Motors, International Steel Limited, and Tecno Auto Glass, etc.

3. Material and Method

The concept of this project is to focus on the production, processing, and export of newproducts and to augment the existing industrial growth with major potential. Construction of industrial zones outside the city premises, basically to ensure a healthylifestyle for urban dwellers, is one of the prime objectives to develop Bin Qasim Industrial Park (BQIP) at Karachi - the Industrial Hub. The Bin Qasim Industrial Park is the first of its kind in the area and would provide an excellent platform for the upcoming industry. The project is proposed to bring about a socio-economic evolutionfor Karachi especially and the entire region in general. The project is environment friendly. There would be no hazardous and polluting industries in this park that may pose any threat to the environment. The industries in Bin Qasim Industrial Park would discharge no hazardous residue to pollute the environment. There will be a separate area earmarked for solid waste disposal. The industries will be encouraged to discharge treated effluent as per SEZ law.

Project Cost, Time and High-level Assumption

The project has been initiated with the estimated cost of 439.11 million rupees (i.e. 6.9212 million rupees per acre) for Phase I of 50 acres, with the provision of 15% contingency. The cost of 228.4 million rupees (i.e.7.61332 million rupees per acre) hasbeen assumed for the construction of Phase II by the provision of an increase of 10% cost per acre based on the time value of money. The total cost concluded to 667.5 million rupees. It is assumed that the project will get a return of 750 million rupees which is more thanenough to cover the PIDC Head office expenses and to earn benefits from the project. The project duration is 4 years after the release of funds from PSDP (i.e. by the end ofDec 2020).

Project Main Objectives

The main purpose of establishing BQIP is to provide a platform for organized and systematic industrial growth in the area and to excel in Steel manufacturing, Automotive Industries, and agro-based industrialization as per International standards.The facilitation envisioned through the establishment of the industrial park will help the local processing industry to produce on a competitive basis. This in turn creates immense export opportunities for the industries working in this park. Added to this, thezone shall generate employment opportunities for the youth and benefit the area in the value addition of the

agricultural production. Another purpose is to provide a skilled workforce to the industry in collaboration with provincial technical training bodies. With the establishment of BQIP, 3000 new direct jobs, and 15,000 indirect jobs are expected to be created.

Project Initiation

A team of PIDC professionals lead by the CEO-PIDC visited Bin Qasim Industrial Park. The agenda of the visit was to explore the potential of the district and strategize to capitalize on the existing skill set and the economic capacity of the area based on theinformation/data gathered during the visit, a SWOT analysis was prepared but was notup to the mark. Also, the risk management process has not been well followed.

Research Objective

The purpose of this research is to explore what are the strengths and opportunities associated with the project and to find out the threats and weaknesses which can be dealt with. The other purpose is to implement a risk management process for such typesof projects to enhance the chances of establishing such types of industrial projects in multiple cities with high returns and to motivate and encourage the industrialists and investors to attract towards such projects which can bring a big boost to the economic activity of the districts and to help in contributing revenue to the Government. This research is also highlighting the aspects that should be required initially to fulfill beforeinitiating such large-scale projects. In this regard, multiple analyses and Risk management processes have been performed in this research, to get findings where theproject remains unable to meet its strategic objectives; which are stated below. SWOT Analysis to explore strengths, weakness, opportunities, and threats, related to the project. Alternative AnalysisRisk Management.

SWOT Analysis

Initial SWOT analysis has not highlighted threats and weakness in detail. Therefore, based on data gathered from different clusters and field survey of the existing industrialareas nearby; **SWOT analysis** has been re-performed which is as under:

Strengths:

- Bin Qasim Industrial Park is situated near the seaport of Karachi.
- Its proximity to the port provides convenient access for import and export activities.
- Being a fully developed SEZ, Bin Qasim Industrial Park offers various fiscal benefits to investors. These benefits include a one-time exemption from customs duties and taxes for imported capital goods, as well as an exemption from income taxes for ten years.
- The project emphasizes environmental sustainability by prohibiting hazardous and polluting industries within the park.

Weaknesses:

- The Bin Qasim Industrial Park project has faced significant delays, resulting ina two-year setback.
- These delays can be attributed to factors such as poor risk management processes and inadequate control measures.
- As a consequence of the delays and challenges faced, the project has had to revise its business objectives and scale back its ambitions. This may have led to missed opportunities and compromised potential for economic growth and job creation.
- The project's shortcomings in risk management have hindered its progress and caused

disruptions.

Opportunities

- The establishment of a well-planned industrial zone, particularly one focused on the automotive sector, presents opportunities for attracting potential investors.
- The successful development and operation of the industrial park can contributeto the socio-economic progress of Karachi and the surrounding region.
- It has the potential to generate employment opportunities, enhance productivity, and contribute to the overall economic development of the area.
- The regional integration facilitated by the China-Pakistan Economic Corridor (CPEC) opens avenues for increased trade and investment.

