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PERFORMANCE EVALUATION IN FAMILY PHYSICIAN: THE APPLICATION OF TOPSIS MULTI-CRITERIA DECISION MAKING METHOD

Engin KARAMAN*

Halim KAZAN†

Ph.D. Candidate.,Istanbul University, İstanbul

Prof. Dr., Faculty of Economics, Department of Business, Istanbul University, İstanbul

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Abstract

In this study, a performance analysis was carried out for the Family Practice application offered to the public by the Ministry of Health. Performance management serves a different purpose in public sectors which provide service in accordance with the principle of social benefit rather than of a profit-loss relationship in comparison with private sectors. Main objective herein is to improve the quality of the service offered to the public in terms of such criteria as efficacy, efficiency and productivity. In this study, the performances of 12 Family Practice units carrying on business in Alaca district of Corum in the months of the year of 2012 were converted into a single score indicating the general performance level with the help of the TOPSIS method among the Multi-Criteria Decision Making Techniques through the data of 8 criteria and such units were put into order in this regard and their performances were compared. At the end of the study, the proximity values (Ci) of the units according to the ideal solution they have received for 12 months were averaged and rated on a yearly basis. According to the average of Ci scores, the performances of 4 units were founded to be successful whereas 5 units displayed normal performance and the performance of 3 units were decided to be ineffective.

Keywords: Family, Practice, Performance Evaluation, TOPSIS, Multi-Criteria Decision Making.
Jel Code: C19, C44, I18

AİLE HEKİMLİĞİ PERFORMANS DEĞERLEMESİNİN TOPSIS ÇOK KRİTERLİ KARAR VERME YÖNTEMİYLE BELİRLENMESİ

Özet

Bu çalışmada Sağlık Bakanlığı tarafından halka sunulan Aile Hekimliği uygulamasının performans analizi yapılmıştır. Kar-zarar ilişkisinden çok toplumsal fayda ilkesine göre hizmet üreten kamu sektörlerinde, performans yönetimi özel sektörlere göre farklı bir amaca hizmet etmektedir. Temel hedef halka sunulan hizmet kalitesini etkinlik, etkililik ve verimlilik kriterleri ekseninde geliştirmektir. Bu çalışmada Çorum ili Alaca ilçesinde faaliyet gösteren 12 Aile Hekimliği biriminin 2012 yılına ait aylardaki performansları, 8 adet kriter verileri üzerinden Çok Kriterli Karar Verme Tekniklerinden TOPSİS yöntemi ile genel performansı gösteren tek bir puana çevrilmiş ve birimler arasında sıralama yapılarak, performansları karşılaştırılmıştır. Çalışmanın sonucunda birimlerin 12 ay boyunca aldıkları ideal çözüme göre yakınlık değerleri (Ci)'nin ortalaması alınarak yıllık bazda bir sıralama oluşturulmuştur. Ci puanlarının ortalamasına göre, 4 birimin performansları başarılı bulunurken, 5 birim normal performans göstermiş, 3 birimin performansının ise başarısız olarak saptanmıştır.

Anahtar Kelimeler : Aile, Performans Değerlendirme, TOPSIS, Çok Kriterli Karar Verme
Jel Kodu : C19, C44, I18

* e-karaman99@hotmail.com (Corresponding author)
† halimkazan@gmail.com

1. INTRODUCTION

An ideal health system consists of personal care, primary health services, secondary health services and tertiary health services. When we apply this rating to the units providing health services, primary health services, secondary health services and tertiary health services cover the services offered respectively in family practices, general hospitals and private branches and university hospitals. It is a fundamental application to express these services in a well-functioning health system as a pyramid which narrows upwardly.

According to Tuzer and Gorpelioglu , such pyramid has almost been in an inverted state in our country in terms of the service delivery. It was calculated that the problems of about 90% of the people applying to our hospitals could indeed by solved in the primary health service [1].

It is thought that the most common way to receive and benefit from the health services would be possible with the reinforcement of the primary health services in all countries as well as making them more efficient. In this way, it is intended to increase the life qualities and health standards of the people [2].

