

# Ranking Organizational Units Based On Human Capital Management Using Analytical Hierarchy Process, Case Study: Foolad Technique International Engineering Co.

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## ABSTRACT

Agreeable performance of the staff of an organization improves the efficiency of the same and contributes to the achievement of the set goals. For that reason, the managers of organizations seek a way to develop the level of existing human capital through which they can achieve privileges such as the improvement of staff performance, the growth of originality, and the reduction of staff absence, and expand the efficiency of their organizations. Regarding the high significance of human capital in organizations, managers have been encouraged to pay more attention to this factor and utilize the existing resources appropriately. Evaluating the management of the human capital is conducive to more acquaintance of the shortcomings existing in each index of human capital management and also leads managers to take necessary steps to obviate them. Hence, in the present study, organizational units have been ranked with the approach of human capital management. Based on this study, managers become able to locate the weak units in the management of human capital and allocate their investments to them. AHP technique has been utilized to perform this ranking. To this end, five practices of the human capital management including leadership practices, employee engagement, knowledge accessibility, workforce optimization, and learning capacity were considered as evaluation criteria, and the alternatives of AHP technique are 27 organizational units of Foolad Technique International Engineering Corporation and in the next place ranking was done. Finally sensitivity analysis was done for evaluating criteria. The results obtained from ranking indicate that the gas and oil process engineering unit of holds the first place with the weight of 0.222 in the hierarchy of organizational units. Also knowledge accessibility was most effective criteria among human capital management criteria.

**KEYWORDS:** human capital, leadership practices, employee engagement, knowledge accessibility, workforce optimization, learning capacity, AHP.

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## INTRODUCTION

Nowadays, human and social capitals are counted as one of the most crucial factors in the people development belonging to an organization [1]. Therefore, people can achieve more professional expertise by investing more on human capital and increase the efficiency and consequently their wages in the organization [2]. Those paramount features of the human capital, that encourage people to invest in it, are comprised of flexibility, adjustment, and the capability of employing human capital. Some of the human capital advantages are unique investment return, wage increment, future leadership, participation opportunity in significant projects and the enhancement of the people clout [3].

In most organizations, intangible assets play a vital role in economic development [4] and are counted as their most important resources. It is necessary to maintain these assets in a balanced level to provide an optimum value for the organization; because the portion of human capitals is more than that of financial capitals and consequently the evaluation of human capital turns significant [5].

Intellectual capital is comprised of three dimensions, namely, human capital, customer capital (communicative) and organizational capital (structural). Diverse terms have been utilized to refer to human capital in various studies such as organization assets, human resources, cultural capital, staff values and human capital [6]. To evaluate the management of human capital, different models have been presented, e.g. Bassi and Mc Murrer models of human capital management. These two models introduced the five stimuli of Leadership practices, employee engagement, knowledge accessibility, workforce optimization, and learning capacity as the indices of evaluating human capital [7].

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In the past, evaluating human capital has been investigated in many researches. Polychroniou and Giannikos (2009) applied Fuzzy Topsis technique for staff selection in a grand Greek bank [8]. In another investigation, Celik et al. (2009) used Fuzzy Topsis technique for the compilation of strategies [9]. Tseng and Lee (2009) applied DEA/AHP for studying the significance of relationship among human capital stimuli and organizational performance variables [10].

Organizations must be aware of the human capital in each organization units in order to make an optimum investment in human capital. Therefore, for ranking organizational units based on the human capital level, analytical hierarchical process should be used. Analytical hierarchical process, presented by Saaty in 1980, divides a principal goal or problem into a group of elements and each element is combined of a group of criteria and then it ranks units by pair comparison matrix. In this technique, first, a hierarchy tree is formed and then it is evaluated [11, 12, 13]. In the present study, organizational units are ranked based on human capital management. At the outset, the level of human capital management in each unit of Foolad Technic International Engineering Corporation is evaluated by the questionnaires of Bassi and Mc Murrer human capital management, and then pair comparison matrixes are made. In the next place, by conducting a survey among managers and academics, the weight of each criterion is measured and then, organizational units are ranked via analytical hierarchy process and at last sensitivity analysis of the human capital management are done and the most effective criteria for ranking the units with AHP are determined. In section 2, the definition of human capital is rendered and its significant is discussed. In section 3, AHP technique is explained; in section 4, methodology is explained; in section 5, explain results and finally conclusion is discussed.

