

A MULTI-CRITERIA JOB EVALUATION METHOD FOR A STATE BANK

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ABSTRACT

Wage management is an important task which affects a firm's productivity in the short term and the consistency of the firm's activities in long term. If an organization fails to establish a fair wage policy among the personnel, conflict is inevitable in the organization. A fair wage policy can be achieved by job evaluation, which is a technique used to determine the relative importance of all jobs in an organization. Jobs are evaluated with respect to ability, responsibility, effort, and job condition factors etc. which make it a multi-criteria problem for organizations. In this study, a job evaluation methodology is developed for a state bank in Turkey. The relative importance of the evaluation criteria which is then used to grade jobs with respect to one another by a Liberatore scale is determined by an Analytic Network Process (ANP) model. This new methodology has a positive effect on competence and performance management systems.

Keywords: Job evaluation; Analytic Network Process; Multi-criteria Decision making; Banking.

1. Introduction

The most important characteristic of the job evaluation problem is the existence of multiple factors that influence the evaluation. The evaluation process is often the duty of a committee; and the data that are available are fuzzy while the description, responsibilities and requirements of the jobs are not usually precisely determined. Nevertheless, for many organizations job evaluation is a crucial activity that enables the rationalization of the links between the importance of a job and the corresponding wage

(Chen & Lee, 2007; Erarslan et. al., 2013; Spyridakos et. al., 2001). It is a systematic process that enables the design and establishment of human resources improvement procedures and fair wage systems. Actually, job evaluation is concerned with the assessment of a value system that encapsulates the importance of the parameters of and reflects the global responsibility and duties of a job. It is remarkable that job evaluation is not concerned with those holding the job, but instead with how much responsibility the job has and its share in the production of the desired results. The job evaluation process results in a positive influence on competence and performance management. This is because it helps establish a reward system that links the importance of the job to the payment offered, and supports the designation of human resources development requirements in order to improve the effectiveness of the job's operation.

A considerable number of approaches have been developed and used for the job evaluation process. The simplest ranks or classifies the jobs based on a comparative process or a points factor rating system (Armstrong and Murlis, 1994; Neathley, 1994). Another approach utilizes a scale for the classification of the jobs. Different levels of grades are assigned to a number of characteristics such as "decision making", "knowledge required" and "equipment used". Every job is placed in a position on the total scale by its evaluation of the characteristics. This approach can easily be applied in cases where there are a small number of jobs to be evaluated, the jobs are not too complex and can be described by the characteristics used, and it is quite easy to determine the lines between two neighboring positions on the scales for every characteristic. Another commonly used approach is based on the comparison of the job with an internal benchmark. This approach cannot be applied in cases where there are a small number of jobs and not a high degree of differentiation among the jobs.

The most common and perhaps the most reliable method in job evaluation is the Point Method (Erarslan & Arıkan, 2004; Xing, 2008). According to this method the evaluation of the jobs are derived from a multi-attribute value system. The principles of this value system are based on the essentials of the Multi-attribute Utility Theory (Keeney and Raifa, 1976; Keeney, 1992). This approach is widely used by management consultants and usually provides reasonable results, but is lacking when it comes to estimation of the weights of the attributes and the evaluation of the jobs on the criteria. Actually, the weights of factors are estimated through a survey analysis or are directly expressed by an expert or a management consultant. It is obvious that in this case the determination of the components of the value system operates like a "black box" for the organization. Also, the individual circumstances of the enterprise or organization are not taken into account to the extent that is required (Spyridakos et al., 2001).

Recently, the most widely used methods in job evaluation are the AHP and ANP methods, developed and introduced to the literature by Thomas L. Saaty. They are mainly used to solve multi-criteria decision-making problems (Saaty, 2001; Saaty, 2000). One of the most important assumptions of AHP is that criteria at the same level are independent from one another and that their effects on each other are not taken into consideration. In fact, many criteria affecting decision-making problems interact with each other, and it is vital to pay attention to these relationships among criteria in order to make the best decisions possible.

