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CHAPTER VIII

A SCIENTIFIC APPROACH IN THE ART OF ORGANIZATION

Banu OZKESER & Cuneyt KARAARSLAN

1. Introduction

Effects, due to globalization, make the enterprises canalize to do better as the time passes. The efforts of being close to technology mandates the enterprises for efficient resource management and in this way, it’s a well-known fact that the key of creating differences is human resources. One of the most vital ideas for businesses in the challenging competitive environment is human factor that manage the activities and resources.

Human resources management has a great importance owing to the contribution of using both production and knowledge. Since, art of management for the corporate affects the ultimate business results directly. Especially; sustainability, profitability, competition level are the three main factors, affected from each other simultaneously. Human resource management is the proper use of human resources with the highest possible efficiency to achieve the goals set by the corporate. In this respect, human resource management

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processes are very important because of forming the road map of the company. The basis is to work with the personnel who can both contribute to the strategic objectives and has adequate knowledge, experience and skills. This process, more important in labor-intensive enterprises, include all phases from human resources selection to promotion.

Human Resources department is responsible from human resources management in the way of realization of strategic targets. In other words, this department manages human resources to add values.

Preparing an efficiency human resources plan helps to begin the human resources process. The primary step is personnel selection section for the requested human resource according to the plan. The focus of personnel selection's being human has a great influence due to responding the expectations of both personnel and organization in an objective method (Gok, 2006, p. 38). Personnel selection and analysis implements the measuring of various qualifications for hiring of the individuals into the appropriate positions or jobs wherever they’ll be more succeed as the time passes.

Selection of right person for the correct job may make the operating conditions be higher. On the other hand, everything can go worse and worse if the incorrect candidate is selected. Unfortunately, mistake in selection, inflicting unhealthy results, may occur after the selection is finished. In addition to this, the social and economical image may be lost.

In general, the selection of right personnel to the correct job is not carried out with the scientific strategies. It only
includes the investigation of resume of personnel and the placement of the candidate to one of the appropriate vacancies. However, the process should take into consideration in details and in scientific strategies. The determination of eligibility criteria of every department and the supply of personnel who can respond to these criteria ought to be preferred. Because, the job of the personnel working in different departments is differ from each other. In addition to this, the decisions that the personnel determines have a great influence in the fields, the firm moves up. Especially, it provides a lot of benefits for R&D department in health management, integrated with the technology management that personnel selection is done with the technical information.

On the other hand, efficient personnel selection offers many advantages. Some of them are listed below:

- The new personnel get in touch with the other people easily and can be a good team member
- The orientation time might be shorter because of the personnel’s strong background
- The increase in dedication of the personnel by getting promotion and success in the job
- The managers can raise business targets through these qualified personnel

As seen from these advantages, being objective in personnel selection makes the confidence to the corporate be stronger day by day (Gurbuz, 2002).

Personel selection process begins with one of the resumes to be investigated at a glance that taken from the resume pool in human resources. After that, if there are more than
one vacancy in the firm, the placement is done by specific criteria. The main criterion should be the synchronization of the job requests and qualifications of candidate. All candidates should be behaved in justice, too.

After the processes have finished, the decision section comes and subjectiveness can easily occur in this point. However, a small mistake may be larger issues in the future. In this period, a scientific method may be a good solution to be objective. This objectiveness also effects the future of the corporate in a positive way.

The beginning point of this study is the problem caused by not using a scientific and objective technique. The candidates ought to be thought in numerous aspects, especially. Research and development department is one of these ones and thus, the expects must be creativeness, analytical thinking, research capability.

If it’s accepted that r&d department is the one, giving directions to strategic aims and the point where all activities born, it is possible to emphasize the importance of the originality of the personnel of r&d, designs, technical capabilities, tendency of researching and creativity.