Within the scope of these objectives, the Ministry of Health put the application of Family Practice system which was started to be implemented in two pilot cities (Duzce and Eskisehir) of our country in 2006 and currently has spread across the country into force.

Family Practice is an academic and scientific discipline and a clinical specialty which has its own curriculum, researches and evidence-based clinical applications and focuses on primary health services [3]

Ersoy defines an ideal Family Physician as "A doctor who is able to follow each individual from birth till death, to provide consultancy either in sickness or health, be closely acquainted with his/her personal characteristics as well as the environment in which s/he lives in and to solve 90% of his/her health problems in the first application by means of combining such advantage with the education received"[4]

As is in all working areas, the determination and identification of the weaknesses and inefficient aspects of the system have great importance also in the Family Practice application. In this way, the quality of the system is improved and its regeneration is ensured. Performance measurement is one of the key elements in the progression of this process.

Performance is a quantitatively and qualitatively explicable concept which is observed as a result of intentional and planned activities. Efficiency in service and productivity and economy in production express the performance in general sense [5].

The measurement and evaluation of the performance in the public sector differ from the private sector organizations in terms of structure. The public sector applies a performance evaluation based on social benefit as compared with the private sector whose objective depends completely on optimization.

One of the institutions commencing the performance applications in the field of public management is the Ministry of Health. In addition to the existing wages policy, the Ministry of Health started the application of additional payment out of the working capital income at the beginning of 2004 in order to put the performance-based charging into practice in the public sector [6].

The performance criteria of the Ministry of Health were developed by the natural payment methods in the Family Practice system as well. Such criteria were determined to be referring rate, pregnant follow-up, vaccine success rate, the number of patients who are subject to the mobile service and baby follow-up rate [7] and the method of deduction at the rate of failure of the planned application was adopted instead of providing premium over the realization number of the performances.

The current application is to reward the unit indirectly which achieves the expected performance instead of achieving more performances without subjecting to any deduction, rather than evaluating the number of the work performed, by means of evaluating the success percentage calculated over the rate of performed work to the stipulated work.

In this study, the performances of 12 Family Practice units carrying on business in Alaca district of Corum and each of which include 2 physicians in the months of the year of 2012 were converted into a single score indicating the general performance level with the help of the TOPSIS method among the Multi-Criteria Decision Making Techniques through 8 criteria specified in the relevant legislation of the Ministry of Health and the units were put in order and their performances were compared. The total score of the monthly performance obtained in the last analysis were averaged and the general rating of the year of 2012 was obtained in this way. Furthermore, the average of reach month was determined and the comparison of each unit one by one with the average of such month was shown on a graphic. The units whose performances were required to be rewarded and who need to be arranged were identified with the help of such averages.

There are many performance evaluation studies in the field of health services; however, the first TOPSIS method to be included in the literature will be used in this study. The performance method of the Ministry of Health used in the Family Practice application is to offer a contingent reinforcer by means of making deduction instead of

rewarding. In this method, not the unit who exhibit more performance but the unit who satisfy the expectation in the least is deemed to be successful. The TOPSIS method, on the other hand, performs a relative evaluation among the units and identifies the units who are closest to the ideal solution and subjects the units to a inter-rating. In this way, the units whose performances are poor can be identified and arrangement-improvement attempts can be developed for them.

2. LITERATURE REVIEW

The first examples of the evaluations observed for the performances of the personnel taking charge in organizations in a systematic and formal way were seen to be in the institutions providing public services in the U.S.A at the beginning of 1900's. The concept of performance evaluation was started to be used in the organizations in a scientific manner as a result of measurement of the employees by F. Taylor in terms of efficiency with the help of work measurement applications [8].

Performance measurement can be defined as a method of determining the performance of individuals, organisations, services or processes [9] as a means of assessing efficiency and effectiveness of action and to assess the alignment of the organisations' activities with its strategy and vision/mission statement.