On the other hand, the ANP eliminates the necessity of modeling by sticking to a hierarchical structure (Saaty, 2001). The decision-making problem using ANP is modeled as a network and all internal dependencies (feedbacks) and interactions among the criteria are taken into consideration during the modeling process. Moreover, it is not costly to apply. As evaluation is done using a scale appropriate for the jobs in the enterprise, it enables the enterprise to develop its own evaluation system. The possibility of making mistakes is enormously low as long as the phases of ANP are performed consistently and regularly. Absolute and understandable results are obtained, and structural changes in jobs and enterprise can easily be reflected on the evaluation plans.

In recent studies, Spyridakos (2001) worked on the multi-criteria job evaluation for large organizations, Dağdeviren (2004a) used AHP to evaluate different jobs in an electricity enterprise, Dağdeviren also (2004b) used a goal programming model to determine factor degree points, Chen & Lee (2007) used a performance evaluation model based on ANP for project managers using managerial practices, and Erarslan et. al. (2013) used the fuzzy AHP method for the job evaluation procedures in a private steel company.

Although, Seçme et. al. (2009) used fuzzy performance evaluation in the Turkish Banking Sector using AHP and TOPSIS, a study that evaluates banking jobs by multi-criteria methods has not been conducted to the best of our knowledge. In the present study, ANP was used because it can exactly respond to the subjective needs of the enterprise and partially eliminate the inconveniences of the conventional methods. Characteristics such as its flexibility, its ability to find solutions to problems in a short time, its capacity to incorporate all kinds of interactions, dependency and feedback in the model and the opportunities it provides to evaluate all relationships systematically make ANP superior over the other methods. The interaction and feedback among the criteria also required the author to use ANP rather than AHP in the study. ANP is based upon pairwise comparison just like AHP, and Saaty's 1-9 ratio scale is used in pairwise comparisons. The Super Decisions software package was used to determine criteria weights.

2. A feedback model to evaluate jobs for a state bank

An ANP model was proposed in order to determine the weights of the criteria and sub-criteria that were used to evaluate the jobs in a state bank. Criteria and sub-criteria were adapted from the "Job Grouping System-JGS" which began to be used in 1982, and was expanded in the Turkish Metal Industrialists Union Publication in 1996 (Metal Grouping System, 1996). The JGS is used to determine and evaluate the circumstances, difficulties and commitments required of the job in daily life. This system is not a tool designed for determining the performance of workers, but for evaluating the jobs. The JGS not only contributes to the determination of the payment system, but also to the planning of training for workers and their professional development and promotion. It evaluates a job using the following four main criteria: ability, responsibility, effort and working conditions.

Sixteen different banking jobs in a branch of a state bank were evaluated by four main JGS criteria and 17 sub-criteria. One thousand total points were distributed among the criteria and sub-criteria in accordance with the weights obtained by ANP. During the distribution of sub-criteria points among the criteria degrees, a Liberatore scale

(Liberatore, 1992) was used. The higher the total points obtained from the sub-criteria, the higher the level of required qualities, responsibilities and abilities the person who will do that job must have. The number of criteria and sub-criteria also meet the standard of including a maximum of seven sub-criteria within each cluster in the network (Saaty, 2001).

This flexible method is easy to understand and apply. If new criteria are introduced in accordance with different job systems, these changes can easily be incorporated into the model. The proposed method enables related people to take part in the decision-making process (group decision making). It also ensures a significant decrease in the decision making time when compared to other job evaluation methods. One of the most important characteristics which distinguish this method from others is the consistency ratio acquired from pairwise comparisons. This ratio provides people within and outside the enterprise with information about the reliability of the results of the study and prevents possible disagreements. The structure of the ANP makes it applicable in the evaluation of the jobs done in different enterprises by using similar and/or different criteria.

The feedback network is illustrated in Figure 1 where criteria are illustrated by clusters and sub-criteria are illustrated by nodes. Arrows are used to show the feedbacks within the clusters and the interactions among the clusters.

