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Performance Management of Supervisors in Railway Company: A Case Study

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ABSTRACT

In an ever changing and advancing world, higher education systems have to be responsive to new and novel conditions triggered by the economical, technological and social changes and their demands and companies have contribute positively to those changes. In order to make this positive contribution, the companies have change or transform themselves. Evaluation systems are the basis for this transformation. Performance appraisal systems that are used as basic data source for employee's success at their work, attitude and behavior characteristics together with contribution to organization success; determination wage rise, to take promote decision, determine training necessities, to take decision for discharge. In this study, it is aimed to measure the performance of superiors responsible for the internal operation of the trains by Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS) method. The criteria that are important for the company have been determined for this management. It is also aimed to increase the success of the company with the performance management system.

Keywords: *TOPSIS, Internal Operation of Trains*

Introduction

Today's ever-changing environmental conditions brings increasingly cross-company competition. That increasing competition require the continuous development and self-renewal to companies today, the success of employees and organizations are parallel. Therefore, measuring straight or

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deficient performance of employees are highly important. Proper performance measurement will lead to proper development and renewal processes.

The one of the principal actions of human resources management is raising individual and organizational performance. Evaluating performance can use for rewarding good performance, personal education and giving penalties when needed (Benligiray, 2007).

Understanding Human resources by managers, have critical value to reach out strategically goals of companies. Accordingly, Managers need solid and understandable performance records. Employees wants to know how their efforts affect organizational outcomes, whether performance evaluation is correct and are they good enough for job. Sharing that kind of information with employees is important for companies which give weight to human resources (Çıta & Keçecioğlu, 2015).

Performance evaluation systems are using as data resource to determine salary modifies, promotion decisions, employee education requirements and layoffs. With the performance evaluation system, companies set individual performances due to their organizational goals. Accordingly, companies get benefits on organizational efficiency, performance and competitiveness (Arslanhers et al. 2016).

In this study, we developed performance evaluation system for company that carry on business in railway food services at Ankara. System aim to measure supervisor's performance according to determined criteria.

Literature Review

Food service companies encounter new obstacles each day. New regulations are imposed, advanced technologies are introduced, and new organizations are developed on a regular basis as a result of new service policies being adopted with regard to industry standards. Performance evaluation and decision-making models, thus taking as much guesswork and human error out of the equation as possible. Performance evaluation in the food service sectors essential for companies to properly compete in order to determine their shortages with respect to rival companies based on the determined inputs and outputs (Rouyendegh, Oztekin et al. 2016).

There are a lot of definition and conception for performance one of definition is *'those outcomes that are produced or behaviours that are exhibited in order to perform certain job activities over a specified period of time'* (Bernardin and Beatty, 1984).

Performance is also talent and skill, knowledge and effort to achieve to success. Goals of effective performance are high quality and service satisfaction, low cost (Hovenga, 2004).

In order to reach this desired goal performance evaluation systems are explored. Performance evaluation is popular in 21th century although the reason why they are done is as old as the Sumerians (Lefton et al. 1977).

Performance appraisal or evaluation are the process of determination, measuring and developing human performance in organizations or company. An effective performance evaluation system must not only implicitly measure current performance levels, but also should show method to struggling

against difficulties, identifying weakness and strengths and information about previous evaluation in order that they may improve future performance (Baird et al. 1982).

Today, companies and agencies use appraisals primarily for assessing the on-the-job behavior (or alleged "traits") governing how an individual perform work tasks. The appraisal is a lever that is used to improve performance, coach employees on how to do better, and take action regarding people who have reached plateaus or declined in performance.

The appraisal, when used in an optimal way, provides a database for fostering desirable outcomes, which one hopes are of a positive nature. The performance appraisal can be used at any time, especially when it may prove useful to encourage employees or to give them recognition for a job well done. The appraisal thus becomes a supplement to formal on-the-job training and is used to articulate and highlight what the manager perceives in the behavior of subordinates (Patten, 1982).

Performance evaluation methods vary can be listed under categories and classification. Most commonly known Performance evaluation methods;

- Traditional Method; Ranking Method Graphic Rating Scales, Critical Incident Method Narrative Essay,
- Modern Methods; Methods Management by Objectives (MBO). Behaviorally Anchored Rating Scales (BARS) Humans Resource Accounting (HRA) Assessment Center 360 Degree, 720 Degree (Shaout &Yousif, 2014).

Some part of methods that using for evaluation performance started with first implementations that named traditional methods. Further methods are named modern methods and developed to improve traditional methods objectivity (Palamutoğlu et al. 2017).