Since the 1980s, organizational changes aimed at improving performance in a changing environment have been a permanent management concern. Reflecting such concern, performance measurement and evaluation became the subject of practical research aimed at addressing the operational concerns of management. Some organizations have responded to these operational concerns through radical re-engineering efforts. Others, in more stable organizational environments, have either resisted to external pressures, or adopted a slower pace to change. Manufacturing organizations were the first to realize that focusing the performance measurement only on financial measures was not enough to maintain effective performance in global markets. This lead to an increasing emphasis on non-financial aspects of organizational performance [10]. Some services organizations followed the lead of manufacturing organizations with regard to emphasizing the non-financial aspects of performance. Thus, they began to utilize performance measurement systems and approaches similar to that of their manufacturing counterparts [11, 12, 13, 14, 15]. In the process, some service specific performance measurement approaches were offered [16, 17, 18, 19]. Public sector organizations, due to political pressures in the form of the New Public Management initiatives [20] are beginning to slowly adopt the performance measurement approaches utilized in the private sector [21, 22, 23].

The objective in the health system is to provide a quality and accessible service. Therefore, performance has become an efficient method used in quality improvement. According the World Health Organization (WHO) [24], there are various methods in the performance measurements for hospitals; these are classified as the regulatory inspections, researches based of patient experiences, the evaluations performed by independent institutions and statistical indications.

The publications with regard to the performance evaluation in the health sector in Turkey are getting attention more despite of the fact that there is limited number of publications on this respect. Tengilimoglu and Toygar [25] examined PATH Project (Performance Assessment Tool for Quality Improvement in Hospitals) which had been released to public by European Regional Office in 2003 and whose usage became more and more common in Europe. Kılıc [2] studied the performances of the Family Practice applications in Duzce which is the first pilot city in Turkey in his thesis and stated his views and gave recommendations on this regard depending on the data obtained. Aksoy [26] on the other hand, subjected the performances of the physicians of Medical Faculty taking charge in Ankara to Data Envelopment Analysis and founded out statistically significant differences between the averages of the outputs provided by the physician groups whose technical performances were low and high. Erkan [27] explained the scope and functioning of the performance based additional payment system being applied by the Ministry of Health, analyzed and interpreted its results and dealt with the criticisms in relation with such system.

In the literature review conducted, no research was founded out that the performance evaluation in the health system had been undertaken with the help of the TOPSIS method. This study is expected to make contributions to the Family Practice performance evaluation as it is the first study on this regard.

3. DATA AND METHODOLOGY USED IN THE STUDY

In the study, the performances of the Family Physicians taking charge outside of the pilot areas were measured. In order to carry out the application, the Family Physicians' performance evaluation data of the year of 2012 indicated on the website of Corum Community Health Directorate was used [28]. Abovementioned data were scored with the help of the TOPSIS method which is one of the multi-criteria decision making techniques and such scores were compared and contrasted with each other and then a rating was constituted.

3.1. TOPSIS Method

Yoon and Hwang (1981) have developed TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method based on the idea of selecting the shortest distance from positive ideal solution (PIS) and the most distant alternatives from negative ideal solution (NIS). Method has been adopted by ZELENY (1982) and Hall (1989) and developed by Yoon (1987) and Hwang, Lai and Liu (1994).In TOPSIS method, while PIS is solution point in which the benefit is maximum and cost is the lowest, NIS states the solution point in which benefit is the lowest and cost is maximum. TOPSIS method is based on the idea that not only the one which is in the closest distance to positive ideal solution among the most favourite alternatives but also the one which is in the farthest distance to negative ideal solution is alternative. Single nominative variable used in the method is factor weights [29].

TOPSIS method includes a solution process consisting of 6 steps. Aforesaid steps are as follows [30].

Step 1: Creation of Decision Matrix (A)

While decision points, whose superiority is desired to be ranked, take place in decision matrix rows, evaluation factors to be used in the decision-making take place in its columns. Matrix A is the initial matrix created by decision-maker. Decision matrix is shown as follows:

$$A_{ij} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix}$$

m gives the number of decision points and n gives the number of evaluation factors in A_{ij} matrix.