Threats

- Other industrial zones and SEZs may pose competition and attract potentialinvestors away from Bin Qasim Industrial Park.
- To remain competitive, it is crucial for the park to continually improve itsofferings and value proposition.
- Changes in political and regulatory environments can pose risks to the stability and operations of the industrial park.
- Uncertainties in policies, trade agreements, or legal frameworks may impactinvestor confidence and hinder the park's growth potential.

1. Alternative Analysis

In addition to the SWOT analysis, another analysis was also performed.

a. Unit Cost Analysis

• Total area	50 acres (30 Acres in Phase II)
• Cost of land	Rs. 93.05 million for 80 Acres
• Development cost per acre	
Phase I	Rs. 6.9212 million (346.06 in total)
Phase II	Rs. 7.61332 million (228.4 in total)
• Total Project cost	Rs. 667.5 million
• Total Saleable area	56 acres (70% approx.)
• Commercial Area	3% of saleable
• Price for Industrial Plots	Rs. 8-16 Million per acre
• Price for Commercial Plots	Rs. 16-18 Million Per acre (3% area)

b. Revenue model

Based on unit cost analysis, a revenue model has been generated; the cost of saleable plots has been decided by visiting nearby industrial areas.

Table 1. Revenue Model

S.No.	Year	Acres to be sale	Proposed Rates	Amount
			(Rs. In Millions)	(Rs. In Millions)

	Phase 1			
	Industrial Plots			
1	2017 – 2018	4	8	32
2	2018 – 2019	7	9.5	66.5
3	2019 – 2020	10	11	110
4	2020 – 2021	15	14.64	219.6
5	2021 – 2022	2.8	16	44.8
	Commercial Plots			
1	2020 – 2021	0.5	16	8
2	2021 – 2022	0.7	18	12.6
	Total (Phase I)	**40**		**493.5**
	Phase 2			
	Industrial Plots			
1	2022 – 2023	15.52	16	248.32
	Commercial Plots			
1	2022 – 2023	0.48	18	8.64
	Total (Phase II)	**16**		**256.96**
	Grand Total	**56**		**750.46**

c. General Parameters:

Another main objective we realized from our brainstorming sessions is that the project can exploit the existing skill set and the potential of the area for systematicand orderly industrial growth to make the local entrepreneurs compatible with theinternational market. This will enable them to apply the latest techniques and methods being used by foreign manufacturers. This industrial park will house a training facility center and business facilitation center with high-qualityinfrastructure.

Risk Management

Risk Management is the 2nd most important process after project management for anysuccessful project because we identify the potential risks and respond to them timely which can create influence the project heavily (Kines et al., 2010). These risks are more dangerous for suchlarge-scale projects and projects where the scope is initially locked and initiated basedon waterfall methodology (Tang et al., 2019). But, unfortunately, the Government sector always overlookssuch sort of management and they see it as a minor job to be addressed, something theyhad to do just before the execution of phases. This in turn concluded with negative impacts on the project and then the project remained unable to achieve its initially strategically aligned objectives.

Establishment of Project Management Office

Although PIDC has been established in PPP mode still, it is working under Governmentinfluence. Therefore, to change this culture; PIDC established a PMO in early 2019 forsome major operational and project-based responsibilities, which can lead to Project Management, Risk Management, Procurement, and Supply chain management, ensurecompliance, data analysis, lessons learned, contract administration, alternative analysis,reserve analysis, effective communication, and to control project performance with thehelp of Project Manager. PMO has established a strong mechanism of risk assessmentby conducting meetings with internal project experts and board members and then implementing it in all projects. As this project was impacted more than other projects of PIDC, therefore, Government officials were raising their fingers towards the objectives and progress of this project and demanding strong justification to keep this project alive. In this regard, it has been decided to initiate a revisit of the SWOT analysisfollowing the risk management processes.

Risk Identification

Risk identification is the process of determining risks that could potentially prevent theprogram, enterprise, or investment from achieving its objectives. It includes documenting and communicating the concern [g]. It is an iterative process that can be implemented throughout the project life cycle but it has more importance once it is donein the planning stage (Lee et al., 2014) and (Sehat and Alavi, 2010). Therefore, Project Manager must have to initiate this process in the planning stage. PMO has started the risk management process for multiple projectsunder PIDC and decided on a common framework, tools, and techniques after scheduling and conducting 3 risk review meetings with Project Managers and experts within an organization. The framework, tools, and techniques we used for this project are:

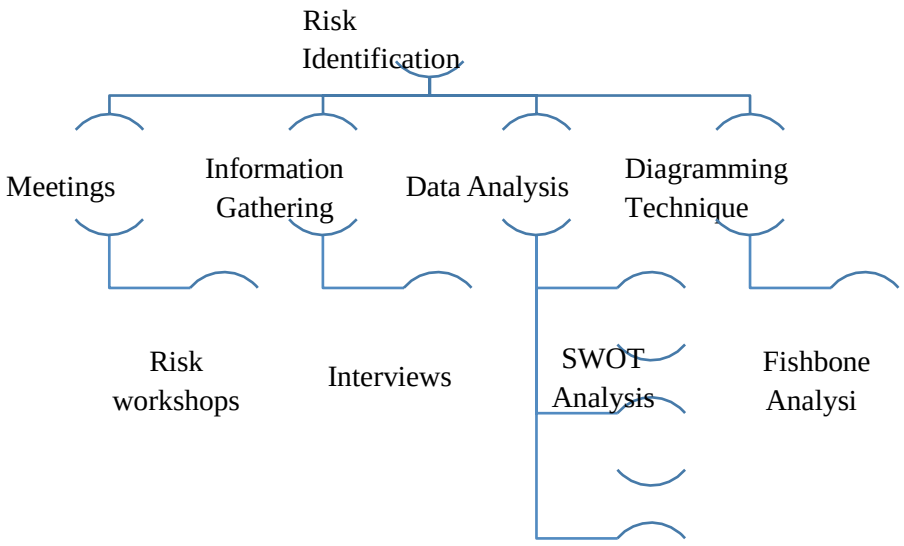


Figure 1. Framework Tools

Diagramming Technique

The fishbone diagram or Ishikawa diagram is a cause-and-effect diagram that helps managers to track down the reasons for imperfections, variations, defects, orfailures (Karabacak & Sogukpinara, 2005). In this research, the experience of the project team has been used to highlight initially identified potential risks and newly identified risks by implementing the 4Ss framework which can lead to significant effects. i.e., Surroundings, Suppliers, System, Skills. As mentioned above, risk management isnot well integrated into such types of organizations therefore, they have not done risk assessment in detail that's the reason they don't consider any risk as a high- level risk which can lead to a major influence on the project.

