

A Propose of Personnel Assessment Method Including a Two-Way Assessment for Evaluating Evaluators and Employees

Shunsuke Saito, Kazuho Yoshimoto, Shunichi Ohmori, Sirawadee Arunyanart

Abstract—In this paper, we suggest a mechanism of assessment that rater and Ratee (or employees) to convince. There are many problems exist in the personnel assessment. In particular, we were focusing on the three. (1) Raters are not sufficiently recognized assessment point. (2) Ratee are not convinced by the mechanism of assessment. (3) Raters (or Evaluators) and ratees have empathy. We suggest 1: Setting of "understanding of the assessment points." 2: Setting of "relative assessment ability." 3: Proposal of two-way assessment mechanism to solve these problems. As a prerequisite, it is assumed that there are multiple raters. This is because has been a growing importance of multi-faceted assessment. In this model, it determines the weight of each assessment point evaluators by the degree of understanding and assessment ability of raters and ratee. We used the ANP (Analytic Network Process) is a theory that an extension of the decision-making technique AHP (Analytic Hierarchy Process). ANP can be to address the problem of forming a network and assessment of Two-Way is possible. We apply this technique personnel assessment, the weights of rater of each point can be reasonably determined. We suggest absolute assessment for Two-Way assessment by ANP. We have verified that the consent of the two approaches is higher than conventional mechanism. Also, human resources consultant we got a comment about the application of the practice.

Keywords—Personnel assessment, ANP (analytic network process), two-way.

I. INTRODUCTION

A. The Purpose of Personnel Assessment

PERSONNEL assessment is Rater (or Evaluators) evaluate for employee's ability, approach to get work and achievements, the result is consult of treatment and education and placement" [1], [2]. Also, according to SANNO University Research Institute, the purpose of personnel assessment can have been suggested to be classified into three. Table I is a summary of the purpose and use of methods of personnel assessment.

B. Personnel Assessment of Problems

There are many problems in personnel assessment. It is divided in particular into three.

- 1) Rater may not sufficiently recognize assessment points

- 2) Evaluated (or employees) is not convinced the mechanism of assessment.
- 3) There is the influence of personal empathy for the assessment.

TABLE I
THE PURPOSE AND USE OF METHODS OF PERSONNEL ASSESSMENT

Purpose	Detail
Treatment	• Wages (salaries) of payments assessment
	• Assessment of bonus payments
	• Assessment data of officers and appointment
Education	• Assessment data of promotion (demotion)
Placement	• Planning the education measures
	• Appropriate Moved and Placement of date

A specific example of the problem is shown in Table II. When rater 1, 2, 3 evaluate evaluated (a), even though the rater 3 do not understand rate very well, rater 3 have to evaluate point 3. In this case, distortion occurs in the assessment with this result, and both rater and ratee are considered to be dissatisfied.

According to the Joint and Research by NTT Com research and Nihon Keizai Shimbun [3], according to the satisfaction survey of personnel assessment mechanism, "Satisfactions" is 3.2%, "Dissatisfaction" is 33.7%

It is that there is the influence of personal empathy for the assessment. Human have emotions of individuals. Ratee receives undeserved reputation.

C. Personnel Assessment of the Solution

In this paper, we propose two-way assessment method using ANP taking into account the following three ideas.

1. Setting of "understanding of the assessment points."
2. Setting of "relative assessment ability."
3. Proposal of two-way assessment mechanism

The first, to investigate the understanding of each evaluator in each assessment points can be reducing the weight of the points that cannot be evaluated. The second is a set of relative assessment ability. If a rater is found to have personal feelings for other raters and ratee, it is possible to reduce the weight of the assessment. The third, for each assessment point, both the rater and the ratee determines the level of understanding of each other. As a result, it is possible to be evaluated from the rater who the ratee wishes. In this paper, we suggest to personnel assessment two-way between rates and ratees.

Shunsuke Saito, Kazuho Yoshimoto and Shunichi Ohmori are with the Department of Design and Management, School of Creative Science & Engineering, Waseda University, 51-15-05, Okubo 3-4-1, Shinjuku, Tokyo, Japan (e-mail: syunsuke.s@akane.waseda.jp, kazuho@waseda.jp, ohmori0406@aoni.waseda.jp).