Step 2: Creation of Normalized Decision Matrix (R)

Normalized Decision Matrix is calculated by benefitting from elements of matrix A and using the following formula [31].

$$r_{ij} = \frac{a_{ij}}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}} \quad i = 1,\dots,m \quad j = 1,\dots,n \qquad (1)$$

Matrix R can be obtained as follows:

$$R_{ij} = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1n} \\ r_{21} & r_{22} & \dots & r_{2n} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ r_{m1} & r_{m2} & \dots & r_{mn} \end{bmatrix}$$

Step 3: Creation of Weighted Standard Decision Matrix (V)

First of all, weight degrees (w_i) related to evaluation factors are determined, ($\sum_{i=1}^{n} w_i = 1$).

Then elements in each column of matrix R are multiplied with the relevant w_i value and matrix V is created. Matrix V is given below:

$$V_{ij} = \begin{bmatrix} w_1 r_{11} & w_2 r_{12} & \dots & w_n r_{1n} \\ w_1 r_{21} & w_2 r_{22} & \dots & w_n r_{2n} \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ \cdot & & & \cdot \\ w_1 r_{m1} & w_2 r_{m2} & \dots & w_n r_{mn} \end{bmatrix}$$

Step 4 : Creation of Ideal (A^+) and Negative Ideal (A^-) Solutions

In this stage, maximum and minimum values in each column of weighted matrix are determined.

$A^+ = \{v_1^+, v_2^+, \dots, v_n^+\}$ (maximum values)

$A^- = \{v_1^-, v_2^-, \dots, v_n^-\}$ (minimum values)

Step 5 : Calculation of Distance Measurements Between Alternatives

Following the identification of ideal points, distance values to maximum and minimum ideal points are calculated with the help of the following formula in 5th step.

$$S_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^+)^2} \quad i = 1,2\dots,m \qquad (2)$$

$$S_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - v_j^-)^2} \quad j = 1,2\dots,m \qquad (3)$$

Number of S_i^+ and S_i^- to be calculated naturally will be equal to the number of decision points.

Step 6: Calculating the proximity relevant to the ideal solution

Ideal and negative ideal distinction measures are used for calculating the proximity (C_i^+) relative to the ideal solution of each decision point. The measure used is the part of the negative ideal distinction measure into the total distinction measure. Calculating the proximity value relative to the ideal solution is shown in the formula mentioned below: [32].

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^+} \qquad (4)$$

C_i^+ value is in $0 \le C_i^+ \le 1$ interval, and $C_i^+ = 1$ shows the absolute proximity of the relevant decision point to the ideal solution and $C_i^+ = 0$ shows the absolute proximity of the relevant decision point to the negative ideal solution.

Finally the values obtained designate the importance order of the decision points (alternatives) by ranging in order of magnitude.

3.2. Criteria Used For the Study

The purpose of this study is to measure the performance of Family Practice units by means of 8 criteria specified within the document which was named as Performance Calculating Method for Family Practice Application and 2th version of which was published in 2007 by the Ministry of Health in Turkey. These criteria are mentioned below:

a) Registered Population: In the calculation of the payments which are made to the family physicians working in the units, 2167 TL is paid up to the first 1000 person and 1.4418 TL is paid per registered person exceeding this number (“1237 numbered Registration of the Ministry of Health”)

b) Vaccine Performance: The vaccines below mentioned are taken into consideration in the performance calculation.

Number of BCG vaccines inoculated: For tuberculosis protection, the effective treatment of the patient suffering from the tuberculosis, prevention of contamination, BCG vaccination and methods of protection with medicine are used. It is applied to the babies who turned 2 month [33].

Number of TDAP vaccines inoculated: It is also known as 5 in 1 combination vaccine. It immunizes against the diphtheria, pertussis, tetanus, poliomyelitis and meningitis. It is applied as primer vaccination 3 times (in 2nd, 4th and 6th months) every two months and 4 times within 18-24 months and so in totally 4 times [34].