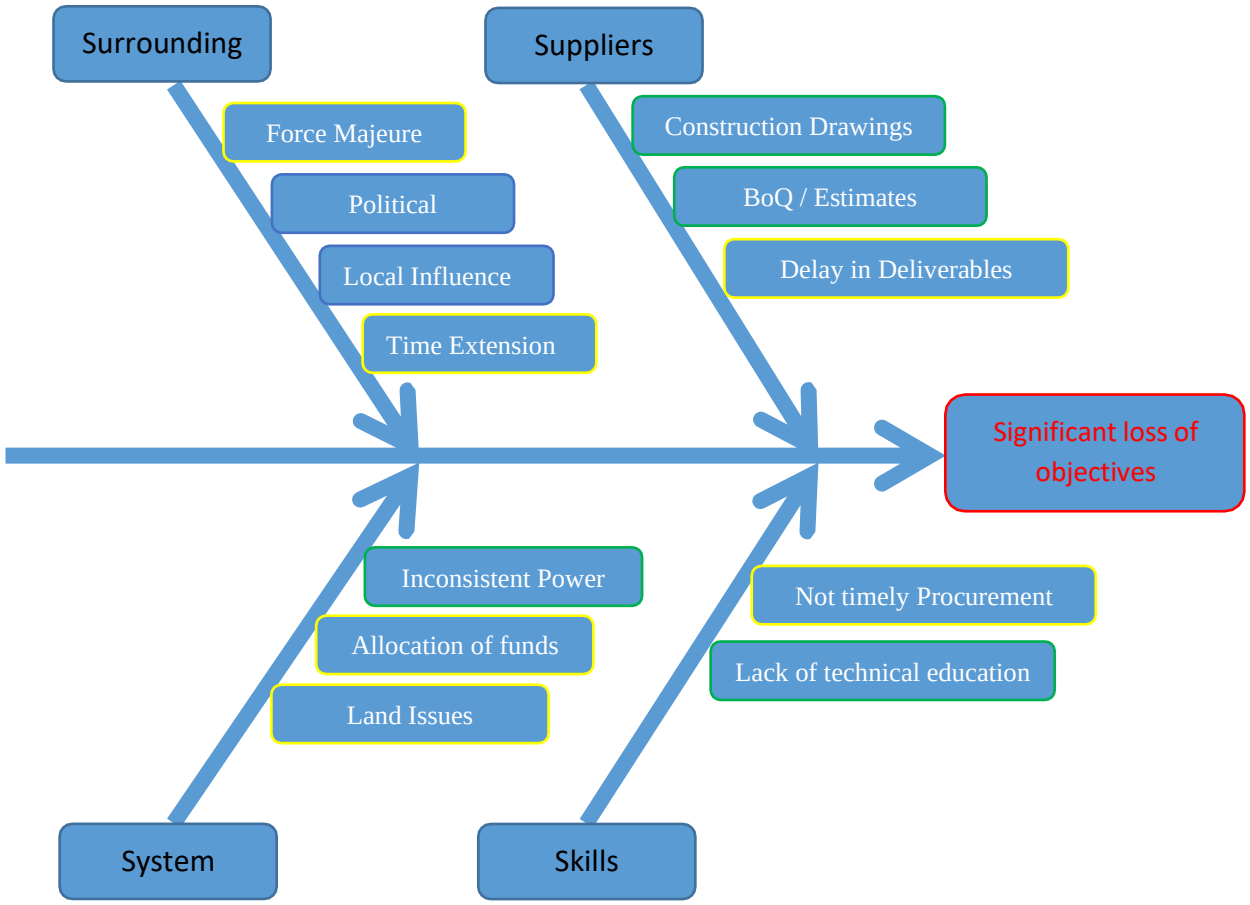


Figure 2. Diagramming technique

Data Analysis

After the fishbone analysis, we headed towards the other below analysis to updateour identified risks and to add and relate more events by studying project performance. In this regard below measure have been followed SWOT analysis (asdescribed earlier). (Serpella et al, 2014)

Document analysis (records of similar nature projects and lessons learned),

Assumption and Constraint analysis have been performed to dig out moredetail about possible events.

Information Gathering

Interviews have been taken with all relevant stakeholders to listen individually if they have experienced some challenges which can't be described publicly and thechallenges they are currently facing.

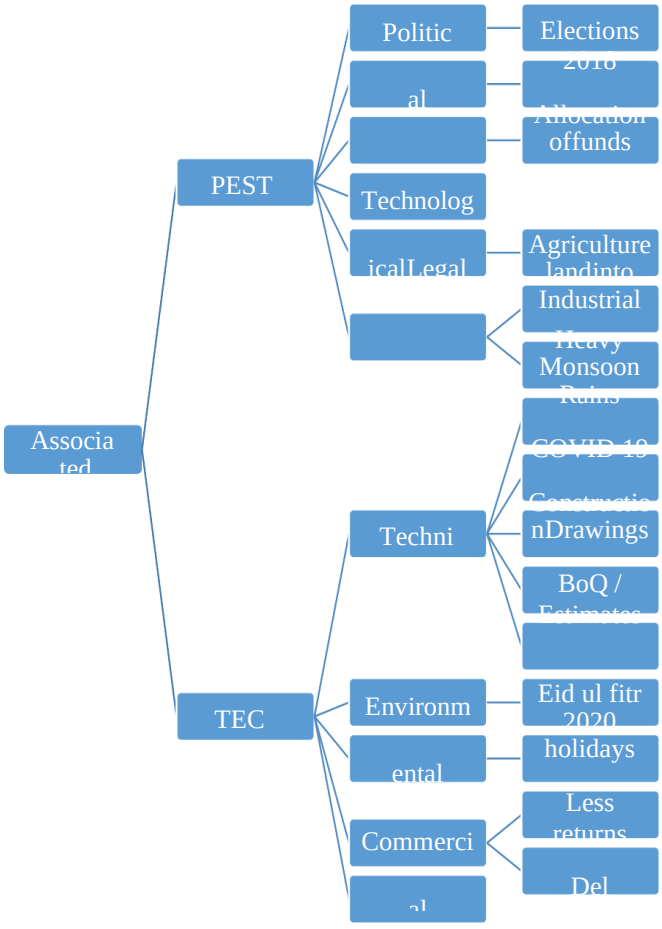
Meetings

Risks workshops have been planned and conducted with the project team and experts to challenge the project team with multiple questions and pessimistic. Approaches, so that more events can be identified and to find out the occurrence and impact of such events.

Risk Breakdown Structure

After the above processes, we prepared a Risk breakdown structure to see a hierarchical representation of identified risks according to the most commonadaptable classification framework i.e., PESTLE and TECOP. PESTLE relates to external risk and TECOP relates to Internal Risks. The reason for establishing thisframework is to present the framework to high-level stakeholders so that they canunderstand the circumstances of external and internal negative events that can impact our project and they can get clarity about how generally risks are presentedin a market. Therefore, the new and old identified risks are represented in RBS below.

As there is no technological risk hs been identified, so we have to ignore T from PESTLE.



Risk Assessment/Risk Analysis

Risk analysis involves examining how project outcomes and objectives might changedue to the impact of the risk event. Once the risks are identified, they are analyzed to identify the qualitative and quantitative impact of the risk on the project so that appropriate steps can be taken tomitigate them (Kang and Ryu, 2019). This is also an iterative process and can be implemented throughout the project cycle because new risks can be identified based on previous risks or from other unknown events. Risks can be evaluated under two processes i.e., qualitative and quantitative riskanalysis. In this research, we have followed only qualitative risk analysis because quantitative measures require greater experience and advanced tools and it is really difficult to adopt in a culture where risk management is just grabbing its place in an organization. On the other hand, Qualitative risk analysis allows the determination of areas of great risk in a short time and without bigger expenditure. Also, the analysis isrelatively easier and cheaper.