## 1. Human Capital

In recent years, people, organizations, and nations have increasingly been perceiving that high levels of competence and qualifications are essential for future security and success. On the whole, people of an organization acquire their knowledge in the process of life and the human capital develops new commodities and services with originality [14]. The managers of the industries have come to this conclusion that the work quality increases by investing in human capital and this leads to the return of unique capital, higher wages, higher job security, more employment prospect and receiving more financial advantages [15]. Stewart (1997) emphasizes that the major goals of investing in human capital are innovation in new products and career services or processes [16]. Hudsson (1993) defined human capital as a combination of instructions, experience, and attitudes toward life and business [17]. In another interpretation, Black and Lynch (1996) have combined and analyzed organizational, social, and individual levels. They believe that human capital model is depends on three elements of the qualifications-worker features, stability features, working methods [18]. Generally, human capital is the most valuable asset among the three types of classification made of intellectual capital. Additionally, the human capital belongs to the staff and its evaluation is exceptionally important for improving issues related to management control [19]. Copious methods have been proposed for evaluating the management of human capital. In their model, Bassi and McMurrer introduced the five stimuli of human capital management as the parts of human capital management, such as leadership practices, employee engagement, knowledge accessibility, workforce optimization, and learning capacity and they are implemented through 23 performance techniques [7].

## 2. Analytical hierarchy process

Analytical hierarchy process is one of the multi-criteria decision making which help the decision maker to make a decision by intellectual and opposite criteria [20]. In general, AHP is combined of two phases:

1. Defining hierarchical tree
2. Numeral evaluation of hierarchical tree

In defining hierarchical tree, first, a proposed purpose, criteria and sub-criteria are defined using experts' experience; and finally, alternatives indicate the tree leaves and numeral evaluation phase is based on the pair comparison [11].

The stages of units ranking by AHP technique are as follows:

**The first step:** defining problem and determining the type of required knowledge

**The second step:** determining the hierarchical structure from top to the bottom. First, the problem purpose is specified in the highest level; second, elements influencing on the purpose are determined; third, criteria influencing on elements are specified, and in the lowest level, there are usually a group of alternatives [13].

**The third step:** Making pair comparison matrices for criteria of each element and alternatives.

**The forth step:** In this stage, the rank of each pair comparison matrix is specified and then the general rank of each element is calculated by its sub-criteria, and consequently this process will continue until the general rank of each alternative in the lowest level is achieved.

**3. Ranking the units of Foolad technique International Engineering Corporation**

In this article, organizational units in the Foolad technique International Engineering Corporation are ranked with the approach of human capital management. AHP Technique has been used for this purpose. In this study, at the outset, by questionnaires of Baasi and Mc Murrer human capital management, the level of human capital management evaluation in organizational units are evaluated, and then the hierarchical tree is formed and pair comparison matrices for criteria and alternatives are made. By using experts' viewpoint, weight of each stimulus is specified and at next, the weight of each option is calculated and units are ranked. Finally, sensitivity analysis is done and the most effective criteria in ranking units with AHP are determined.

**The first step:** In the first stage of this study, the criteria of human capital management (such as leadership practices, employee engagement, knowledge accessibility, workforce optimization, and learning capacity, were considered as evaluation criteria of organizational units, and then a questionnaire of human capital management has been prepared using the above criteria and its validity was verified by several managers and academics in the field of human capital management. In order to evaluate the stability of the questionnaire, cronbach alpha was applied and it was 0.95 for the whole of questionnaire and this is acceptable. In the next place, the level of human capital management in each organizational unit of Foolad Technique Corporation was measured. The level of each criteria of human capital management has been displayed in table 1.