Number of Hepatitis B vaccines inoculated: Hepatitis B is a viral disease causing the pneumonia, contaminating to the baby from the mother carrying this virus in childbirth and causing the hepatitis named as chronic hepatitis, the liver failure, cirrhosis and finally the liver cancer for the baby. The vaccine is applied 3 times according to the calendar of 0th , 1st and 6th month. The vaccines provide %100 protection against the disease [34].

Number of KKK vaccines inoculated: It is inoculated against the Measles, Mumps and Rubella diseases. The first vaccine is made in 12th month and the second vaccine is made at the first grade of primary school. [34].

Vaccine Calendar is given in the table below mentioned.

c) The Number of Monitored Babies: Each individual between 0-365 days is called a baby. It specifies the number of babies monitored by family physicians.

d) The Number of Monitored Pregnant Women: Female patient who is determined to be pregnant according to test, observation and views performed by the family physician and whose necessary notification data related to her pregnancy is forwarded to the ministry after recorded, is considered as "Pregnant".

e) The Number of Patients Receiving Mobile Service: It is the number of patients who are certainly registered to the family physician and who selected the option “Dependent to Mobile Service” during the registry process.

Data for patient transfer criteria which is one of the family practice applications cannot be recorded by the relevant source, it could not be processed in our study.

Vaccine Calendar is given in the table below mentioned.

Table 1 : Vaccination calendar

At Birth	End of 1st month	End of 2nd month	End of 4th month	End of sixth month	12th month	18-24 months	Primary 1st Class	Primary 8th class
Hep B	I.	II.			III.			
BCG			I.					
DaBT-IPA-Hib			I.	II.	III.		R.	
KPA			I.	II.	III.	R.		
KKK						I.		R.
OPA					+.		+.	+.
Td								+.

Source: http://www.beyazhastane.com/Asi_Takvimi.aspx

3.3. Application

Monthly performance scores determined over 8 criteria for 12 Family Practice units within the scope of study have been individually calculated for all months of the year 2012 and the arithmetic average of these scores has been calculated for each unit and performance of units during the year has been asked to be observed.

Table 2: Criteria used in the study

No	Code	Criteria
1	KN	Registered Population
2	BCG	Number of applied BCG vaccinations
3	DABT	Number of applied DABT vaccinations
4	HPTT	Number of applied Hepatitis B vaccinations
5	KKK	Number of applied KKK vaccinations
6	BİS	Number of monitored babies
7	GİS	Number of monitored pregnant
8	GHS	Number of patients receiving mobile service

As a first step, Standard Decision Matrix of Units with (12x8) size for TOPSIS method has been formed. Accordingly, decision matrix belonging to January 2012 is as in Table 3.

Table 3 : Decision Matrix (A) For January 2012 Criteria

Family Physician	KN	BCG	DABT	HPTT	KKK	BİS	GİS	GHS
Unit 1	6666	6	20	16	6	52	22	2
Unit 2	7968	4	32	40	6	70	48	385
Unit 3	7798	4	40	36	8	74	28	0
Unit 4	7644	4	20	18	6	34	18	554
Unit 5	7164	4	24	16	4	48	26	221
Unit 6	6878	10	22	18	8	66	16	756
Unit 7	6764	8	46	42	14	82	24	552
Unit 8	7422	4	24	20	4	64	28	297
Unit 9	4240	4	12	4	8	32	12	764
Unit 10	1147	3	4	1	2	4	3	128
Unit 11	3112	6	12	10	2	24	8	594
Unit 12	4442	10	20	12	10	42	18	724

$$r_{11} = \frac{6666}{\sqrt{6666^2 + 7968^2 + 7798^2 + ... + 4442^2}} = 0,3057$$

Step 2: Creation of Normalized Decision Matrix For Units

It has been calculated and shown in Table 4 by benefiting from Matrix A elements in Table 3 and using equation numbered (1).