Qualitative Risk Analysis

Qualitative risk analysis has been performed to analyze the probability of occurrence and impact of such potential risks. In this research, we used both tools and techniques
i.e. Expert Judgement and Probability / Impact matrix to analyze the negative events indetail and to come up with justifiable and reliable risk responses.

Expert Judgement:

A team of Experts from Boards members (PIDC and MoI&P) have been contactedin this regard and identified risks have been shared with them through the Delphi technique to get efficient responses. Although, due to a shortage of time, there wereonly three rounds of questionnaires have been involved in this process. The first round of questions is to confirm the probability of occurrence of such risks. The second, round of questions is about the impact of such events, and the third, is aboutthe response to such events. Along with the above process, brainstorming sessions have been scheduled by PMOwith the project team to analyze risk occurrence, risk impact, and risk response. Theexperts and project team found some more risks after challenging every aspect of the project and also concluded that Project management risks can also be included based on planning, schedule, estimation, controlling, and communication; which will be further represented in **TECOP (as 'P' is now represent Project Management).** The new risks are also identified during this whole process which will be presented in Risk Register as **Annex A**.

Probability / Impact Assessment

The Probability and Impact Matrix is one of the most commonly used qualitative assessment methods. It is based on the two components of risk, probability of occurrence and the impact on objective(s) if it occurs. For each identified risk, the impact and probability are assessed. Interviews and meetings with experienced project participants, stakeholders, and experts in the subject are the basis for the impact and probability assessment. These impacts and probabilities are rated and their level is assessed. The risks which receive high ratings are investigated furtheror an appropriate response is planned. The low-rated risks do not require immediateaction but should be included in the Risk register for monitoring [h].

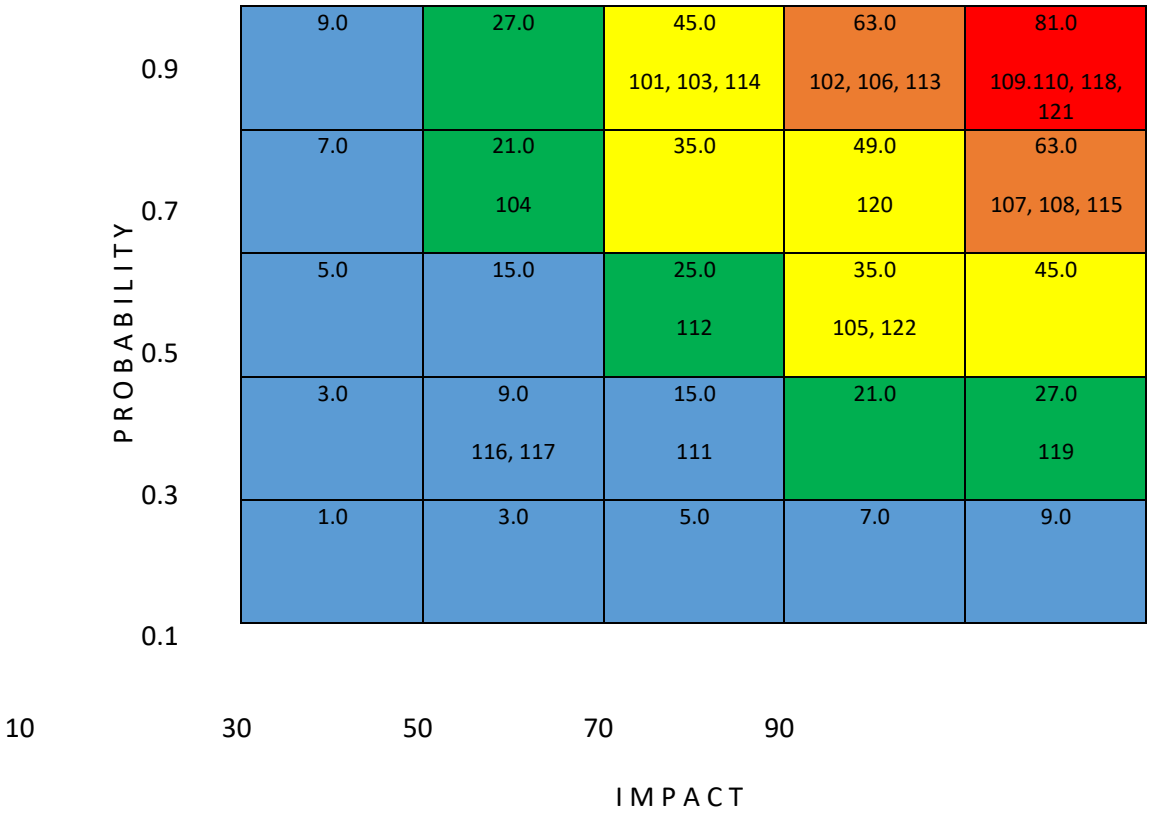
Probability Impact Matrix

It is also called a risk matrix. It is used to define the level of risk by considering the category of probability or likelihood against the category of consequence severity. Thisis a simple mechanism to increase the visibility of risks and assist managementdecision-making. The scale for representing probability, impact, and severity is given below.