Table1: number of criteria's in each organizational unit

Units	Criteria	Leadership Practices	Employee Engagement	Knowledge Accessibility	Workforce Optimization	Learning Capacity
Systems		2.95	3.125	2.6	3.15	3.083
Information technologies		2.817	2.396	2.044	2.783	2.764
Financial accounting		3.18	3.05	2.607	3.3	3.233
Organizational development		3.4	3.188	2.75	3.3	3.417
Industry accounting		3.45	3.094	2.8	3.1	3.542
Telecommunication		3.367	2.75	2.244	2.833	3.333
auto mission		3.413	3.125	2.633	3.038	3.328
Research & development		3.625	3.813	2.983	3.525	3.938
Civil engineering		3.41	2.938	2.827	3.12	3.067
Administration		3.1	2.833	2.511	2.933	3.139
Gas & oil process engineering		4.05	3.75	3.467	4.1	4.083
Metallurgy & production process engineering		3.775	3.375	2.967	3.425	3.604
Technical inspection and quality control		3.54	3.15	2.673	3.08	3.3
Computer center		3.933	3.542	3.056	3.733	3.75
Estimation and contractor		3.363	3.344	2.988	3.463	3.302
General plan and road engineering		3.7	3.333	2.8	3.767	3.667
Logistic		3.875	3.594	3.158	3.775	3.979
Economical studies		3.233	2.833	2.911	3.233	3.222
Electrical engineering		4.24	3.225	2.753	3.5	3.383
Information resource		4.1	3.979	3.061	3.85	3.944
Architect and urban engineering		3.625	3.375	2.908	3.475	3.604
Project accounting		3.167	2.958	2.833	3.2	3.417
Business management		3.433	3.236	2.852	3.633	3.537
Equipment mechanics		3.717	3.313	2.95	3.667	3.542
Energy & facilities mechanics		2.871	3.107	2.705	3.1	3.202
Fluid mechanics		2.986	2.821	2.6	2.943	3.119
Project planning and control		3.483	3.125	2.75	3.283	3.444

**The second step:** In this stage the decision-making tree has been made and displayed in figure 1.

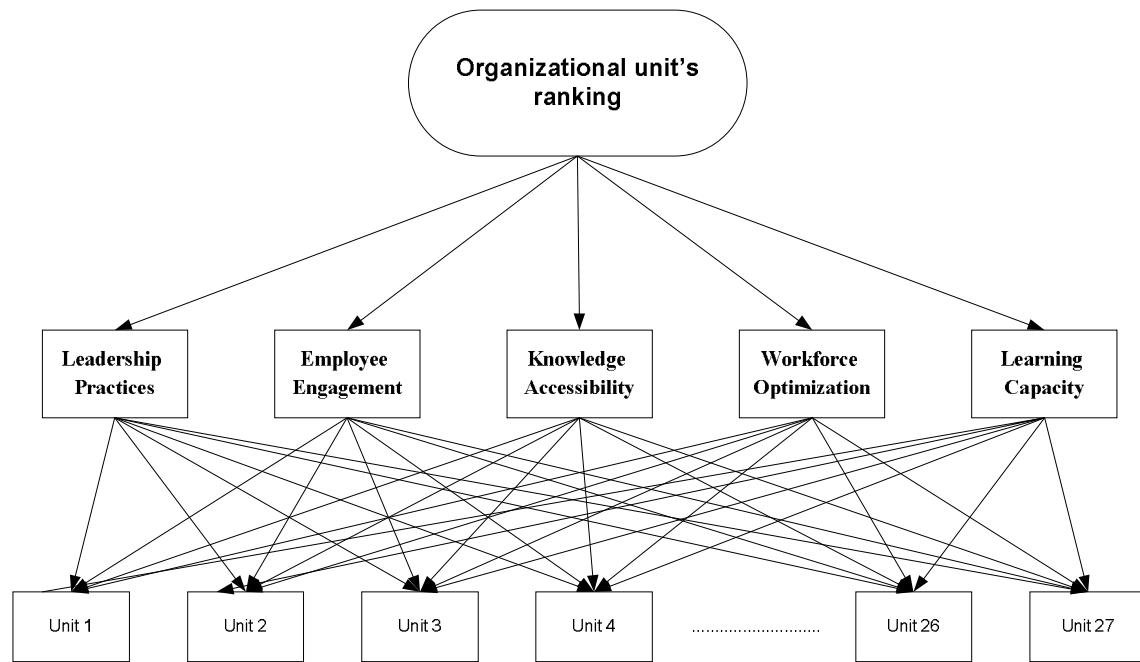


Figure1: decision making tree

**The third step:** in the next stage, the weight of each criterion was determined (table 2) using academics and experts' viewpoints.

Table 2: Criteria Weights

Criteria	Leadership Practices	Employee Engagement	Knowledge Accessibility	Workforce Optimization	Learning Capacity
Criteria Weights	0.2056	0.1857	0.2133	0.1915	0.2038

Then, the pair comparison matrix was formed applying the weight of each criterion. To this end, the proportion of each criterion's weight was utilized. In the next stage, the pair comparison of the alternatives was formed using the values of each criterion in the organizational units (which have been shown in table 1). The proportion of values of each criterion was used in this regard.