II. RESEARCH MODEL

A. Flow of Research

The flow of this paper it is shown in Fig. 1. We do modeling of this paper. After we create the survey sheet of a personnel assessment, conduct surveys. Then, we calculate the weight of each assessment points of raters. The last, we carried out a questionnaire survey, and consider to them for raters, the ratee, and employees of the same department.

TABLE II

UNDERSTANDING AND THE ASSESSMENT SCORE OF EACH POINT OF RATER

Evaluated (a)	Rather1		Rather2		Rather3	
	Understanding Level	Marks	Understanding Level	Marks	Understanding Level	Marks
Point1	○	5	○	5	×	3
Point2	○	3	○	5	×	3
Point3	△	4	△	4	×	3
Point4	△	2	△	2	○	3

○: Understand △: A Little Understanding ×: Not Understand

B. Model Assumptions

This model has multi-raters and multi rates. An example is illustrating three raters; three ratees is shown in Fig. 2. In this case, we measured "Assessment understanding of point" and "Assessment ability." "Assessment understanding of point" is divided two. Rater side is whether the possible understand the duties behavior of the ratee in the assessment point. Also, ratee side is whether that can assessment how much understanding about their duties behavior of each assessment point. 'Evaluation ability' means that rater's weight of a point is decreasing if they cannot assess properly evaluated.

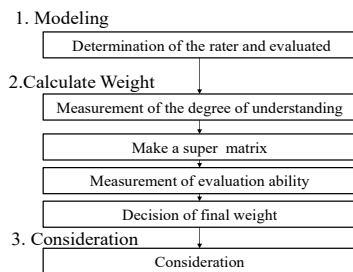


Fig. 1 Research flow

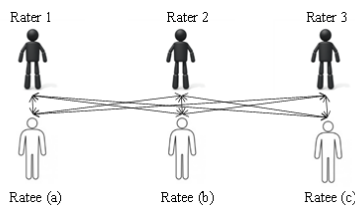


Fig. 2 Research model

Q. Which do you have how understand the duties behavior of ratee (a) about point 1 ?

① Not all understand ② A little understand ③ Understand ④ Very understand ⑤ All understand

Fig. 3 Example of absolute assessment method

C. Usefulness

This paper's purpose is making personnel evaluation method to improve the consent degree of rater and ratee. The result is vivificated by two means. First, we carry out consent survey. Secondly, human resources consultant 1, got a comment about the application of the practice

III. SOLUTION AND ANALYSIS METHODOLOGY

A. The Method of Solution

Various mathematical approaches have been devised in order to analyze decision-making problem in Management Science. However, there is no decision-making approach of using a human subjective judgment. Thomas Saaty was devised AHP (Analytic Hierarchy Process which is a method of human subjective judgment. ANP is said to the evolution of AHP [4]-[8]. A feature of ANP is "It is possible to evaluate with interactivity between layers" and "To deal with complicated network structure problem." In this paper, we suggest applying ANP to personnel assessment. Also, we suggest absolute assessment for Two-Way assessment by ANP.

B. Method of Calculation

Calculation procedure consists of two processes. First, we calculate limit matrix after we make a super matrix. We represent super matrix which is the relationship the understanding the assessment points (supermatrix S_i). In particular, we investigate the degree of understanding to rater and ratee. We change the sum of the line is to be 1 of the matrix. And it can be represented as a matrix (1). In input information of the super matrix S_i is absolute assessment method. After we investigate raters and ratee by absolute assessment survey, we change the sum of the line is to be 1 of the matrix. An example of absolute assessment method is shown in Fig. 3.

$$S_i = \begin{pmatrix} O & A \\ B & O \end{pmatrix} \quad (1)$$

where, A_{ij} : Assessment of ratee j by rater i , B_{ij} : Assessment of rater i by ratee j . Supermatrix converges to limit matrix as (2). Limit matrix is shown as a matrix (3), we calculate the weight.

$$\lim_{n \rightarrow \infty} (S)^{2n+1} = V_\infty \quad (2)$$

$$V_\infty = \begin{pmatrix} O & A' \\ B' & O \end{pmatrix} \quad (3)$$

where, A'_{ij} : Weight of assessment of ratee j by rater i , B'_{ij} : Weight of assessment of rater i by ratee j . A causal relationship between the rater and ratee by two-way. From these results, these methods are possible to grasp the relationship understanding of each assessment points between rater and ratee. Secondly, we calculate the relative assessment ability value in consideration of such empathy. Relative assessment ability value is obtained quantitatively indicates "whether there is assessment ability" to the rater with the exception of himself

and the ratee. Specifically, “whether there is Patronize assessment.” As results, if it is determined that rater is not capable of evaluating many people, weights is set to be inevitably low. The formula is shown in (4).