Table 2. Scale

Stages	Probability	Impact	Severity	Score	Outcome
Very High	0.9	90	Significant (minimum)75% degradation in project benefits or cost/schedule overrun	>=70	Red Zone (Stop and revise strategy)
High	0.7	70	Moderate 50% degradation in project benefits or cost/schedule overrun	51 to 70	Orange Zone (Level of extreme steps)
Moderate	0.5	50	Small 25% degradation in project benefits or cost/schedule overrun (Risk Tolerance)	31 to 50	Yellow Zone (Tolerable)
Low	0.3	30	Minimal 10% degradation in Project benefits or cost/schedule overrun (Risk Appetite)	16 to 30	Green Zone (Move on)
Very Low	0.1	10	No degradation in mission benefits or no cost/schedule overrun	0 to 15	Blue zone (Negligible)

Probability is the likelihood of occurrence of an event, a range from 0 (even will not occur) to 1 (event certainty). The impact is an influence on the event, ranges from 0 (no impact) to 100(maximum impact) Severity is the classification of an event where it falls, high severity means high seriousness requires while mitigating the risks. Based on all the above data risk register (Annex A) and probability impact matrix has been prepared to document all identified risks, to mitigate them, and to assign responses. Below is the risk matrix .



Risk Register

The Risk Register captures and maintains the information (both threats and opportunities) on almost all the risks that were identified and related to the project. So,it provides a record of risks, including their status and history [i]. In this research, we inserted a detail of threats (certain) and issues (occurred) along with justifications behind, risk response and action by*, contingency plan and action by*.

Risk Response

Risk response is the process of developing strategic options, and determining actions, to enhance opportunities and reduce threats to the project's objectives. A project team member is assigned to take responsibility for each risk response*. This has been established by PMO in collaboration of the PM and project team and higher management See Annex A for further elaboration.

Contingency Plan

Contingency planning involves defining action steps to be taken if an identified risk event should occur" (PMI, 1996, p. 120). The purpose of the contingency plan is to lessen the damage of the risk when it occurs. Without the plan in place, the full impactof the risk could greatly affect the project. In this research, after getting lessons from all above, PIDC is viewing contingency planning as a necessity in today's project world.

* A person or entity who is responsible to take necessary actions.

Annex A

Risk ID	Risk Classification	Events & Description	Justification	Probability	Impact	Score	Responses	Action by	Contingency	Action by
	PESLE									
101	Political	Elections 2018, etc.	Local and political influence due to Elections 2018 delayed a project for almost a couple of months	0.9	50	45	Accepted		Approached relevant authorities to reduce the impact	PIDC
102	Economical	Allocation of funds The project was not started due to not timely release of funds by PSDP	PC-1 was approved in 2013 but the project was not started due to no funds, and the project went on hold. The project was re-initiated after approval of the revise PC-1 in 2016. Due to the change of Government, the project went on hold	0.9	70	63	Accepted		continuously collaborated with MoI&P to reduce all hurdles and keep the project alive	PIDC
103	Social	Land Issues Land was handed over to the contractor in Phases between Sep 2017 to April 2018 due to several on-site hurdles	Land has been purchased with multiple stakeholders Also, local community hindered the construction as per conflict of interest	0.9	50	45	continuously collaborated with local Government & influential local residents to solve the issue	PIDC		

104	Legal	Unviability of NoC against EIA	NoC require from Sindh environmental protection agency	0.9	30	27	Speed up the process	Consultant and PM		
105	Environmental	Heavy monsoon rains	Heavy monsoon rains since last couple of years and water retained at a construction site due to water logged area	0.5	70	35	VO of A3 sand layer initiated to protect road to avoid water stagnations	Consultant and PM	Revisit the BoQ & Schedule to avoid further discrepancies	Consultant and PM
106		COVID 19	Site remained closed for almost 2 months due to lockdown announced by Sindh Government	0.9	70	63	Accepted	Government	Revise the Schedule and approve extension	PIDC
	TECOP									
107	Technical	Delay in the Design submission	Some variations and discrepancies have been observed by the contractor during the execution phase; such as road levels and cross sections, main gate, septic and OHT, therefore, drawings have been revised by consultant couple of times. In this regard, consultant failed to submit a complete set of drawings on time	0.7	90	63	Call an urgent meeting and revise milestones Immediate action require in order to complete the tasks within specified schedule	Consultant and PM	need continuous follow up with consultant through meetings to avoid further delays Effective communication require	PM and PMO