**The fourth step:** In this stage, the weight of each criterion and then the weight of each option have been calculated through pair comparison matrix and ranking was done based on them. The results obtained from the weight of each pair comparison matrix, the final weight, and units ranking have been displayed in table 3.

Table3: total weight and ranking

Units	weight	Rank	Units	weight	Rank
Systems	0.17	23	Estimation and contractor	0.188	12
Information technologies	0.145	27	General plan and road engineering	0.196	6
Financial accounting	0.175	21	Logistic	0.21	3
Organizational development	0.183	14	Economical studies	0.177	19
Industry accounting	0.183	15	Electrical engineering	0.196	9
Telecommunication	0.166	24	Information resource	0.215	2
auto mission	0.177	18	Architect and urban engineering	0.194	10
Research & development	0.203	5	Project accounting	0.178	17
Civil engineering	0.176	20	Business management	0.19	11
Administration	0.165	25	Equipment mechanics	0.196	7
Gas & oil process engineering	0.222	1	Energy & facilities mechanics	0.171	22
Metallurgy & production process engineering	0.196	8	Fluid mechanics	0.165	26
Technical inspection and quality control	0.18	16	Project planning and control	0.184	13
Computer center	0.206	4			

**Step 5:** This step deals with the sensitivity analysis of organizational unit evaluation criteria and the importance of human capital management drivers in organizational unit ranking is determined with a human capital management approach. To do so, the problem is solved five more times, but with this difference that each time, one of the evaluation criteria is removed and the obtained criteria weight difference is measured and the removed criteria that generates more difference in the options weight is more important. The sensitivity analysis results are shown in Table 4:

Table 4: Sensitivity Analysis

Unconsidered criteria	Leadership Practices	Employee Engagement	Knowledge Accessibility	Workforce Optimization	Learning Capacity
weight difference	1.029	0.93	1.068	0.959	1.02
criteria rank	2	5	1	4	3

#### 4. RESULTS

The organizational unit prioritizing results in Foolad Technique International Engineering Co. with a human capital management approach reveals that by applying Analytical hierarchy process, gas and oil process engineering unit with the final weight of 0.229 has the first rank, and then the information resource and logistic units are in the second and third ranks with the weight of 0.215 and 0.210, respectively. At last the sensitivity analysis of evaluation criteria is performed and the importance of each human capital management drivers on organizational unit ranking is determined with the help of Analytical hierarchy process. The results revealed that the knowledge accessibility criteria is in the first rank, and then leadership practices and learning capacity are in the second and third ranks, respectively.

#### 5. Conclusion

Nowadays, organizations are quite aware of the importance of human capital existence and consider it as one of the valuable capitals of the organization. On the other hand, they have come to this conclusion that the work quality can be enhanced through investing in human capital and copious advantages are achieved. For investing appropriately in human capital, the organization should evaluate the level of its human capital. Therefore, in the present study, the organizational units of Foolad Technic International Engineering Corporation are ranked with the approach of human capital management and this will lead to the clarification of the units needing more investment in human capital. AHP technique was applied for ranking. In the first place, the level of human capital management in each organizational unit was measured by the questionnaire of human capital management. Then, the weight of each stimulus was obtained based on the experts' viewpoints and pair comparison matrix was made based on the data obtained from the questionnaire and weights criteria, and then, the ultimate weight of each alternative was achieved through which ranking was done. At last, sensitivity analysis for human capital management was done and most effective criteria determined.

The results of ranking organizational units with the approach of human capital management indicate that the engineering unit of gas and petroleum process holds the highest weight (0.222) among organizational units. In the next place, information resources and logistics units with the weights of 0.215 and 0.21 hold the second and third ranks respectively. Regarding the approximate similarity between the weights obtained for each organization units, it can be concluded that all organizational units stand in relatively the same level of human capital management. Also the result of sensitivity analysis showed that knowledge accessibility is most effective criteria among five criteria.

These results help the managers of organizations to locate the organizational units that hold lower level vs. others and consequently invest more on the staff of these units. Also managers can do most human capital practices for knowledge accessibility practices until they can promote units in ranking.

In addition to the above mentioned merits, this article has some limitations. One of these limitations is that the criteria of human capital management are considered only based on the Bassi and Mc Murrer human capital management and ranked only based on AHP technique. Researchers can consider various criteria in the future studies and determine the most important of them by analyzing their sensitivity. Moreover, ranking can be done by other methods of MCDM.

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