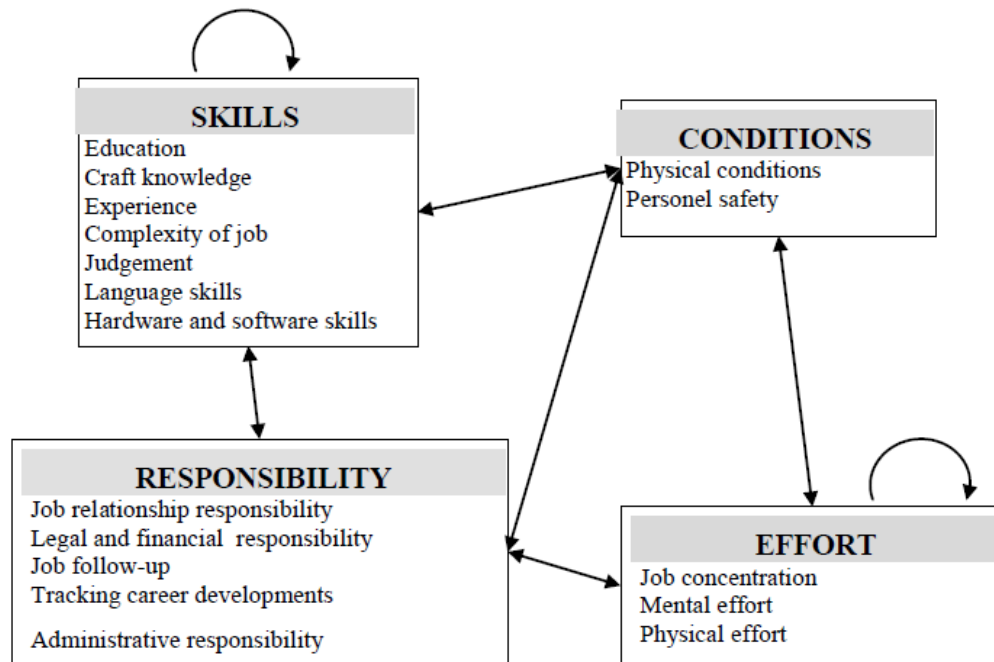


Figure 1. The feedback network for the state bank

ANP is used to determine the alternative weights and ranking in problems in which there are a finite number of alternatives. However, there are no clusters of alternative networks in this study since our aim is to design a system which serves a more general purpose and will be used in the evaluation of all the jobs in the enterprise. The cluster of alternatives is made up of all the jobs in the enterprise. When all kind of jobs are evaluated in big

enterprises, it is certain that pairwise comparisons are unreliable and consistency is not available due to the fact that job characteristics could somehow be different. For this reason, only the criteria and sub-criteria weights were determined through ANP. All interactions and feedbacks in the networks summarized in Table 1 were determined, and the required connections were made with the help of the Human Resources Department and General Director of the state bank. The definitions for all criteria are shown in the Appendix.

Table 1
The relationships of the criteria

Affected Criteria	Effector Criteria
SKILLS	
1.Education	2, 3
2.Craft knowledge	1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17
3.Experience	1, 2
4.Complexity of job	1, 2, 5, 7, 8, 9, 10, 11, 12, 13, 14
5.Judgement	1, 2, 3, 4, 7, 13, 14
6.Language skills	1, 2
7.Hardware and software skills	1, 2, 3, 4, 10, 11, 13, 14
RESPONSIBILITY	
8.Job relationship responsibility	2, 3, 5, 13, 14
9.Legal and financial responsibility	2, 3, 5, 13, 14
10.Job follow-up	2, 3, 5, 13, 14
11.Tracking career developments	1, 2, 6, 7
12.Administrative responsibility	1, 2, 3, 5, 13, 14
EFFORT	
13.Job concentration	8, 9,10, 12, 14, 15, 16, 17
14.Mental effort	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12
15.Physical effort	16, 17
CONDITIONS	
16.Physical conditions	13, 15
17.Personel safety	2, 3, 13, 15

3. Criteria weighting

Pairwise comparisons of the criteria and sub-criteria were done using Saaty’s 1-9 ratio scale. The inconsistency ratio is required to be less than 0.1. Sub-criteria weights were obtained from the pairwise comparisons and are shown in Table 2.

