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Job and Personnel Assessment in the Apparel Industry Using Fuzzy Logic

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Abstract
In this study, a new approach to job and personnel assessment for the apparel industry is presented. The purpose of this new approach is to evaluate both qualitative and quantitative data at the same time. For this purpose, evaluation of the linguistic data is based on fuzzy logic application. Necessary criteria essential for job and personnel assessment were determined by academics who study textile and psychology. Numeric data used in the study were evaluated with recent data and specially designed software called "Work Sampling". The results obtained from this approach were investigated together with company managers and in order to obtain a final result, main criteria weights were determined. Appropriate usage of the final results acquired from the assessment of personnel was discussed.

Key words: *fuzzy logic, personnel assessment, work sampling, apparel industry.*

Introduction

As in many other sectors, in the apparel industry the main objective of production is efficiency. In particular, the basis of apparel industry production is based on human labour. In order to create a competitive and productive environment, companies apply various methods such as the premium wage system or employee of the month selection. Thus assessments made on a scientific basis increase confidence in results, employee motivation and productivity.

In the apparel industry, many methods are applied in order to evaluate personnel and the job. However, discussions with company managers indicate that the realities of methods applied are questionable. There are basically two reasons for this situation: the first is a lack of reliance on recent methods and the second is not knowing how to reflect these methods in the operator's salary. Thus in order to reflect the truth, results obtained by the method used in the evaluation process are very important. Nevertheless most of the premium wage systems are based on only a single variable such as the quality or amount of daily production. In cases where multiple variables exist, the weights of variables which will affect the system are determined far from the scientific methods. Even though scientific methods are applied, it is difficult to say that variables used in the production department can cover all the factors, because a manufacturing process includes qualitative variables such as the ability, experience, the degree of difficulty of the work as well as quantitative data. An evaluation method performed without using all this information creates question marks in the mind of employees. As a result, employees distrust the applied system and all efforts in providing an efficient production become a collective reason of inefficiency.

Fuzzy logic applications have been used more and more in order to eliminate such problems and achieve more scientific results. Studies on fuzzy logic have given satisfactory results in the textile and apparel industry and brought a new perspective to problems related to production which are unsolved or had an irrational solution [1 - 10]. These studies mostly focus on decision supporting, supplier selection, clothing comfort, product development, body scanning, assembly line balancing, product quality and fabric cutting schedules. No study has been found based on personnel evaluation using fuzzy logic (with real data) in the apparel industry.

In this study, firstly the main criteria are stated in order to determine the employees' performances and the difficulty degree of work in the apparel industry, and then effects of the main criteria on employees' assessments are evaluated using fuzzy logic, recent data and work sampling. Linguistic variables peculiar to fuzzy logic are expressed with different types of membership functions during the process of job and personnel assessment and these functions are used in calculations. Assessments of all criteria are made by different sources selected with a similar method to the 360-degree appraisal system using questionnaires and recent data. In order to evaluate questionnaire assessments by the fuzzy inference method, fuzzy rules are determined and final results for personnel are obtained by the defuzzification process, which is based on the aforementioned rules. Unlike other studies, all assessment results for employees are combined into one final score for each personnel.

Description of method

In order to perform job and personnel assessment, a company that produces evening and wedding dresses and has 36 employees with 6 different departments is selected. The main materials of the study are composed of questionnaires and software prepared by the project team over recent years under a scientific project which aimed to create a computer programme for work sampling studies.

During the study, three different methods such as fuzzy logic, work sampling, and analytic job evaluation are applied. The fuzzy logic method, which formed the basis of the study, is applied especially in quantising the linguistic variables. The first process in personnel and job assessment is the determination of main criteria which address the apparel industry and reflect its exact content. For this purpose, academics from both the textile engineering and psychology departments are interviewed and a common framework is identified. Thus six main criteria and evaluation methods of these criteria are given in ***Table 1***. In the final stage these criteria are combined by multiplying the relative weights, determined by a company manager.