$$R = \frac{\sum_{j=1}^{n+m} p_{ijk}}{\sum_{i=1}^{n+m} \sum_{j=1}^{n+m} p_{ijk}} \quad (4)$$

where, R: relative evaluation ability value, K:set of evaluation point k, i: a set of rater i, j:set of evaluated j, and p_{ijk} a score of relative evaluation ability value by rater and evaluated j in evaluate point k.

IV. RESULTS

We applied the proposed method to Financial Industry of a major company in Japan. There are three raters and three rate and four points (or criteria). In this paper, we calculate the weight of each assessment points of raters from the two-way assessment. Table III shows the results. If it were investigated using one-way assessment, which is the current mechanism of the assessment, Rater 1 was the highest weight in all points. The other hand, in the proposed the absolute assessment method; rater 3 is the highest weight in the points 1, 2, 3, and rater 2 is the highest weight in the points 4.

TABLE III
FINAL WEIGHT

METHOD	Rather	Point1	Point2	Point3	Point4
One-way method (Now method)	Rather1	0.600	0.600	0.600	0.600
	Rather2	0.300	0.300	0.300	0.300
	Rather3	0.100	0.100	0.100	0.100
Suggest Absolute evaluation method	Rather1	0.304	0.305	0.287	0.269
	Rather2	0.291	0.324	0.333	0.370
	Rather3	0.404	0.371	0.380	0.361

V. CONSIDERATION

Table IV shows the results of the investigation for the consent degree of the three assessment methods. Consent degree of the One-way was 3.00, Consent degree of the two-way (absolute assessment) was 4.33. From this result, the proposed two methods have resulted in exceeding the One-way, which is the current mechanism of the assessment. In other words, this model is worth that continues to apply in practice.

TABLE IV
CONSENT OF EACH METHOD

Rather	One-way method	Suggestion: Absolute assessment method
Rather1	3	5
Rather2	4	3
Rather3	4	4
Rater-average	3.67	4.00
Evaluated(a)	2	5
Evaluated(b)	3	4
Evaluated(c)	2	5
Evaluated-average	2.33	4.67
The average overall	3.00	4.33

In addition, after the end of the questionnaire investigation by this method, we have obtained new findings from the interviews. The consent degree of two raters and three ratees has resulted in exceeding the One-way. It is better to determine the weight of assessment for each assessment points. There is a reason that rater's side is not possible to see all of the ratee.

The other hand, convinced of the rater 2 was below the assessment of the one-way. Because he is considered “the ratee has a low ability to assessment.” If this hypothesis is correct, one solution is to educate the assessment method to the ratee. Finally, we got the opinion from the assessment's side that “this method can be expected to fair guidance and assessment of rater.” That is a side effect is also considered to be obtained. Next, we investigated in 21 employees is an employee of same department (valid responses number 20 people). It shows the survey two items.

- 1) The rater rank in regard to the rate
- 2) Scoring in regard to the ratee

It is shown in Table V, rater ranking in regard to the ratee by employees of the same department. If the rater's ranking is high, it can be said that indicates that the rater is the most understanding of the work of the ratee. Rater 3, which is the immediate manager, was not in first place in all of the points. This is because the number of direct guidance by the evaluator 2 is more than the rater 3 in point 3, 4. Fig. 4 shows each rater of each point and the average value of the rater of the employees of the same department.

It is likely that employees of the department close to the ratee cannot be assessed, or rater 3 is not able to make an accurate assessment. We described two reasons.

The first reason is it is empathy to the ratee. There are many points that are far from the average score of the employees of the same department in the case where rater 3 is an immediate manager of the three ratees is able to evaluate properly. So, it can be said that performing the rater training is possible to eliminate the difference. The second reason is the case of rater 3 is not being assessed correctly. In practice, it has been working with other employees, he may not be able to keep track of all the job action. So, it can be said that assessment method by talked to employees of the same department, is possible that there are no two average differences.