Traditional evaluation method among the most commonly used methods in businesses. In this method personnel performance is measured by scale of several criteria. These criteria is usually factor of personality characteristics, business behavior, measuring result. Since this method can be applied simply and results are showed with points, it has extensive usage area. However, the choice of evaluation factors care is an important issue. however Selected evaluation factors are identified carefully as observable, concrete, clear to for the work to be done (Uyargil et al. 2008) The results of the evaluation should be clear, transparent and realistic besides be equal to defined criteria (Tunçer, 2013).

Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is one of the multi-criteria decision making (MCDM) technique that is extensively used to solve MCDM problems (Aruldoss et al. 2013). It was firstly initiated by Hwang and Yoon (Akkoç & Vatensever, 2013) (Hwang, Yoon, 1981). TOPSIS technique is based on the concept that selected alternative is the shortest geometric distance to the positive ideal solution and the longest geometric distance to the negative ideal solution (Chen, 2000).

In addition to assert the distance of selection alternative to positive and negative idea solution, TOPSIS also presents ideal and non-ideal solutions (Wang et al. 2009).

There are 6 steps in the TOPSIS 1) Formation of the decision matrix, 2) Normalization, 3) Weighting, 4) Ideal positive and determination of ideal negative solutions, 5) Ideal positive and

ideal offset from the negative solution and 6) Ideal solving relative proximity calculation and ranking (Palamutoğlu et al. 2017).

Methodology

This study uses TOPSIS multi-criteria decision make approach to evaluate performance. TOPSIS is a mathematical approach that can use within decision making process. It makes best pick among alternatives and developed by Hwang and Yoon at 1981 (Özdemir, 2014).

Before we run TOPSIS method, we start with scaling decision matrix, which includes company criteria and supervisors, matrix scored 1 to 5 according to real data. We basically compute scores for monthly budget and crew budget criteria according to deviations from company monthly goal. Additionally, sub-product sale criteria score due to deviation and calculated mean set down as one product sale score in 1-5 range. Other criteria scores and criteria weights determined by company.

After complete scale data 1 to 5 then we run TOPSIS to evaluate performance. TOPSIS was created by idea that picking alternatives due to distance with ideal solution (Ömürbek, 2013; Çakır & Perçin, 2013). TOPSIS picks one that close positive ideal solution and away from negative ideal solution (Özdemir, 2014).

TOPSIS Methodology

Step 1: Decision matrix is formed by decision maker. [Alternatives (m) x criteria (n)]

$$A_{ij}=\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix} \quad (1)$$

Step 2: Matrix A_{ij} is normalized by given formula below.

$$N_{ij}=\frac{a_{ij}}{\sqrt{\sum a_{ij}^{2}}} \quad (2)$$

Then we form normalized matrix N.

$$N=\begin{bmatrix} n_{11} & n_{12} & \cdots & n_{1n} \\ n_{21} & n_{22} & \cdots & n_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ n_{m1} & n_{m2} & \cdots & n_{mn} \end{bmatrix} \quad (3)$$

Step 3: Matrix N multiply with criteria weights that determined by decision maker. Sum of total weights must be equal to 1. This step is subjective part of TOPSIS.

$$V=\begin{bmatrix} w_1.n_{11} & w_2.n_{12} & \cdots & w_n.n_{1n} \\ w_1.n_{21} & w_2.n_{22} & \cdots & w_n.n_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ w_1.n_{m1} & w_2.n_{m2} & \cdots & w_n.n_{mn} \end{bmatrix} \quad (4)$$

Step 4: İdeal positive solution and ideal negative solution are calculated.

$$A^{*}\left\{Maks\, j_{V_{ij}} \middle| j = 1, \dots, p; i = 1, \dots, m\right\}=\{v_1^*, v_2^*, \dots, v_3^*\} \quad (5)$$

$$A^{-}=\left\{Min\, j_{V_{ij}} \middle| j = 1, \dots, p; i = 1, \dots, m\right\}=\{v_1^-, v_2^-, \dots, v_3^-\} \quad (6)$$

Step 5: Distances to ideal positive solution and ideal negative solution are calculated by given formulas below.

Distance to ideal positive solution

$$S_i^*=\sqrt{\sum(V_{iJ}-V_J^*)^2} \quad (7)$$

Distance to ideal negative solution

$$S_i^-=\sqrt{\sum(V_{iJ}-V_J^-)^2} \quad (8)$$

Step 6: Relative closeness to ideal solution is calculated by formula given below.

$$C_i^*=\frac{S_i^-}{S_i^-+S_i^-} \quad (9)$$

Then C_i values sort descending. Biggest C_i value is the best alternative.