Table 2
The relative importance of sub-criteria

Sub-criteria	Relative Importance
Education	0.074959
Craft knowledge	0.229686
Experience	0.115071
Judgment	0.049841
Complexity of job	0.052167
Language skills	0.014348
Hardware and software skills	0.063694
Job relationship responsibility	0.025682
Legal and financial responsibility	0.031823
Job follow-up	0.060793
Tracking career developments	0.040720
Administrative responsibility	0.042092
Job concentration	0.05169
Mental effort	0.097818
Physical effort	0.014426
Physical conditions	0.026392
Personnel safety	0.008397

In this study, the five point rating scale developed by Liberatore (1992) was used in the distribution of sub-criteria points among the criteria levels. The weight of each level was determined by the Analytic Hierarchy Process. In a five point scale, the highest level is always considered as nine times more important than the lowest level. Moreover, the inconsistency ratios are at the level of 0.05 or lower. The level weights found for the five point scale are shown in Table 3.

Table 3
The relative importance of levels

Level	1	2	3	4	5
	0.033	0.063	0.129	0.261	0.513

In the distribution of the sub-criteria scores among the criteria levels, the sub-criterion score was considered to be the score of the highest level. The scores of the other levels were found by comparing the highest level with the each individual level. For instance, level 4 point for ‘experience’ is calculated as 59 by using Equation 1.

$$\text{Level 4 point for 'experience'} = (0.261 * 115) / (0.513) = 59 \tag{1}$$

In the same way, the other sub-criteria points are distributed among the criteria levels and shown in Table 4 for the banking jobs.

Table 4
Criteria, sub-criteria and level scores

Criteria/Sub-criteria	Total Scores	Level Scores				
		1	2	3	4	5
SKILLS	599					
Education	75	5	9	19	38	75
Craft Knowledge	229	15	28	58	117	229
Experience	115	7	14	29	59	115
Complexity of job	52	3	6	13	26	52
Judgment	50	3	6	13	25	50
Language Skills	14	1	2	4	7	14
Hardware and software skills	64	4	8	16	33	64
RESPONSIBILITY	202					
Job relationship resp.	26	2	3	7	13	26
Legal and financial resp.	32	2	4	8	16	32
Job follow-up	61	4	7	15	31	61
Tracking career develop.	41	3	5	10	21	41
Administrative resp.	42	3	5	11	21	42
EFFORT	164					
Job concentration	52	3	6	13	26	52
Mental effort	98	6	12	25	50	98
Physical effort	14	1	2	4	7	14
CONDITIONS	35					
Physical conditions	26	2	3	7	13	26
Personnel safety	9	1	1	2	5	9

A questionnaire was prepared to determine sub-criteria levels for 16 different banking jobs. According to the questionnaire, sub-criteria levels and total scores of the banking jobs are summarized in Table 5 and Table 6.

Table 5
Sub criteria levels for the banking jobs

BANKING JOBS	Branch Director	Banking Expert	Assistant Banking Expert	Marketing Department Director	Marketing Department Co-director	Marketing Department Service Executive	Marketing Department Service Personnel	Credit Department Director	Credit Department Co-director	Credit Department Service Executive	Credit Department Service Personnel	Operational Jobs Department Director	Operational Jobs Department Co-director	Operational Jobs Service Executive	Operational Jobs Service Personnel	Security Personnel
SKILLS																
Education	5	4	4	4	4	3	3	5	4	4	3	5	4	3	3	3
Craft knowledge	5	4	4	4	4	3	3	5	4	4	3	5	4	3	3	4
Experience	5	4	4	5	4	3	3	5	4	4	3	5	4	3	3	4
Complexity of job	5	4	4	4	4	3	3	4	4	4	3	5	4	3	3	2
Judgment	5	4	4	5	4	3	3	5	4	4	3	4	4	3	3	4
Language skills	4	4	4	4	4	3	3	4	4	4	3	4	4	3	3	2
Hardware and software skills	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2
RESPONSIBILITY																
Job relationship resp.	5	4	4	4	4	3	3	5	4	4	3	5	4	3	3	4
Legal and financial resp.	4	4	4	4	4	3	3	4	4	4	3	4	4	3	3	3
Job follow-up	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	3
Tracking career develop.	4	4	4	4	4	4	3	4	4	4	4	4	4	4	3	3
Administrative resp.	4	4	3	4	4	3	3	4	4	3	3	4	4	3	3	3
EFFORT																
Job concentration	4	4	4	4	4	4	3	4	4	4	4	4	4	4	3	4
Mental effort	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Physical effort	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5
CONDITIONS																
Physical conditions	5	4	4	4	4	4	4	4	4	4	4	5	4	4	4	5
Personnel safety	3	3	3	4	4	3	3	3	3	3	3	3	4	3	3	5

