



RISK ASSESSMENT QUESTIONNAIRE

Risk Performance Assessment of urban metro construction quality

Prepared by BERNA ÇALIŞKAN

2024

EXPLANATION:

Dear Sir or Madam,

MCDM/MCDA methods are an important support tool in solving various decision-making problems in the field of transport, especially in the field of safety and quality of public transport, selection of development scenarios for public transport systems, location analyses of transport projects, as well as in other problems related to broadly understood road, air, rail and sea transport.

This survey mainly focusing on 'Risk Performance Assessment of urban metro construction quality' which would be a resource for determining the relative importance of influencing factors and judgement matrix will be obtained by expert scoring . We would like to reassure you that all answers will be treated in absolute confidence and used for academic purposes only.

We would like to thank you very much for your cooperation.

Berna ÇALIŞKAN

Department of Civil Engineering,
Transport Engineering,
Istanbul Technical University,
Turkey
E-mail address: caliskanber18@itu.edu.tr



Survey's target group : experts (specialists in the field of rail transport engineering), academic professionals and specialists in the related agencies)

Pairwise comparison method allows the decision-maker to compare each item with the rest of the criteria and give a preferential level to the item in each pairwise comparison.

The Analytic Hierarchy Process (AHP) is a multi-criteria decision making (MCDM) process which is based upon pairwise comparison method. In terms of construction of a hierarchy that includes the relevant aspects of the criteria, conventional structure of AHP (nine-point rating scale) was used.

Importance Level	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Moderate Importance	Experience and judgement slightly favor one activity over another
5	Strong Importance	Experience and judgement strongly favor one activity over another
7	Very Strong	An activity is favored very strongly over another
9	Extreme Importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values	Numbers 2-4-6-8 are used for intermediate evaluations.

For each comparison, decide which is the more important and select the appropriate weighting. Two example of pairwise comparison are specified below.

Example:

Criteria A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Criteria B
------------	----------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	------------

The value 9 indicates that Criteria A is “extremely more important than” the Criteria B.

Criteria A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Criteria B
------------	---	---	---	---	---	---	---	---	---	---	----------	---	---	---	---	---	---	------------

The value 3 indicates that Criteria B is “moderate importance than” the Criteria A.



SECTION 1

Select the degree of relative importance/ preference of each criterion for the quality risk evaluation (5 main criteria)

A- Construction Environment **B-** Construction Materials **C-** Construction Machinery **D-** Construction Management **E-** Construction Methods

EVALUATION CRITERIAS																		
A- Construction Environment	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	B- Construction Materials
A- Construction Environment	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	C- Construction Machinery
A- Construction Environment	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	D- Construction Management
A- Construction Environment	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	E- Construction Methods
B- Construction Materials	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	C- Construction Machinery
B- Construction Materials	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	D- Construction Management
B- Construction Materials	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	E- Construction Methods
C- Construction Machinery	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	D- Construction Management
C- Construction Machinery	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	E-Construction Methods
D- Construction Management	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	E-Construction Methods



SECTION 2

Select the degree of relative importance/ preference of each sub-criterion for the quality risk evaluation

EVALUATION CRITERIAS																		
A- CONSTRUCTION ENVIRONMENT																		
1-Geology of the construction site	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	2- Hydrologic condition of the construction site
1- Geology of the construction site	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Underground pipeline
1- Geology of the construction site	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Situation of surrounding buildings
1- Geology of the construction site	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Situation of surrounding structures
2- Hydrologic condition of the construction site	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Underground pipeline
2- Hydrologic condition of the construction site	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Situation of surrounding buildings
2- Hydrologic condition of the construction site	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Situation of surrounding structures
3- Underground pipeline	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Situation of surrounding buildings
3- Underground pipeline	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Situation of surrounding structures



4-Situation of surrounding buildings	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Situation of surrounding structures
B- CONSTRUCTION MATERIALS																		
1-Quality of materials	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	2- Availability of construction materials
1-Quality of materials	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3- Transport of construction materials
2- Availability of construction materials	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3- Transport of construction materials
C-CONSTRUCTION MACHINERY																		
1-Level of construction technology	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	2- Maintenance of machinery and equipment, equipment safety guards
1-Level of construction technology	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Construction site workers' capability on using construction machinery
1-Level of construction technology	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Monitoring the activity of



																		construction site equipment
2- Maintenance of machinery and equipment, equipment safety guards	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Construction site workers' capability on using construction machinery
2- Maintenance of machinery and equipment, equipment safety guards	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Monitoring the activity of construction site equipment
3-Construction site workers' capability on using construction machinery	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Monitoring the activity of construction site equipment
D-CONSTRUCTION MANAGEMENT																		
1-Coordination and responsibilities of construction stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	2- Experience level of Project participants
1-Coordination and responsibilities of construction stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Financial management and cost controlling
1-Coordination and responsibilities of construction stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Workforce planning
1-Coordination and responsibilities of construction stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Level of construction safety management, emergency response plan



1-Coordination and responsibilities of construction stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	6-Coherent and integrated project planning
2- Experience level of Project participants	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Financial management and cost controlling
2- Experience level of Project participants	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Workforce planning
2- Experience level of Project participants	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Level of construction safety management, emergency response plan
2- Experience level of Project participants	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	6-Coherent and integrated project planning
3-Financial management and cost controlling	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4-Workforce planning
3-Financial management and cost controlling	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Level of construction safety
3-Financial management and cost controlling	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	6-Coherent and integrated project planning
4-Workforce planning	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5-Level of construction safety
4-Workforce planning	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	6-Coherent and integrated project planning
5-Level of construction safety management, emergency response plan	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	6-Coherent and integrated project planning



E-CONSTRUCTION METHODS																		
1-Common usage and applicability of metro construction methods	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	2- Site constraints and force majeure for the tunnel, station and other connecting operation's construction techniques
1-Common usage and applicability of metro construction methods	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Technical guidance in the construction phase
2- Site constraints and force majeure for the tunnel, station and other connecting operation's construction techniques	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3-Technical guidance in the construction phase

Question- According to main and sub-criterias for 'Risk Performance Assessment of urban metro construction quality' Do you think this questionnaire covers the correct identification of factors? Please mention if you have any suggestions/recommendations where necessary.



Question - If you were on the project selection arbitration committee, when it comes to the development of a infrastructure project, how would you score the following main and sub-criteria from 1 to 10?

TECHNICAL		Probability of technical success	
		Technological appeal	
		Project duration	
		Innovation scope	
		Connection with existing projects	
		Engineering suitability	
		Technological suitability	
		Environmental compliance	
STRATEGIC		Appropriateness of the project objectives in the social context	
		Project mission	
		Project leader reputation	
		Economic development success	
		Regional benefit	
ORGANIZATIONAL		Expert personnel	
		Infrastructure, Equipment and facility adequacy	
		Material resources	
		Work program	
		Work safety	
FINANCIAL		Financial viability	
		Collaboration possibility	
		Effective use of public resources	
		Investment costs	
		Return on investment	