Table 4 : Normalized Decision Matrix (R) of Units For January 2012

Family Physician	KN	BCG	DABT	HPTT	KKK	BİS	GİS	GHS
Unit 1	0,3057	0,2857	0,2253	0,1987	0,2379	0,2776	0,2682	0,0012
Unit 2	0,3655	0,1905	0,3605	0,4969	0,2379	0,3737	0,5851	0,2243
Unit 3	0,3577	0,1905	0,4506	0,4472	0,3172	0,3950	0,3413	0,0000
Unit 4	0,3506	0,1905	0,2253	0,2236	0,2379	0,1815	0,2194	0,3228
Unit 5	0,3286	0,1905	0,2704	0,1987	0,1586	0,2562	0,3170	0,1288
Unit 6	0,3155	0,4762	0,2478	0,2236	0,3172	0,3523	0,1950	0,4405
Unit 7	0,3102	0,3810	0,5182	0,5217	0,5551	0,4377	0,2926	0,3216

Family Physician	KN	BCG	DABT	HPTT	KKK	BİS	GİS	GHS
Unit 8	0,3404	0,1905	0,2704	0,2484	0,1586	0,3416	0,3413	0,1731
Unit 9	0,1945	0,1905	0,1352	0,0497	0,3172	0,1708	0,1463	0,4452
Unit 10	0,0526	0,1429	0,0451	0,0124	0,0793	0,0214	0,0366	0,0746
Unit 11	0,1427	0,2857	0,1352	0,1242	0,0793	0,1281	0,0975	0,3461
Unit 12	0,2037	0,4762	0,2253	0,1491	0,3965	0,2242	0,2194	0,4218
Total	3,2678	3,1905	3,1092	2,8942	3,0929	3,1600	3,0598	2,8999

Step 3: Creation of Weighted Standard Decision Matrix (V) For Units

In this step, weight degrees (w_i) related to the evaluation factors are determined and multiplied with the values in the relevant column in Table 4 and then weighted normalized values are found.

While calculating weight degrees related to the evaluation factors, each criteria's column values belonging to that unit in Normalized Decision Matrix are collected. Then these values related to criteria are accumulated and total criteria value is calculated. Finally, column sum of each criteria is divided into total value of criteria and weights are calculated [35].

Total Criteria = 3,2678 + 3,1905 + 3,1092 + 2,8942 + 3,0929 + 3,1600 + 3,0598 + 2,8999 =24,6744

$$w_1 = \frac{3,2678}{24,6744} = 0,1324$$

Accordingly, weight degrees of all criteria have been found as in Table 5.

Table 5: Weight degrees of criteria Used in the units

Unit	KN	BCG	DABT	HPTT	KKK	BİS	GİS	GHS
W	0,1324	0,1293	0,1260	0,1173	0,1253	0,1281	0,1240	0,1175

As a result of the multiplication of values in the columns of matrix in Table 4 with the evaluation factors, weighted Standard Decision Matrix has been formed in Table 6.

$$V_{ij} = Wi \cdot r_{ij}$$

$$V_{11} = 0,1324 \cdot 0,3057 = 0,0405$$

Table 6: Weighted Standard Decision Matrix (V) of the Units for January, 2012

Family Physician	KN	BCG	DABT	HPTT	KKK	BİS	GİS	GHS
Unit 1	0,0405	0,0369	0,0284	0,0233	0,0298	0,0355	0,0333	0,0001
Unit 2	0,0484	0,0246	0,0454	0,0583	0,0298	0,0479	0,0726	0,0264
Unit 3	0,0474	0,0246	0,0568	0,0525	0,0398	0,0506	0,0423	0,0000
Unit 4	0,0464	0,0246	0,0284	0,0262	0,0298	0,0232	0,0272	0,0379
Unit 5	0,0435	0,0246	0,0341	0,0233	0,0199	0,0328	0,0393	0,0151
Unit 6	0,0418	0,0616	0,0312	0,0262	0,0398	0,0451	0,0242	0,0518
Unit 7	0,0411	0,0493	0,0653	0,0612	0,0696	0,0561	0,0363	0,0378
Unit 8	0,0451	0,0246	0,0341	0,0291	0,0199	0,0438	0,0423	0,0203
Unit 9	0,0258	0,0246	0,0170	0,0058	0,0398	0,0219	0,0181	0,0523
Unit 10	0,0070	0,0185	0,0057	0,0015	0,0099	0,0027	0,0045	0,0088
Unit 11	0,0189	0,0369	0,0170	0,0146	0,0099	0,0164	0,0121	0,0407
Unit 12	0,0270	0,0616	0,0284	0,0175	0,0497	0,0287	0,0272	0,0496