Personality

During the personality evaluation process, criteria and their sub-criteria are taken into consideration in order to examine the personality of the employee. Determining the necessary criteria is a very difficult task. In literature, Goldberg, an American researcher, compiled

Table 1. *Framework of the study.*

Main criteria	Evaluation method
Personality	Fuzzy logic
Work-related behaviours	
Nature of the work	Fuzzy logic & analytical job evaluation
Education level	Recent data
Experience	
Productivity	Work sampling

Table 2. *Criteria and sub-criteria for personality; *has opposite meaning in comparison with its criterion.*

Criteria	Sub-criteria	Statements
Extroversion	Liveliness	Amuse others
	Initiative	A socially powerful person
	Introversion*	Live in a world of her/his own
Docility	Soft-hearted	Inclined to forgive others
	Calmness	Remain calm under pressure
	Reactivity*	Have a sharp tongue
Responsibility	Orderliness	Do things according to a plan
	Stability	A highly disciplined person
	Adherence to the rules	Stick to the rules
	Look for excitement*	Prefer variety to routine
Emotional balance	Predisposition to anxiety*	Often worry about things
	Self confidence	Can stand criticism
Openness to improvement	Analytical thinking	Tend to analyse things
	Open to innovation	Work on improving him/herself
	Sensivity	Polite to others

an "International Personality Item Pool" (IPIP), which consists of 2413 items and is presented on a web-site [11]. By considering these items, the "Five Factor Personality Inventory", developed by Somer *et al*. [12], as well as the criteria and sub-criteria are selected for this study, shown in ***Table 2***.

In order to evaluate sub-criteria, the best statement of each sub-criterion, which is arranged in a manner easily understood by personnel working in production, is determined with the help of academics in psychology as well as previous studies. As these statements are used in a questionnaire, some sub-criteria have the opposite meaning in comparison with their criteria in ***Table 2***. Thus in this way an internal control system is established in order to check whether the questions are answered consistently or not.

The questionnaires prepared are delivered to evaluators in order to evaluate the degree of participation for each aforementioned statement between 1 and 10. Accordingly the most participated statement is expressed with a value of "10" and the unparticipated statement with a value of "1". To maximise the level of objectivity, evaluators are selected from as varied sources as possible . Therefore a similar method to the 360-degree appraisal system is followed by choosing employees' colleagues, supervisor and him/herself for the questionnaire evaluation process.

In this study, all assessments of the linguistic variables are evaluated by the fuzzy inference method. The outputs obtained by evaluation of the sub-criteria are used as an input value for its related criterion. Thus initially the structures of the input membership functions are defined between on a scale from 1 to 10, similar to the questionnaire evaluation scale. In this respect, the "poor", "fair" and "good" are defined with three triangular membership functions, which have "-3.5, 1, 5.5", "1, 5.5, 10", and "5.5, 10, 14.5" boundary points, respectively. All assessment procedures are done by the MATLAB Fuzzy Toolbox. (see ***Figure 1***). In order to express the opposite meaning, sub-criteria boundary points of the membership functions are changed conversely.

After determining the input membership functions, theoutput membership functions are defined as "very poor", "poor", "fair", "good" or "very good" on a scale from "0" to "10" using trapezoid functions with boundary points of "-1.5, 0, 1, 2.5", "0, 2, 3, 5", "2.5, 4, 6, 7.5", "5, 7, 8, 10" and "7.5, 9, 10, 11.5", respectively (see ***Figure 2***).

In order to convert the input membership function to the aggregated membership function, the Mamdani inference method is applied using certain rules. To cover all possible conditions, all rules are defined according to the number of input functions and number of sub-criteria. For instance, in the responsibility criterion, there are 3 input membership functions and 4 different sub-criteria, thus $3^4 = 81$ rules are defined. Therefore in the rest of the study all possible rules are determined for criteria and sub-criteria and it is assumed that all rules have the same weights.