TABLE V
RANKING OF THE RATER BY EMPLOYEES OF THE SAME DEPARTMENT

RANK	POINT1	POINT2	POINT3	POINT4
Rather1	3	3	3	3
Rather2	2	2	1	1
Rather3	1	1	1	2

VI. CONCLUSION

The purpose of this paper was to propose an assessment method that the rater and the ratee are convinced. As a result, it was possible to show that consent degree is higher than one-way assessment which is the current mechanism of the assessment. Also, it was possible to eliminate the three problems. In the future, we should collect hundreds of review data.

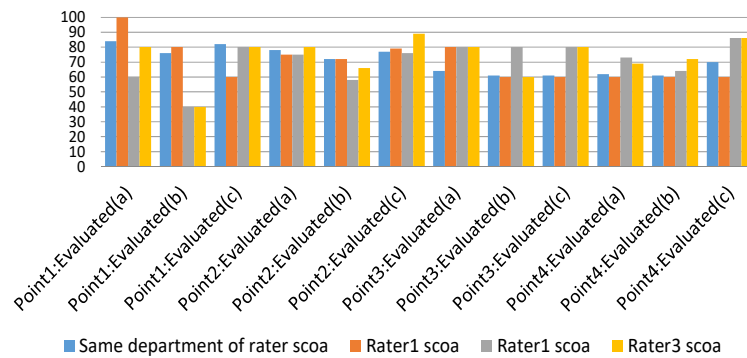


Fig. 4 Score of the evaluators in each point

REFERENCES

- [1] Sannno University, Personnel Evaluation Practice Project, "Personnel Evaluation Practice for the Manager," 2009.
- [2] Human Resource Management Glossa, April 10, 2015, <https://kotobank.jp/word/360%E5%BA%A6%E8%A9%95%E4%BE%A1-112551>, May 10, 2015.
- [3] The Nihon Keizai Shimbun publishing company, NTT com research, "Awareness about the personnel evaluation" May 10, 2015, <http://research.nttcoms.com/database/data/001961/>, June 10, 2015.
- [4] Kenji Kanedu, The Nikkei publishing company, "Actual personnel evaluation," 2005.
- [5] T. L. Saaty, Decision Making with Dependence and Feedback; "The Analytic Network Process, RWS Publications," Pittsburgh, 1996.
- [6] T.L.Saaty, "The Analytic Hierarchy Process," McGraw-Hill 1980.
- [7] Naokazu Yamaki and Kazuyuki Sekitani, Shizuoka University, "A Large-Scale AHP Including Incomplete Information and Multiple evaluators and Its Application to Personnel Administration Evaluation System," Operations, Research 42(4), 405-421, December 1999. <http://ir.lib.shizuoka.ac.jp/bitstream/10297/3688/1/090701004.pdf>, March 21, 2015.
- [8] Naoithi Hathimaki and Shuntarou Shimada, "Apply the group AHP in Personnel Evaluation Operations Research", 42, 1997, pp367-370, http://www.orjs.or.jp/~archive/pdf/bul/Vol.42_05_367.pdf, March 2, 2015.

Shunsuke Saito received a bachelor's degree in engineering from Waseda University, Tokyo, Japan, in 2014. She is currently a Master degree candidate in the facility and logistics design laboratory, department of business design management, Waseda University. His current research interests include logistics and decision-making techniques.

Sirawadee Arunyanart received a bachelor's degree in engineering from Khon Kaen University, Thailand, in 2001, the Master degree of Logistics Management at University of Sydney in 2007. She is currently a Ph.D. candidate in the facility and logistics design laboratory, department of business design management, Waseda University. Her current research interests include logistics.

Shunichi Ohmori received a bachelor's degree in engineering from Waseda University, Tokyo, Japan, in 2007, the master degree in engineering from Waseda University in 2009, and the Ph.D. degree in engineering from Waseda University, in 2013. He is currently an assistant professor in the facility and logistics design laboratory, department of business design management, Waseda University. His current research interests include supply chain optimization.

Kazuho Yoshimoto received a bachelor's degree in engineering from Waseda University, Tokyo, Japan, in 1974, the master degree in engineering from Waseda University in 1976, and the Ph.D. degree in engineering from Waseda University, in 1982. He is currently a professor in the facility and logistics design laboratory, department of business design management, Waseda University. His current research interests include facility planning, logistics, and service engineering.