ECONOMIC AND MANAGEMENT SURVEYING AND COMPARISON OF SOIL IMPROVEMENT METHODS

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Always, local soil checking is the first issue in early studies of construction. The behaviour of soil may differ due to its different characteristics. Thus, it is important that we study the soil properties before implementing any project. Especially, in coastal region it is very important to study the risk of liquefaction and try to control and reduce its risks.

There are a variety of methods to deal with liquefaction; each of them has its own advantages and disadvantages (Elias et al., 2001; Enson et al., 1999). This paper attempts to evaluate different criteria of soil improvement, introducing optimum and most applicable methods amongst available methods of soil improvement techniques with using the Analytic Hierarchy Process (AHP).

Shahid Rajaee Port Complex Development Project (SRPCD) is a case study in this stidy (Nouri et al., 2008; Jalili and Nouri, 2007). In this case after evaluation of the various techniques (vibro compaction, vibratory hammer probe, stone columns, dynamic compaction, explosive compaction, drainage, deep soil mixing, permeation grouting, compaction grouting and compaction piles), dynamic compaction technique is selected as a better option for soil improvement using AHP method (Saaty, 2008) as shown in Figure 1 and Tables 1-3.

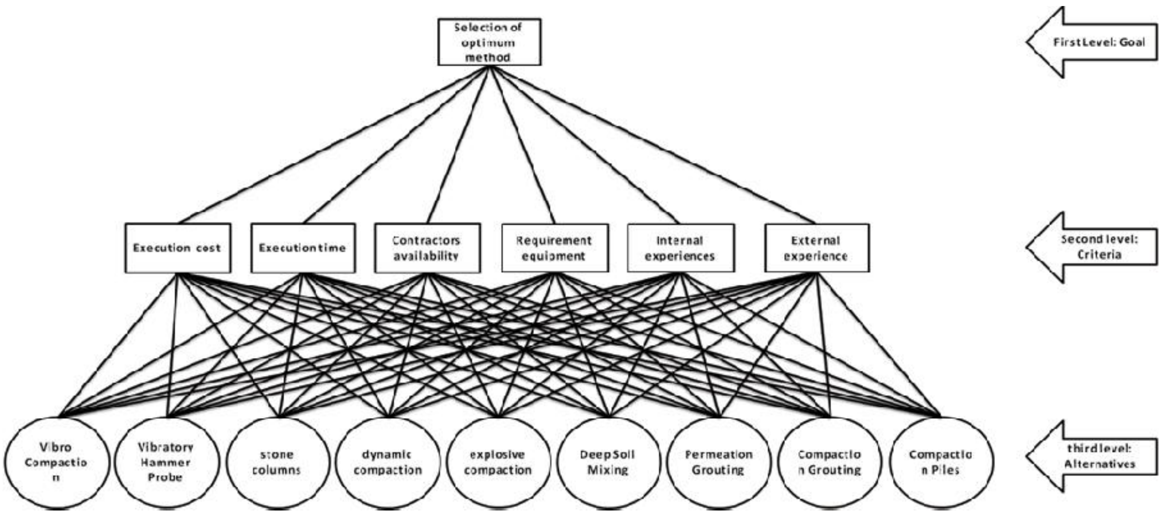

Figure 1. Hierarchical tree

Table 1. Pair wise comparison matrix of criteria with respect to goal

	A	B	C	D	E	F	Criteria weight
A	1	3	5	5	7	8	0.4572
B	1/3	1	3	3	5	6	0.2410
C	1/5	1/3	1	1	3	4	0.1097
D	1/5	1/3	1	1	3	4	0.1097
E	1/7	1/5	1/3	1/3	1	2	0.0490
F	1/8	1/6	1/4	1/4	1/2	1	0.0335

Table 2. Alternatives weight with respect to six evaluation criteria

	Execution cost	Execution time	Contractors availability	Requirement equipment	Internal experiences	External experiences
Vibro Compaction	0.0968	0.2079	0.1576	0.0571	0.1158	0.1837
V. Hammer Probe	0.0599	0.0805	0.0198	0.0571	0.0184	0.1837
Stone Columns	0.0599	0.2079	0.1576	0.0571	0.1753	0.1837
Dynamic Comp.	0.2156	0.0805	0.2902	0.1605	0.2778	0.0712
Explosive Comp.	0.3031	0.0805	0.0198	0.0264	0.0184	0.0712
Deep Soil Mixing	0.0198	0.0348	0.0198	0.1605	0.0184	0.0329
Permeation Grou.	0.0378	0.0194	0.1576	0.1605	0.2778	0.0712
Compaction Grou.	0.1471	0.0805	0.0198	0.1605	0.0184	0.0187
Compaction Piles	0.0599	0.2079	0.1576	0.1605	0.0796	0.1837

Table 3. Results of alternatives weight using Analytic Hierarchy Process (AHP)

Rank	Alternatives	Score
1	Dynamic Compaction	0.1834
2	Explosive Compaction	0.1810
3	Vibro Compaction	0.1297
4	Compaction Piles	0.1224
5	Stone Columns	0.1158
6	Compaction Grouting	0.1080
7	Permeation Grouting	0.0729
8	Vibratory Hammer Probe	0.0623
9	Deep Soil Mixing	0.0245
Sum		1

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