After determining certain rules, in order to evaluate the aggregated membership function, the defuzzification process is applied. For this purpose, the most suitable defuzzification method is determined with the help of company managers. In this context, the "bisector" method is defined as the most appropriate for the defuzzification process, which chooses the

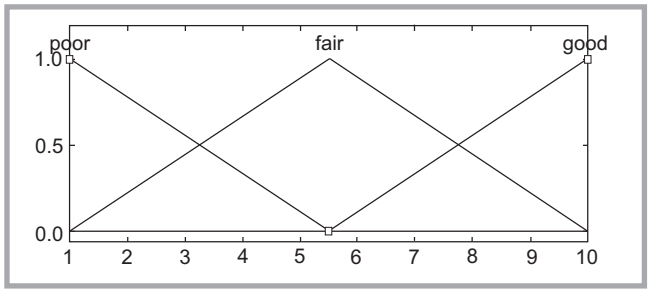

Figure 1. *Input membership functions.*

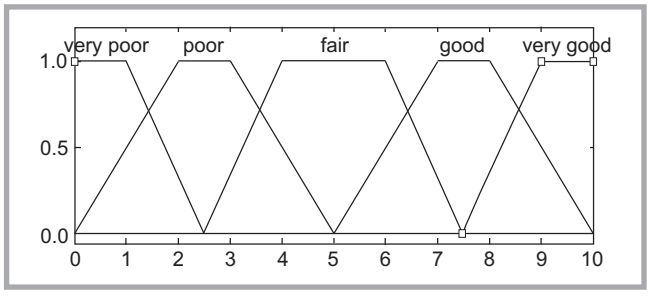

Figure 2. *Output membership functions.*

defuzzification value as dividing the area under the point of the aggregated output fuzzy set (membership function) into two equal pieces (***Equation 1***) [13].

$$\int_{\alpha}^{z} \mu_A(x)dx = \int_{z}^{\beta} \mu_A(x)dx \quad (1)$$

where,
z - defuzzification value
$\mu_A(x)$ - aggregated membership function.

Work-related behaviours

Work-related behaviours are determined by using four different criteria and are expressed by statements in ***Table 3***. The process of evaluating work related behaviours is the same as with the evaluation of personality criterion.

Nature of the work

In order to evaluate the nature of the work five different criteria and their sub-criteria are determined by using the modified analytical job evaluation method [14]. In contrast to personality and work related behaviours, assessment of questionnaires is made by the superior of the employee and company manager. As the statements consist of negative expressions, to evaluate sub-criteria, opposite meaning functions are used (see ***Table 4***).

Education level

Information about employees' education level is obtained from the human resources department. The education level is considered in two different ways;

1- Vocational education: This is special education about the employee's job such as CAD (Computer Aided Design), pattern or machine maintenance training.
2- School Education: This is the graduation level of the employee.

A scoring system is developed in order to add the education level to calculations. For vocational education, training periods are calculated in months and then the "personal weight" of each employee is defined by dividing his/her score to the total score of 36 personnel. The same procedure is performed for school education, however, this time the mathematical expression for elementary school, secondary school, high school and college are defined as 1, 2, 3 and 4, respectively. In order to obtain a total value for the education criterion (and to give more importance to school education), vocational and school education values are multiplied by coefficients 0.2 and 0.8 before the aggregation process.

Table 3. *Criteria for work-related behaviours.*

Criteria	Statements
Learning ability	Understands the point quickly
Tendency to work	Capable of her/his work
Process knowledge	Knows the process well
Technical knowledge	Has enough technical knowledge