Case Study

Designed performance system is practiced for company which carry on business in railway food services sector at Ankara. Company responsible for 5 railway lines. Each line is managed by supervisor. Every supervisor has tremendously key role for company since all staff who give food services in trains are under control by supervisors. Even though supervisors are highly important to company, company have not any performance evaluation system to measure them. Only deciding criterion for premium is monthly line turnovers. In this case study multi-criteria performance evaluation has performed for company due to criteria and it weights which are given table 1 below. When score of monthly budgets, crew budget and product sales target is determined. Firstly, score is calculated as a rate of approach target for each group, that approach rate takes score as a corresponding range and then determined different importance rating (factor) is used for every criterion. Total group score is divided factor and point of product sales target is determined. While Score of products is calculated rate of most important product group sales are used as base. Table 2 is show calculation of products group. Instead of using approach ratio actual point is used for survey, inspection, training, complaints and then same calculation is applied to calculate score of these criteria's. Table 3 and Table 4 show respectively general calculation and result for one route.

Table 1. Performance Criteria's

Criteria	**Explanation**
Train Budget	Main income recourse of company depends on the train sales It expected from every supervisor passes their monthly total budget
Crew Budget	Each crew accomplishes their own train cycle and they should pass budget that is determined.
Product Budget	Some products have strategic significance (quality, price, taste). There are 5 sales product group Sandwiches, Meal, Biscuit-Chocolate, Hot-Cold Drinks.
Complaint	Costumer complaint effect corporate image negatively and damage it.
Survey	This appraisal involves personnel opinion and idea that important for company.
Training	Monthly Technical, operational etc. training is provided for supervisor, end of that course every supervisor takes an exam.
Inspection	Result of regular physical inspections performed by upper managers is added as a point in criteria.

Table 2. Score of Product Group

Score							Score Interval				
Product Group	1.Terrible	2.Poor	3.Average	4.Good	5.Excellent	W	1.Terrible	2.Poor	3.Average	4.Good	5.Excellent
Sandwich	1	2	3	4	5	0,25	-10%	-5%	0%	10%	15%
Meal	1	2	3	4	5	0,2	-10%	-5%	0%	10%	15%
Biscuit	1	2	3	4	5	0,2	-10%	-5%	0%	10%	15%
H. Drink	1	2	3	4	5	0,15	-10%	-5%	0%	10%	15%
C. Drink	1	2	3	4	5	0,2	-10%	-5%	0%	10%	15%

Table 3. Score Interval of Criteria

Score							Score Interval				
Performance Criteria's	1.Terrible	2.Poor	3.Average	4.Good	5.Excellent	W	1.Terrible	2.Poor	3.Average	4.Good	5.Excellent
Budget M	1	2	3	4	5	0,2	-10%	-5%	0%	10%	15%
Budget C	1	2	3	4	5	0,2	-10%	-5%	0%	10%	15%
Product	1	2	3	4	5	0,1	1,5	2,5	3	3,5	4,5
Compl.	1	2	3	4	5	0,2	1,5	2,5	3	3,5	4,5
Survey	1	2	3	4	5	0,1	1,5	2,5	3	3,5	4,5
Training	1	2	3	4	5	0,1	1,5	2,5	3	3,5	4,5
Insp.	1	2	3	4	5	0,1	1,5	2,5	3	3,5	4,5

Table 4. Final Result of one Route

criteria	target	actual	result	score
Monthly total budget (tl)	338.572,91 ₺	240.297,70 ₺	-29,03%	1
Crew budget	327	234	-28,5%	1
Product sales	3,00	2,90	2,90	3
Complains	3,00	1,00	1,00	2
Survey	3,00	3,00	3,00	3
Training	3,00	5,00	5,00	5
Inspection	3,00	2,50	2,50	3

Result

The results of Decision matrix is shown in Table 5.

Table 5: Decision matrix

	Total Sales	Crew Budget	Product Sales	Complains	Survey Scores	Training Scores	Audit Scores
S1	1	1	3	2	3	5	3
S2	1	1	3	1	4	3	4
S3	1	1	2	1	4	4	5
S4	1	1	3	2	2	2	4
S5	4	1	2	2	3	5	2