The aim of this study is both selecting research and development personnel with a scientific approach and the personnel selected by this manner are requested to set the priorities of r&d projects. Finally, the benefits of scientific method approach and the values gained to firm by objective way, have a great importance.
2. Material and Methods

In this study, human resources department of a big company used the Analytic Hierarchy Process (AHP) while selecting research and development personnel in the candidates. Thomas Saaty (1980) developed this approach, called the Analytic Hierarchy Process (AHP), an important and effective tool to decide in complex situations. AHP let the decision makers make the best decision in all alternatives. In other words, it can be said that AHP helps both subjective and objective aspects get together by the decision maker. In addition to his, the AHP makes decision process go on well by eliminating the prejudice.

The AHP considers a group of evaluation criteria, and a group of alternatives so as to make the best decision. It is a significant matter that some of the criteria may be in the opposite site of the others. In this point it should not be thought that the best alternative is the one which optimizes each criterion, rather the one which achieves the most convenient trade-off among the various criteria.

The AHP creates a weight for each evaluation criterion according to the pairwise comparisons of the criteria. The higher the weight, the more significant the suitable criterion. Then, for a fixed criterion, the AHP assigns a score to each alternative considering the decision maker’s pairwise comparisons of the alternatives based on that criterion. The upper the score, the better the performance of the alternative with respect to the noted criterion (Russel and Taylor III, 2003, p. 322).
In briefly, the AHP gets together both the weights of criteria and the scores of the alternatives, by determining a global score for each option, and a final ranking. The global score for a given alternative is a weighted sum of the scores it obtained with respect to all the criteria.

Also, the AHP is a very flexible and user-friendly way to obtain the scores on the basis of the pairwise relative assessments of both the criteria and the alternatives which are provided by the user.

The directory of the calculations of AHP approach are always the significant experience which decision maker has. Hence, the AHP may be taken into account as a tool having the power to translate the evaluations made by the decision maker into a multi-criteria ranking (Ozdemir and Saaty, 2006, p. 349-359).

Moreover, the AHP is easy or unmixed since there is no need of building a complex expert system with the decision maker’s knowledge about it. On the other hand, the AHP can have a major demand of evaluations by the user, exclusively for problems with many criteria and alternatives. Although every single rating is very simple, because of it’s requirement of the decision maker to express how two alternatives or criteria compare to each other, the load of the evaluation assignment may become irrational. Actually, the number of pairwise comparisons grows parallel with the number of criteria and alternatives. For instance, when comparing ten alternatives on four criteria, 6 (=4·3/2) comparisons to form the weight vector are needed, and 4 x (10 x 9/2)=180 pairwise comparisons are requested to build the score matrix, too. Nevertheless, the AHP can be automated by specifying
suitable verges for automatically deciding some pairwise comparisons in order to reduce the decision maker’s work-load and make easier (Saaty, 2008, p. 83-98).

The AHP provides the decomposing of the problem into a hierarchy of sub-problems so as to analysis in a subjective way. The subjective analysis are converted into meaningful values. The methodology is explained in detail in following steps:

**Step 1:** The decision maker can take into account the problem in separated form, like a hierarchy of aim, criteria, sub-criteria and alternatives. This, the first step of the AHP process, is the most original and significant part of decision-making. Forming the decision problem as a hierarchy is the base level of the AHP. Hierarchy, a more orderly form of a network, indicates a relationship between elements of the model. An inverted tree structure is similar to a hierarchy. Mr. Saaty recommends that a useful way to form the hierarchy is to work down from the goal to the alternatives until the possibility of the comparisons of equalities comes true.

**Step 2:** Data, corresponding to the hierarchic structure, are collected from decision-makers within the pairwise comparison of options on a qualitative scale. Decision maker can characterize the comparison, by rating, beginning from equality to extremely strong. After that the hierarchy has been formed, the decision maker performs pairwise comparisons at every level to determine the relative significance of each element at that level. The aim of all these comparisons is to specify the relative significance of all elements of the hierarchy to make the final decision based on the initial objective. In pairwise comparisons, AHP uses a scale, having
the values from 1 to 9. Table 1 shows how the decision maker’s verbal descriptions of the relative importance between the two criteria are transformed into a quantitative rating.