Table 4. *Criteria and sub-criteria for the nature of the work.*

Criteria	Sub-criteria	Statements
Environmental conditions	Vibration	Vibration of working environment is excessive
	Dirt & dust	The rate of dirt and dust is excessive in the working environment
	Temperature / humidity	The working environment is hot and humid
	Illumination	The working environment has inadequate lighting levels
	Noise	The noise level of the working environment is excessive
Work safety risk		The work has a high risk of accidents
Monotony		The work is very monotonous
Effort	Mental effort	The work causes mental effort
	Physical effort	The work causes physical effort
	Visual effort	The work causes visual effort
Responsibility	Machine & equipment responsibility	The responsibility of machine & equipment is excessive
	Work quality responsibility	The responsibility of work quality is excessive
	Material responsibility	The responsibility of material is excessive
	Job security responsibility	The responsibility of job security is excessive

Experience

The process of evaluating experience is the same as with the evaluation of the education level criterion. The experience criterion is addressed in two ways;

1- Experience in the company: The time that personnel work in the company.
2- Experience out of the company: The time that personnel work in the apparel or similar industries.

Productivity

As the production process of a company consists of minimum quantity and maximum variety of products, the work sampling method is preferred to get the fastest results about personnel productivity with the help of software. Thus after determining the characteristics of work flow, work activities are divided into three different categories ("efficient", "supporter" and

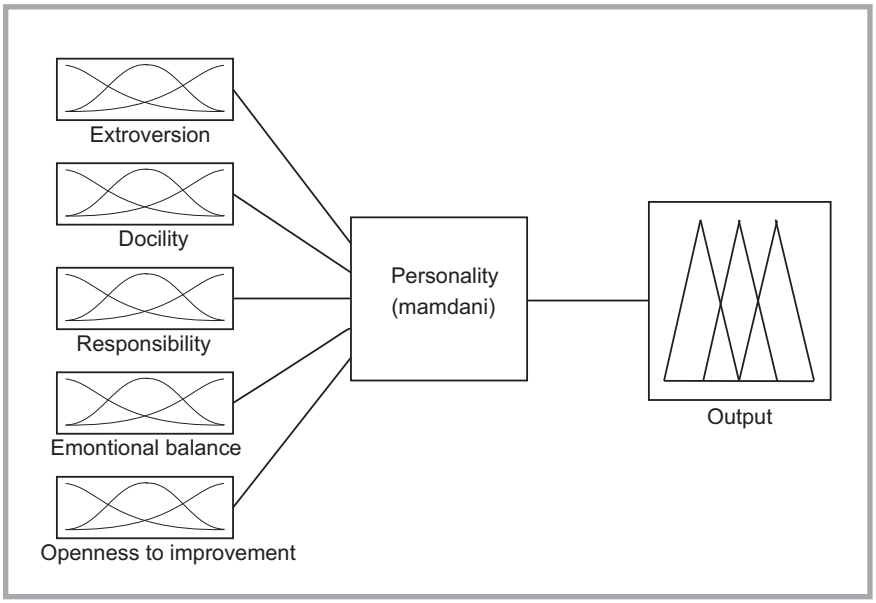

Figure 3. *Mamdani inference method for personality criterion.*

Table 5. *Final results of personality criterion; *DO - Defuzzificated output, **PW - Personal weights.*

No	DO	PW	No	DO	PW
1	5.9	0.0287	19	6.3	0.0307
2	6.0	0.0292	20	5.8	0.0282
3	5.5	0.0268	21	5.4	0.0263
4	5.5	0.0268	22	5.1	0.0248
5	5.6	0.0273	23	5.2	0.0253
6	5.0	0.0243	24	7.0	0.0341
7	6.0	0.0292	25	4.9	0.0239
8	6.4	0.0312	26	5.8	0.0282
9	5.4	0.0263	27	4.5	0.0219
10	5.5	0.0268	28	5.4	0.0263
11	6.8	0.0331	29	6.7	0.0326
12	4.9	0.0239	30	5.4	0.0263
13	4.9	0.0239	31	5.3	0.0258
14	5.3	0.0258	32	5.2	0.0253
15	5.7	0.0278	33	6.6	0.0321
16	6.4	0.0312	34	6.3	0.0307
17	5.3	0.0258	35	5.7	0.0278
18	5.8	0.0282	36	6.9	0.0336