108		BoQ / Estimates	missing items and miss calculated quantities identified in BOQ which showed a professional lapse of the consultant and caused further delays in finalizing the rate analysis, Variation Orders and payment of IPCs.	0.7	90	63	Immediate action requires to identify all loopholes	Consultant and PM	Revisit the BoQ to avoid further discrepancies PMO should assist	Consultant, PM and PMO
109		Ineffective Procurement Consultant and Contractor	Consultant and Contractor has been awarded with contracts by least cost single stage two envelope process, but also selected on behalf of political favoritism	0.9	90	81	Take Necessary actions to make it effective	PM, Procurement engineer	PMO should ensure compliance and mitigate negative events	PMO
110		Potential delays in deliveries	The contractor is behind schedule	0.9	90	81	Call an urgent meeting to identify the reasons EVM technique needs to be implemented to monitor project performance	PM, Consultant, and Contractor	Schedule compression techniques can be implemented MPR and Suppliers' KPI require special attention	PM, PMO and Consultant
111		Misunderstanding of facts by potential supplier	In case of ambiguity	0.3	50	15	Clear all ambiguities asap	PM and Contract engineer		

112		Delay in Procurement	lead to schedule overrun	0.5	50	25	Take Necessary actions to make it quick	PIDC and Contractor		
113		Time extension Process itself cause delays	The extension required proper case submission by the contractor, evaluation of relevant documents and recommendation by the consultant and PM PIDC. Last but not least, seek the approval of board members. Therefore, directly or indirectly, this affected further delays at site	0.9	70	63	the extension should be timely requested and processed	Higher Management, PM and PMO PIDC, Board members, and Consultant	PMO has initiated a quick response plan in case of emergencies and for effective communication Board members can be intimated by letters	Higher Management, PM and PMO PIDC, Board members and Consultant
114	Environmental	Eid ul fitr 2020 holidays	A lockdown has been lifted by the Government 10 days before Eid ul fitr. It was also not possible for the contractor to re-mobilize the resources at this time	0.9	50	45	Accepted	Contractor	Revisit the schedule	PM and Consultant
115	Commercial	Loss in revenue	The impact of delays may lead to a loss in returns	0.7	90	63	Need special attention	PM and PMO	Revise the strategy and all elements which are affected	PM and PMO
116	Operational	Payment Delay of payment against IPCs	Due to not timely funding by PIDC	0.3	30	9	Strong follow-up	PM	Effective forecasting & good relationship require	Higher Management and PMO

117		Payment Delay of payment against IPCs	some unspecified BoQ items, rate analysis and variation orders, and not verifying IPCs properly in the first go by Consultant which suffered multiple rectifications and revisions of IPCs. This affect a lack of interest by the contractor on site and he stopped working several times.	0.3	30	9	Necessary actions to be adopted to release payment contractually	Consultant and PM	Revisit and locked the procedures by specifying deadlines	PM and PMO
118		Termination of Contracts Contractor & Consultant contracts Termination	The contractor submitted a FAKE performance bank Guarantee at the time of renewal in Oct 2020, and Consultant also endorsed it. Therefore, both contracts have been terminated for acts of fraudulent practice and violation of Clause 74.1 (Integrity Pact) of the contract.	0.9	90	81	Re-procurement was quickly initiated to avoid further delays Revised strategy & management initiated	Higher Management, PM, and Contract Engineer	Document analysis to avoid past experiences Backward scheduling needs to be followed	PM, PMO, and Contract Engineer,
119	Project Management	Change in Scope	Scope creep	0.3	90	27	Avoid changes	PM and Higher management	The scope baseline needs to be locked	PM
120		Cost Overrun	Contingency limit cross due to any reason	0.7	70	49	Try to limit it within the contingency	PM, Consultant & Contractor	Revisit the BoQ with Bottom-up estimating	

121		Schedule Overrun	Contingency limit cross due to any reason	0.9	90	81	Try to limit it within the contingency	PM and Consultant	Revise contingency Apply schedule compression technique	PM, PMO, Consultant, and Contractor
122		Quality concerns	Not following technical specifications	0.5	70	35	Need to be addressed quickly	PM, Consultant & Contractor	A quality Control Plan should be initiated	PM and PMO
						1068				

4. Conclusion

In this research, by integrating risk management and assessment 22 risks have been identified with cumulative score 1068. So, the project score is 48.5 which is under the Risk Tolerance of an organization. The risks identified in the blue zone are transferredto the watchlist but measures can be taken to mitigate them (if require). After further research and meetings with the project team and experts, we prepared an analysis by following the PERT approach, which is also presented in the conclusion ofthis research. The total remaining project's calculated duration is 11.5 months with all high-level processes on the critical path. Further details are below.