$a_{11}=\frac{1}{\sqrt{1^2+1^2+1^2+1^2+4^2}}=\frac{1}{4,47}=0,22$

$a_{21}=\frac{1}{4,47}=0,22$

$a_{31}=\frac{1}{4,47}=0,22$

$a_{41}=\frac{1}{4,47}=0,22$

$a_{51}=\frac{4}{4,69}=0,84$

$a_{12}=\frac{1}{\sqrt{1^2+1^2+1^2+1^2+1^2}}=\frac{1}{2,23}=0,44$

$a_{22}=\frac{1}{2,23}=0,44$

$a_{32}=\frac{1}{2,23}=0,44$

$a_{42}=\frac{1}{2,23}=0,44$

$a_{52}=\frac{1}{2,23}=0,44$

$a_{13}=\frac{3}{\sqrt{3^2+3^2+2^2+3^2+2^2}}=\frac{3}{5,91}=0,5$

$a_{23}=\frac{3}{5,91}=0,5$

$a_{33}=\frac{2}{5,91}=0,33$

$a_{43}=\frac{3}{5,91}=0,5$

$a_{53}=\frac{2}{5,91}=0,33$

$a_{14}=\frac{2}{\sqrt{2^2+1^2+1^2+2^2+2^2}}=\frac{2}{3,74}=0,52$

$a_{24}=\frac{1}{3,74}=0,26$

$a_{34}=\frac{1}{3,74}=0,26$

$a_{44}=\frac{2}{3,74}=0,52$

$a_{54}=\frac{2}{3,74}=0,52$

$a_{15}=\frac{3}{\sqrt{3^2+4^2+4^2+2^2+3^2}}=\frac{3}{7,34}=0,4$

$a_{25}=\frac{4}{7,34}=0,54$

$a_{35}=\frac{4}{7,34}=0,54$

$a_{45}=\frac{2}{7,34}=0,27$

$a_{55}=\frac{3}{7,34}=0,4$

$a_{16}=\frac{5}{\sqrt{5^2+3^2+4^2+2^2+5^2}}=\frac{5}{7,81}=0,64$

$a_{26}=\frac{3}{7,81}=0,38$

$a_{36}=\frac{4}{7,81}=0,51$

$a_{46}=\frac{2}{7,81}=0,25$

$a_{56}=\frac{5}{7,81}=0,64$

$a_{17}=\frac{3}{\sqrt{3^2+4^2+5^2+4^2+2^2}}=\frac{3}{8,36}=0,6$

$a_{27}=\frac{4}{8,36}=0,47$

$a_{37}=\frac{5}{8,36}=0,59$

$a_{47}=\frac{4}{8,36}=0,47$

$a_{57}=\frac{2}{8,36}=0,23$

Standard Matrix

$$\boldsymbol{R_{ij}}\begin{bmatrix} 0{,}22 & 0{,}44 & 0{,}36 & 0{,}53 & 0{,}28 & 0{,}56 & 0{,}35 \\ 0{,}22 & 0{,}44 & 0{,}54 & 0{,}26 & 0{,}57 & 0{,}33 & 0{,}47 \\ 0{,}22 & 0{,}44 & 0{,}36 & 0{,}26 & 0{,}57 & 0{,}45 & 0{,}59 \\ 0{,}22 & 0{,}44 & 0{,}54 & 0{,}53 & 0{,}28 & 0{,}22 & 0{,}47 \\ 0{,}89 & 0{,}44 & 0{,}36 & 0{,}53 & 0{,}42 & 0{,}56 & 0{,}23 \end{bmatrix}$$

Weighted Matrix

$$\mathbf{W_j} = \begin{bmatrix} 0{,}2 & 0{,}2 & 0{,}1 & 0{,}2 & 0{,}1 & 0{,}1 & 0{,}1 \end{bmatrix}$$

Weighted Decision Matrix

$$\boldsymbol{V_{ij}}\begin{bmatrix} 0{,}04 & 0{,}08 & 0{,}03 & 0{,}10 & 0{,}02 & 0{,}05 & 0{,}03 \\ 0{,}04 & 0{,}08 & 0{,}05 & 0{,}05 & 0{,}05 & 0{,}03 & 0{,}04 \\ 0{,}04 & 0{,}08 & 0{,}03 & 0{,}05 & 0{,}05 & 0{,}04 & 0{,}05 \\ 0{,}04 & 0{,}08 & 0{,}05 & 0{,}10 & 0{,}02 & 0{,}02 & 0{,}04 \\ 0{,}17 & 0{,}08 & 0{,}03 & 0{,}10 & 0{,}04 & 0{,}05 & 0{,}02 \end{bmatrix}$$