Table 6. *Final results of work-related behaviour criterion.*

No	DO	PW	No	DO	PW
1	8.4	0.0310	19	8.7	0.0321
2	8.2	0.0303	20	7.8	0.0288
3	7.7	0.0284	21	8.7	0.0321
4	8.8	0.0325	22	8.2	0.0303
5	8.7	0.0321	23	6.6	0.0244
6	6.7	0.0247	24	8.8	0.0325
7	7.4	0.0273	25	5.9	0.0218
8	6.9	0.0255	26	7.8	0.0288
9	7.4	0.0273	27	6.3	0.0232
10	7.0	0.0258	28	7.7	0.0284
11	8.6	0.0317	29	7.4	0.0273
12	7.0	0.0258	30	7.1	0.0262
13	4.8	0.0177	31	7.0	0.0258
14	6.7	0.0247	32	5.6	0.0207
15	8.6	0.0317	33	8.4	0.0310
16	8.2	0.0303	34	8.2	0.0303
17	6.8	0.0251	35	5.9	0.0218
18	8.5	0.0314	36	8.5	0.0314

Table 7. *Final results of the nature of the work criterion.*

Criteria	Errand personnel	Length adjustment	Sewing	Hand working	Cutting	Assembly	Ironing
Environmental conditions	2.3	2.9	3.8	2.6	2.8	2.8	3.3
Work safety risk	6.5	4.0	5.0	2.5	7.5	3.0	6.0
Monotony	4.0	6.5	5.5	8.5	3.5	4.5	6.5
Effort	5.7	3.3	3.9	3.0	5.4	3.8	2.7
Responsibility	5.3	4.3	7.3	6.4	7.3	6.7	5.0
DO	3.5	4.0	5.0	3.9	4.5	3.9	4.0
PW	0.1215	0.1389	0.1736	0.1354	0.1563	0.1354	0.1389

Table 8. *Distribution of personnel in departments.*

Personnel No	Departments
13, 25	Errand personnel
4, 24, 26, 28	Length adjustment
3, 6, 7, 8 15, 21, 22, 36	Sewing
11, 18, 23, 27, 29, 30, 31, 32, 33	Hand working
1, 5, 10, 14, 16, 17	Cutting
19, 20, 35	Assembly
2, 9, 12, 34	Ironing

"inefficient") for each production department. Observations are made according to the random assignment algorithm of "work sampling" software, which was pre-developed by the researchers of this study.

Results and discussions

In this section, the results of six different criteria collected from different evaluation processes are presented for 36 personnel separately. As the personnel names are obscured, they are numbered from 1 to 36.

Results of personality criterion

As the questionnaires' results are obtained from three different sources, in order to use these evaluations in the fuzzy inference method, average values of these sources are considered as input values. After gathering sub-criteria output values, they are used as input values for the related criteria. Thus in order to get a final result for each personnel with respect to 3 input membership functions and 5 different criteria, $3^5 = 243$ rules are defined by the Mamdani inference method (see ***Figure 3***). Defuzzification results and their "personal weight" values for personality criterion are given in ***Table 5***. The percentages of defuzzificated outputs are transformed to "personal weight" on the basis of the total percentage values of all personnel.

Results of the work-related behaviour criterion

By using four different sub-criteria, results of the work-related behaviour criterion is obtained by the fuzzy inference method, where 81 rules are considered. Defuzzification results and their "personal weight" values for the work-related behaviour criterion are given in ***Table 6***.

Results of the nature of the work criterion

To evaluate the nature of the work criterion, results of the sub-criteria are used in order to evaluate the five criteria. After evaluating the five criteria using the fuzzy inference method, the final scores and personnel weights are obtained for seven different departments, presented in ***Table 7***. In the final results of personnel and job assessment, the score of each personnel will vary according to their department. Related departments of each personnel are presented in ***Table 8***.

Results of the education level criterion

Considering coefficients 0.2 and 0.8, final scores of the education level criterion for each personnel are given in ***Table 9*** (see page 21).