Table 6
Total scores of the banking jobs

Banking Jobs	Total Score
Branch Director	787
Operational Jobs Department Director	762
Credit Department Director	748
Marketing Department Director	619
Marketing Department Co-director	508
Operational Jobs Department Co-director	508
Banking Expert	505
Credit Department Co-director	505
Assistant Banking Expert	495
Credit Department Service Executive	496
Security Personnel	418
Marketing Department Service Executive	345
Credit Department Service Personnel	345
Operational Jobs Service Executive	345
Operational Jobs Service Personnel	321
Marketing Department Service Personnel	321

4. Conclusions

An ANP model was proposed to evaluate the jobs in a branch of a state bank in Turkey. The weights of the criteria and sub-criteria were determined by using the ANP model. One thousand points in total were distributed among the criteria and sub-criteria in accordance with the weights obtained through ANP. A Liberatore scale was used for the distribution of the sub-criteria points among the criteria degrees. Finally, total scores were calculated for each job.

The ANP is a flexible method which is easy to use. When new criteria need to be introduced for different job systems, these changes can easily be incorporated into the model. Besides, the method enables related people to take part in the decision-making process and facilitates group decision-making. This guarantees a significant decrease in decision making time in comparison with other job evaluation methods. Moreover, the consistency ratios obtained through ANP prevent possible disagreements by providing people within and outside the enterprise with the necessary information about the reliability of the results of the study.

The software package ‘Super Decisions’ doesn’t pave the way for making a sensitivity analysis without an alternative cluster. This cluster consists of all the works in the enterprise. When all jobs in a big enterprise are evaluated using ANP, it is certain that pairwise comparisons are unreliable and inconsistency occurs. For this reason, in enterprises in which there are few jobs (less than 7), a sensitivity analysis can be done by including alternative clusters in the ANP model. Under these circumstances, how the

weight of the criteria and sub-criteria as well as the significance levels of jobs will change in case of a change in the weight of any criterion can easily be seen.

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APPENDIX

CRITERIA	DEFINITION
SKILLS	
1.Education	Required education level and degree for performing job with a satisfactory level.
2.Craft knowledge	All technical, procedural and organizational knowledge such as knowledge of equipment and machinery, knowledge of concepts, ideas, other cultures or languages required for the job.
3.Experience	After the acquisition of the necessary basic information and education, the required experience period for doing the job accurately and with the desired quality.
4.Complexity of job	Complexity of jobs created by job characteristics such as variability, diversity, and uncertainty etc.
5.Judgement	The ability to act independently and accurately and have fast decision making skills and use initiative.
6.Language skills	The required level of foreign language related to the job.
7.Hardware and software skills	The ability of using office equipments such as typewriters, computers, copiers, etc. and/or the level of knowledge of the software features related to the job.
RESPONSIBILITY	
8.Job relationship responsibility	The direct responsibility for the supervision, coordination or management of employees, or others in an equivalent position.
9.Legal and financial responsibility	Responsibility for legal issues and financial resources such as cash, vouchers, cheques, debits and credits, invoices, budgets and income
10.Job follow-up	Once a job starts, it is usually required to follow-up the activities related to it in order to achieve the organizational goals in terms of cost and quality.
11.Tracking career developments	It is required to expand job-related knowledge to improve ability and earnings potential.
12.Administrative responsibility	Responsibility of supervising and directing others, the number and type (qualification) of people supervised.
EFFORT	
13.Job concentration	The level of required attention of the senses such as seeing, hearing, feeling, touch.
14.Mental effort	Analytical, problem solving and judgmental skills related to design, handling of people, development of policies and procedures, and planning and strategic skills are required.
15.Physical effort	The degree of physical effort required to do the job with a normal tempo.
CONDITIONS	
16.Physical conditions	The degree of unpleasantness or discomfort caused.
17.Personel safety	Despite the implementation of all safety requirements, consideration of the possible accidents and sanitary drawbacks which can arise from the nature of the job.