Table 3. Total Remaining Project

Activity	Activity Description	Time (Months)			Mean duration	Variance
		O	M	P		
A	Procurement of consultancy services	1	1.5	2	1.5	0.03
B	Design of leftover works & EIA	1	1.5	2	1.5	0.03
C	Procurement of Contracting services	1	1.5	2	1.5	0.03
D	Execution of project	5	6	7	6	0.11
E	Project Closure	0.5	1	1.5	1	0.03
					11.5	0.22

SD
0.47

We have to calculate the probability of completing a project in 12 months which has been decided by the Board and higher management. To calculate probability as per the Z table, **Z = (x-mean) / SD**, where Z is the difference between the desired completion time andthe project's expected time divided by the standard deviation for the project X is 12, Mean is 11.5 and SD is 0.47. The value on the Z table as per the above calculation is 1.061. Therefore, the probability of completing a project in 12 months is **85.5%.**

Therefore, it is concluded that the project is still on track and we can proceed with the operations we are implementing currently with extra care under PMO. We can still get returns of almost 83 million PKR which is an ample amount to accept of projects over500 million PKR. Government stakeholders and other Board members have been intimated with our research in a meeting scheduled in December 2020, and they give us a green signal to complete a project by Dec 2021 with the below provisions that need to be followed. Project performance should be monitored closely via the EVM technique and KPI’s and MPR need special attention. The project schedule and BoQ have to be revisited onan urgent basis once Consultant will be finalized. Currently, the project is at the stage of re-procurement of Consultancy and Constructingservices and there is an 85.5% probability to complete the project within 12 months.

5. References

A PIDC. (n.d.). Pakistan Industrial Development Corporation. Retrieved from https://pidc.com/

Wikipedia. (n.d.). Special economic zone. In Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Special_economic_zone

Board of Investment Pakistan. (n.d.). Special Economic Zones. Retrieved from https://invest.gov.pk/sez#:~:text=The%20fiscal%20benefits%20under%20the,for%20 a%20period%20of%20ten

Board of Investment Pakistan. (2019). SEZ RULES. Retrieved from https://invest.gov.pk/sites/default/files/2019-01/SEZ_RULES.pdf

MITRE Corporation. (n.d.). Risk identification. In Systems Engineering Guide. Retrieved from https://www.mitre.org/publications/systems-engineering-guide/acquisition-systems-engineering/risk-management/risk-identification#:~:text=Definition%3A%20Risk%20identification%20is%20the,risk%2C%20risk%20identification%2C%20risk%20management

DTU Management Engineering. (n.d.). Impact and Probability in Risk Assessment. Retrieved from http://apppm.man.dtu.dk/index.php/Impact_and_Probability_in_Risk_Assessment#:~:text=The%20probability%20assessment%20involves%20estimating,%3B%20i.e.%2C%20opportunities%20and%20threats.

Karabacak, B., & Sogukpinar, I. (2005). ISRAM: information security risk analysis method. Computers & Security, 24(2), 147-159.

Serpella, A. F., Ferrada, X., Howard, R., & Rubio, L. (2014). Risk management in construction projects: A knowledge-based approach. Procedia - Social and Behavioral Sciences, 119, 653–662.

Sehat, S., & Alavi, S. S. (2010). The necessity of application of risk management to third-party insurance, and the impact of new third-party insurance laws on the related risks. Journal of Insurance World News, 144–145.

Abuja, M., & Eaton, D. (2010). Towards a Risk Management Framework for Libyan House-Building Projects [Online]. University of Salford.

Kines, P., Andersen, L. P. S., Spangenberg, S., Mikkelsen, K. L., Dyreborg, J., & Zohar, D. (2010). Improving construction site safety through leader-based verbal safety communication. Journal of Safety Research, 41, 399–406. https://doi.org/10.1016/j.jsr.2010.06.005

Lee, K. P., Lee, H. S., Park, M., Kim, H., & Han, S. (2014). A real-time location-based construction labor safety management system. Journal of Civil Engineering and Management, 20, 724–736. https://doi.org/10.3846/13923730.2013.802728

Tang, S., Shelden, D. R., Eastman, C. M., Pishdad-Bozorgi, P., & Gao, X. H. (2019). A review of building information modeling (BIM) and the internet of things (IoT) devices integration: present status and future trends. Automation in Construction, 101, 127–139. https://doi.org/10.1016/j.autcon.2019.01.020

Koc, K., & Gurgun, A. P. (2022). Scenario-based automated data preprocessing to predict the severity of construction accidents. Automation in Construction, 140, 20. https://doi.org/10.1016/j.autcon.2022.104351

Kang, K., & Ryu, H. (2019). Predicting types of occupational accidents at construction sites in Korea using a random forest model. Safety Science, 120, 226–236. https://doi.org/10.1016/j.ssci.2019.06.034