Results of experience criterion

A similar way to the evaluation of the education level is that of the experience criterion. The final score is obtained by calculating the average of "personal weight" values of experience in and out of the company. Personal weight values of 36 personnel are presented in ***Table 10***.

Results of productivity criterion

In order to calculate the productivity criterion, the percentage of efficient working activities are considered. The percentages of efficient activities are transformed into "personal weight" on the basis of the total percentage values of all personnel. The percentages of efficient activities for each person and their "personal weight" values are given in ***Table 11***.

Final results

Before performing the final assessment, a final meeting was held with company managers and supervisors in order to determine the weights of 6 main criteria

between 0 and 1 so that the sum of the weights will be 1. Criteria weights determined for the company are presented in ***Table 12*** (see page 22).

After determining the weights of the main criteria, the final score for each personnel is obtained by multiplying each criterion weight by personnel weights.

The key of job and personnel assessment is the weight of criteria which can be varied according to company's policy. Thus, values of these coefficients naturally will vary from company to company. According to this evaluation number 18 is chosen as best personnel and is followed by 2, 13, 5 and 19 respectively. The evaluation system in the apparel company is used in the selection of employee of the month. However, it is possible to use these results with different objectives. Namely, in a case of distributing $5000 profit margin to personnel, the share of each personnel can be easily determined by multiplying recent margin by final score of each personnel (see ***Table 13***, page 22).

Conclusions

Obviously the most important input variable of the apparel industry is the human. Therefore the increment of employee productivity will be directly reflected in the company's performance. From this perspective, the assessment of personnel and work on the development of personnel is necessary for the company's success. However, the assessment process must cover a certain time as well as be systematic and measurable, focussing on success. Above all it must reward successes rather than punish failures. Therefore, when establishing a performance assessment system, prejudices must be avoided and an objective, systematic method used. The basis of developing a systematic method is to use scientific data.

The study undertaken to achieve this goal, suggests a new model for job and personnel assessment. The job evaluation process is discussed along with other criteria. The combination of both linguistic and numerical variables are developed in the model. In particular the fuzzy logic and inference methods are applied in a mathematical expression of linguistic variables. The membership functions and rules used in the fuzzy inference method

Table 9. *Final results of personality criterion*

No	Vocational education	School education	PW	No	Vocational education	School education	PW
1	0.0656	0.0492	0.0525	**19**	0.1311	0.0492	0.0656
2	0.0000	0.0328	0.0262	**20**	0.0000	0.0492	0.0393
3	0.0000	0.0164	0.0131	**21**	0.0000	0.0164	0.0131
4	0.0000	0.0164	0.0131	**22**	0.0000	0.0164	0.0131
5	0.1967	0.0164	0.0525	**23**	0.0000	0.0328	0.0262
6	0.0000	0.0328	0.0262	**24**	0.0656	0.0164	0.0262
7	0.0000	0.0656	0.0525	**25**	0.0000	0.0164	0.0131
8	0.0000	0.0164	0.0131	**26**	0.0000	0.0164	0.0131
9	0.0000	0.0492	0.0393	**27**	0.0000	0.0328	0.0262
10	0.0000	0.0164	0.0131	**28**	0.0000	0.0164	0.0131
11	0.0000	0.0328	0.0262	**29**	0.0000	0.0164	0.0131
12	0.0000	0.0328	0.0262	**30**	0.0000	0.0164	0.0131
13	0.0000	0.0492	0.0393	**31**	0.1967	0.0164	0.0525
14	0.0656	0.0492	0.0525	**32**	0.0000	0.0164	0.0131
15	0.0000	0.0164	0.0131	**33**	0.1967	0.0164	0.0525
16	0.0820	0.0492	0.0557	**34**	0.0000	0.0328	0.0262
17	0.0000	0.0328	0.0262	**35**	0.0000	0.0164	0.0131
18	0.0000	0.0164	0.0131	**36**	0.0000	0.0164	0.0131