<table>
<thead>
<tr>
<th>Intensity of Importance</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equal importance</td>
</tr>
<tr>
<td>3</td>
<td>Moderate importance</td>
</tr>
<tr>
<td>5</td>
<td>Strong importance</td>
</tr>
<tr>
<td>7</td>
<td>Very strong or demonstrated</td>
</tr>
<tr>
<td>9</td>
<td>Extreme importance</td>
</tr>
<tr>
<td>2, 4, 6, 8</td>
<td>Intermediate values</td>
</tr>
</tbody>
</table>

Note: Saaty, 1985.

Step 3: The pairwise comparisons of various criteria composed in step 2 are placed into a square matrix in the beginning of this step 3. All the cross elements of the matrix are 1, as shown in the figure 1. If the value of element (i,j) is more than 1, this means that the criterion in the i-th row is better than criterion in the column, j-th. Otherwise, the criterion, located in the j-th column, is better than the one in the i-th row. The (j,i) element of the matrix is the opposed form of the (i,j) element.

Figure 1. The Form of Comparison Matrix

\[
A = \begin{bmatrix}
  a_1 & a_2 & \ldots & a_{1n} \\
  a_1 & a_2 & \ldots & a_{2n} \\
  \cdot & \cdot & \ddots & \cdot \\
  \cdot & \cdot & \ddots & \cdot \\
  a_{n1} & a_{n2} & \ldots & a_n
\end{bmatrix}
\]
Step 4: The eigen value principal and the right eigen vector of the comparison matrix, corresponding normalised, give the relative significance of the different criteria, being compared. The elements of the eigen vector which are normalised are termed weights according to the criteria or sub-criteria and ratings based on the alternatives.

Step 5: The evaluation of the matrix of order n is taken into account whether it is consistency or not. Comparisons formed by this method are subjective. In this point, the AHP approach tolerates discordance through the amount of redundancy. Should this consistency index fail to reach a required level, answers to comparisons can be examined again. In other words, after the priorities of the evaluation criteria are obtained, evaluating the options on the basis of the criteria is the next step. In this step 5, a relative evaluation rating is obtained for every one of the decision alternatives according to each criterion. The procedure for the pairwise comparison of the alternatives is like the procedure for comparing the criteria. Therefore, if there are n evaluation criteria in the problem, we would have n separated matrices of pairwise comparisons of the alternatives, one matrix for each criterion.

Step 6: The rating of every various is both multiplied with the weights of the sub-criteria and aggregated to have the local ratings according to each criterion. Then, the local ratings are multiplied and also aggregated to have the global ratings. The last stage of the AHP method involves determining the overall evaluation of the decision alternatives (Saaty, 2008, p. 83-98).
3. Calculation

This study consists of two main steps. In the first one, personnel selection is taken into consideration. Then r&d projects’ priorities are decided. In specifically, r&d personnel selection process is studied.

Commission is set while r&d personnel is being selected and this commission determines the requirements of the job. The five main criteria and their sub-criteria are determined as below and shown in figure 2.

Plan: Plan development, experience of making strategic planning

Implementation: Realizing the activities depending on plan, the capability of doing plans related to budget control

Research: Following technological developments, the innovations in the field

Behaviours and Hobbies: The team soul and communication, social memberships

Personnel Competencies: Technical trainings and certificates to the specific field

Figure 2: Decision Hierarchy of Determination of Candidates for R & D Department
Each main and sub-criteria is bench-marked in the comparison pairwise matrix prepared by the commission. In this point, the scale of importance is taken into account. In the meantime, the softwares, used in AHP, are searched. The most founded ones are, Expert Choice, Decision Lens and Super Decisions.

Expert Choice is an easier method for having a user-friendly form and its sensitivity analysis. Owing to these reasons, it is preferred to use in this study. After putting the data of the matrix to Expert Choice programme, consistency rate is calculated for each matrix.