$\boldsymbol{A}^{*}$= {0,01 , 0,08 0,05, 0,10, 0,05, 0,05, 0,05}

$\boldsymbol{A}^{-}$= {0,04, 0,08, 0,03, 0,05, 0,02, 0,02, 0,02}

Ideal Positive Solution Matrix

$S_i^{*}=\sqrt{\sum(V_{iJ}-V_J^{*})^2}$

$(V_{iJ}-V_J^{*})^2$:

$$\begin{bmatrix} 0{,}01 & 0 & 0{,}0003 & 0 & 0{,}0008 & 0 & 0{,}0005 \\ 0{,}01 & 0 & 0 & 0{,}0028 & 0 & 0{,}0005 & 0{,}0001 \\ 0{,}01 & 0 & 0{,}0003 & 0{,}0028 & 0 & 0{,}0001 & 0 \\ 0{,}01 & 0 & 0 & 0 & 0{,}0008 & 0{,}0011 & 0{,}0001 \\ 0 & 0 & 0{,}00033 & 0 & 0{,}0002 & 0 & 0{,}001 \end{bmatrix}$$

$S_1^{*} = \sqrt{0{,}0197} = 0,\ 14$

$S_2^{*} = \sqrt{0{,}2150} = 0,\ 14$

$S_3^{*} = \sqrt{0{,}2131} = 0,\ 14$

S_4^* = $\sqrt{0{,}0200}$ = 0, 14

S_5^* = $\sqrt{0{,}0018}$ = 0, 04

Ideal Negative Solution Matrix

$$S_i^- = \sqrt{\sum (V_{iJ} - V_J^-)^2}$$

$(V_{iJ} - V_J^-)^2$:

$$\begin{bmatrix} 0 & 0 & 0 & 0{,}0028 & 0 & 0{,}0011 & 0{,}0001 \\ 0 & 0 & 0{,}00033 & 0 & 0{,}0008 & 0{,}0001 & 0{,}0005 \\ 0 & 0 & 0 & 0 & 0{,}0008 & 0{,}0005 & 0{,}0012 \\ 0 & 0 & 0{,}0003 & 0{,}0028 & 0 & 0 & 0{,}0005 \\ 0{,}01 & 0 & 0 & 0{,}0028 & 0{,}0002 & 0{,}0011 & 0 \end{bmatrix}$$

S_1^- = $\sqrt{0{,}0041}$ = 0, 06

S_2^- = $\sqrt{0{,}0018}$ = 0, 04

S_3^- = $\sqrt{0{,}0026}$ = 0, 05

S_4^- = $\sqrt{0{,}0037}$ = 0, 06

S_5^- = $\sqrt{0{,}0222}$ = 0, 14

$C_1^* = \frac{S_i^-}{S_i^- + S_i^-} = \frac{0{,}06}{0{,}06+0{,}14}$ = 0, 31

$C_2^* = \frac{S_i^-}{S_i^- + S_i^-} = \frac{0{,}04}{0{,}04+0{,}14}$ = 0, 22

$C_3^* = \frac{S_i^-}{S_i^- + S_i^-} = \frac{0{,}05}{0{,}05+0{,}14}$ = 0, 25

$C_4^* = \frac{S_i^-}{S_i^- + S_i^-} = \frac{0{,}06}{0{,}06+0{,}14}$ = 0, 30

$C_5^* = \frac{S_i^-}{S_i^- + S_i^-} = \frac{0{,}14}{0{,}14+0{,}04}$ = 0, 77

$C_2^* < C_3^* < C_4^* < C_1^* < C_5^*$

That sorting shows us C_5 has maximum performance and performance results of the other alternatives don't have visible difference.

Conclusion

There are many varying opinions on the subject of performance appraisals and why companies are done. Some organizations do performance appraisals because they feel obligated to do them – because everyone else does. Some organizations do performance appraisals to make sure they have a piece of paper in the employee's file – in case they ever need to do action. But successful organizations understand the importance of incorporating performance appraisals into their performance management process and strategy.

Although performance management system is requirement for company it is has negative and positive effect for employee and companies. Time consuming, discouragement, inconsistent message, biases are disadvantage of performance management. Performance based conversations, targeted staff development, encouragement to staff, rewards staff for a job well done, under-performers identified and eliminated, documented history of employee performance, allows for Employee Growth, they are told as advantages of performance management.

This study purposed to create a performance system through TOPSIS method for company which carry on a business railway food services at ANKARA. Multiple criteria decision making ensure that evaluate supervisor's performance properly. Given scores for each criterion by managers combined as a one performance value (C_i^*). Therefore, decision making on training, reward, layoff and promote etc. would be more accurate.

In the other hand, Since TOPSIS evaluate performance due to each other supervisor performance, results may be insufficient to understand performances are enough or not for company. This situation could be better by using TOPSIS combined methods. Further studies aim it.

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