Table 10. *Final results of experience criterion.*

No	In company	Out of company	PW	No	In company	Out of company	PW
1	0.0291	0.0396	0.0343	**19**	0.0654	0.0198	0.0426
2	0.0944	0.0286	0.0615	**20**	0.0291	0.0121	0.0206
3	0.0872	0.0572	0.0722	**21**	0.0145	0.0594	0.0370
4	0.0726	0.0352	0.0539	**22**	0.0109	0.0198	0.0153
5	0.0581	0.0440	0.0510	**23**	0.0363	0.0110	0.0237
6	0.0006	0.0220	0.0113	**24**	0.0254	0.0330	0.0292
7	0.0012	0.0066	0.0039	**25**	0.0097	0.0029	0.0063
8	0.0145	0.0264	0.0205	**26**	0.0109	0.0055	0.0082
9	0.0109	0.0550	0.0329	**27**	0.0109	0.0033	0.0071
10	0.0006	0.0330	0.0168	**28**	0.0042	0.0506	0.0274
11	0.0182	0.0154	0.0168	**29**	0.0042	0.0044	0.0043
12	0.0218	0.0352	0.0285	**30**	0.0030	0.0198	0.0114
13	0.1017	0.0572	0.0794	**31**	0.0036	0.0044	0.0040
14	0.0073	0.0498	0.0286	**32**	0.0024	0.0022	0.0023
15	0.0218	0.0594	0.0406	**33**	0.0218	0.0330	0.0274
16	0.0484	0.0330	0.0407	**34**	0.0030	0.0088	0.0059
17	0.0484	0.0528	0.0506	**35**	0.0018	0.0005	0.0012
18	0.1017	0.0374	0.0695	**36**	0.0042	0.0220	0.0131

Table 11. *Final results of productivity criterion.*

No	Efficient activities, %	PW	No	Efficient activities, %	PW
1	54.55	0.0270	**19**	45.45	0.0225
2	60.00	0.0297	**20**	51.85	0.0256
3	34.55	0.0171	**21**	26.42	0.0131
4	40.00	0.0198	**22**	55.56	0.0275
5	58.18	0.0288	**23**	55.56	0.0275
6	43.64	0.0216	**24**	51.92	0.0257
7	65.45	0.0324	**25**	38.00	0.0188
8	36.36	0.0180	**26**	65.45	0.0324
9	72.73	0.0360	**27**	80.00	0.0396
10	55.56	0.0275	**28**	58.18	0.0288
11	60.00	0.0297	**29**	72.73	0.0360
12	55.56	0.0275	**30**	69.09	0.0342
13	63.64	0.0315	**31**	60.00	0.0297
14	60.00	0.0297	**32**	80.00	0.0396
15	37.50	0.0186	**33**	63.64	0.0315
16	45.45	0.0225	**34**	69.09	0.0342
17	47.17	0.0233	**35**	63.64	0.0315
18	72.73	0.0360	**36**	51.85	0.0256

Table 12. Weights of main criteria.

Main criteria	Criteria weights
Personality	0.20
Work-related behaviours	0.20
Nature of the work	0.10
Education level	0.05
Experience	0.15
Productivity	0.30

are determined with the help of company managers and academics in order to evaluate personnel in the best possible way. The broad model includes six main criteria and their sub-criteria are prepared, and as a result of the evaluation process, company employees are ranked from best to worst. In this case, employee number 18 gained a $ 181.77 share of the $ 5000 profit margin.

It should be noted that the way of using the data obtained depends on the policies of the company. Therefore the criteria types and their weights will be changed according to those policies. More importantly, the success of the model proposed depends on systematic usage rather than complex calculation processes. Also another important issue for success is to give feedback to employees about the results of the model.

It is recommended to future researchers who will be working on this issue to use the results of decision making techniques such as AHP (Analytic Hierarchy Process) and ANP (Analytic Network Process) during the determination of criteria weights in the final assessment process.