4. Results

By using Expert Choice Comparion Suite Version 5.11.1, there are the priority results of the main criteria:

Plan: 0,12;
Implementation: 0,31;
Research: 0,32;
Behaviours and Hobbies: 0,07;
Personal Competencies: 0,18.

According to this, commission is agree to select the first three people who have the upper priorities.

The personnel for r&d department who are selected by this approach had an expected performance at the end of the year. This also shows that this scientific method does not have an unexpected result. After that, these personnel
get together to form a group in order to set the priorities in the short term for r&d projects. In this step, AHP method is used again.

In this second major step, the criteria of selection of r&d projects, depending on the experience and knowledge of r&d personnel, are determined and shown in figure 3.

Cost: The cumulative amount paid or required in payment for a purchase

Rate of Target Market: The rate of the project for the destination market

Return Time: The period begins with the project and ends with the implementation or serial production

Implementation: The possibility of the realization of the Project in present conditions

Profitability: The rate of the benefit of the project to the company’s profit

**Figure 3:** Decision Hierarchy of R & D Project
Selection for Priority-Setting
5. Discussion

According to these criteria, there are 10 research and development projects, with the beginning of RD-1 to RD-10. All of them were evaluated by this scientific method. The data were entered to expert choice programme with the use of pairwise comparison matrix as it’s done in the beginning of the study for selection personnel of R&D in the health institution.

According to this, the priorities that were found are below;

Cost: 0,11
Rate of Target Market: 0,28
Return Time: 0,26
Implementation: 0,09
Profitability: 0,26

As shown in the values above, rate of target market is the first one. Increase in sales potential can be considered as the most vital benefit of a project. Since, the return of the project to the firm after a big labour has a great value. The return time and profitability are similar to each other about the values.

In result; the projects having the codes of RD-1, RD-4, RD-8 are decided to begin in the short term due to their priorities. In briefly, this scientific strategy lets an objective selection be done in many alternatives. The data of the method were changed after used to select the appropriate candidate for vacancy.
6. Conclusion

Personnel selection is a multi-criteria decision-making problem, especially in health management. Evaluation criteria can consist of quantitative and qualitative data. Therefore, the evaluation must be lack of objectivity and it is necessary to be verified the verifiable methods.

Success in the personnel selection is effective in the realization of the other business functions. The mistakes which can be occur while selecting staff may cause an increase in staff turnover, lack of jobs carried out in the desired quality, lost of time and the other financial issues. AHP (Analytic Hierarchy Process) is accepted as effective and appropriate method for configuration of personnel selection process and setting the priorities of projects. The originality of this study is the use of AHP as two successive rings of a chain.

In this context, AHP provides an important advantage for a corporate looking for certainty and transparency in the selection process. In addition to this, AHP presents possibility of quantitative and qualitative evaluation criteria in the same hierarchy. Besides, this scientific method allows decision-makers to identify the inconsistency of decision in the pairwise comparisons. Robustness of personnel selection decision model is tested fast and easily with sensitivity analysis. Assessment of evaluation of the scientific approach shows that AHP contributes intensively in the personnel selection and setting of project priority. In other words, AHP is a useful tool and helps not only to order candidates for r&d department and to choose one of them, but also to set
the priorities of the projects. Recommended method can be applied in selection projects, too.

Another benefit of this scientific method is its presenting simple, flexible and user-friendly approach. The method suggested in this study can be used by the firms in a decision with multi-alternatives. In other words, if there are many alternatives before decide, AHP is an appropriate method to recommend.

Finally, objective approach should be implemented from the beginning till the end of the activity. Especially, personnel selection is an important step for human resources and the possibility of a mistake in decision may bring much more wrong issues with itself. The research and development department is one of the vital ones in this area. The evaluation based on the capabilities and qualifications of personnel has a huge role so as to make specific strategic plans of the company.

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