Table 13. Personal weights of job and personnel assessment.

No	Personality	Work-related behaviours	Nature of work	Education level	Experience	Productivity	Final score	Share
1	0.0287	0.0310	0.0295	0.0525	0.0343	0.0270	0.0308	153.78
2	0.0292	0.0303	0.0262	0.0262	0.0615	0.0297	0.0340	169.77
3	0.0268	0.0284	0.0327	0.0131	0.0722	0.0171	0.0309	154.60
4	0.0268	0.0325	0.0262	0.0131	0.0539	0.0198	0.0291	145.73
5	0.0273	0.0321	0.0295	0.0525	0.0510	0.0288	0.0337	168.66
6	0.0243	0.0247	0.0327	0.0262	0.0113	0.0216	0.0226	112.84
7	0.0292	0.0273	0.0327	0.0525	0.0039	0.0324	0.0275	137.49
8	0.0312	0.0255	0.0327	0.0131	0.0205	0.0180	0.0237	118.58
9	0.0263	0.0273	0.0262	0.0393	0.0329	0.0360	0.0310	155.19
10	0.0268	0.0258	0.0295	0.0131	0.0168	0.0275	0.0249	124.43
11	0.0331	0.0317	0.0255	0.0262	0.0168	0.0297	0.0283	141.26
12	0.0239	0.0258	0.0262	0.0262	0.0285	0.0275	0.0264	131.93
13	0.0239	0.0177	0.0229	0.0393	0.0794	0.0315	0.0339	169.66
14	0.0258	0.0247	0.0295	0.0525	0.0286	0.0297	0.0289	144.30
15	0.0278	0.0317	0.0327	0.0131	0.0406	0.0186	0.0275	137.39
16	0.0312	0.0303	0.0295	0.0557	0.0407	0.0225	0.0309	154.33
17	0.0258	0.0251	0.0295	0.0262	0.0506	0.0233	0.0290	145.13
18	0.0282	0.0314	0.0255	0.0131	0.0695	0.0360	0.0364	181.77
19	0.0307	0.0321	0.0255	0.0656	0.0426	0.0225	0.0315	157.59
20	0.0282	0.0288	0.0255	0.0393	0.0206	0.0256	0.0267	133.52
21	0.0263	0.0321	0.0327	0.0131	0.0370	0.0131	0.0251	125.35
22	0.0248	0.0303	0.0327	0.0131	0.0153	0.0275	0.0255	127.46
23	0.0253	0.0244	0.0255	0.0262	0.0237	0.0275	0.0256	127.96
24	0.0341	0.0325	0.0262	0.0262	0.0292	0.0257	0.0293	146.63
25	0.0239	0.0218	0.0229	0.0131	0.0063	0.0188	0.0187	93.29
26	0.0282	0.0288	0.0262	0.0131	0.0082	0.0324	0.0256	128.10
27	0.0219	0.0232	0.0255	0.0262	0.0071	0.0396	0.0258	129.16
28	0.0263	0.0284	0.0262	0.0131	0.0274	0.0288	0.0270	134.80
29	0.0326	0.0273	0.0255	0.0131	0.0043	0.0360	0.0266	133.17
30	0.0263	0.0262	0.0255	0.0131	0.0114	0.0342	0.0257	128.35
31	0.0258	0.0258	0.0255	0.0525	0.0040	0.0297	0.0250	125.04
32	0.0253	0.0207	0.0255	0.0131	0.0023	0.0396	0.0246	123.12
33	0.0321	0.0310	0.0255	0.0525	0.0274	0.0315	0.0314	156.77
34	0.0307	0.0303	0.0262	0.0262	0.0059	0.0342	0.0273	136.28
35	0.0278	0.0218	0.0255	0.0131	0.0012	0.0315	0.0227	113.67
36	0.0336	0.0314	0.0327	0.0131	0.0131	0.0256	0.0266	132.91

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