Step 4: Forming the Ideal (A^+) and Negative Ideal (A^-) Solutions

In this step, ideal A^+ and negative ideal A^- solution sets are formed. For A^+ set, the biggest value at each column of V matrix was selected and the lowest value at each column of V matrix was selected for A^- set, then the table below mentioned was created.

Table 7: Ideal (A^+) and Negative Ideal (A^-) Solutions for the Units

A^+	0,0484	0,0616	0,0653	0,0612	0,0696	0,0561	0,0726	0,0523
A^-	0,007	0,0185	0,0057	0,0015	0,0099	0,0027	0,0045	0

Step 5: Calculating the Distant Measures Between the Units

The distant of both criteria to the positive ideal solution (S_i^+) and from the negative ideal solution (S_i^-) has been calculated by means of the formula 2 and 3, and founded as mentioned in Table 8.

Table 8: Distant Measurements between the Alternatives

Family Physician	S_i^+	S_i^-
Unit 1	0,0987	0,0690
Unit 2	0,0640	0,1197
Unit 3	0,0780	0,1072
Unit 4	0,0943	0,0741
Unit 5	0,0965	0,0714
Unit 6	0,0760	0,1004
Unit 7	0,0417	0,1344
Unit 8	0,0891	0,0818
Unit 9	0,1109	0,0687
Unit 10	0,1537	0,0088
Unit 11	0,1221	0,0518
Unit 12	0,0833	0,0909

Step 6: Calculating the unit proximity relative to the ideal solution

For calculating the proximity (C_i^+) relative to the ideal solution for each decision point, the ideal and negative ideal distinction measures are used. The measure used is the part of the negative ideal distinction measure into the total distinction measure. Calculating the proximity value relative to the ideal solution is shown in the formula below mentioned:

$$C_i^+ = \frac{S_i^-}{S_i^- + S_i^+}$$

According to this formula, it holds;

$$C_1^+ = \frac{0,0690}{0,0987 + 0,0690} = 0,4113$$

Accordingly table 9 shows the C_i^+ points given by the units.

Table 9 : Proximity Values (C_i^+) and Sequences of the Units Relative to the Ideal Solution in January of 2012

Family Physician	(Ci)	Processing
Unit 1	0,4113	9.
Unit 2	0,6516	2.
Unit 3	0,5787	3.
Unit 4	0,4402	7.
Unit 5	0,4254	8.
Unit 6	0,5691	4.
Unit 7	0,7634	1.
Unit 8	0,4785	6.
Unit 9	0,3825	10.
Unit 10	0,0539	12.
Unit 11	0,2978	11.
Unit 12	0,5216	5.

In this processing, the unit having the highest C_i^+ value has priority. According to this the greatest performance was shown by the Family Practice unit 7 in January of 2012 and the units 2, 3 and 6 followed it respectively. The units 10, 11 and 12 showed the poorest performances respectively.

According to these steps, Table 10 shows C_i^+ values and sequences of all months for the units.

Table 10: C_i^+ values and sequences of all months in 2012 for the units

Month	January		February		March		April		May		June	
Family Phy.	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence
Unit 1	0,4113	9	0,4884	9	0,5308	5	0,4987	8	0,4369	8	0,5961	2
Unit 2	0,6516	2	0,7137	1	0,5328	4	0,6337	2	0,6567	1	0,5958	3
Unit 3	0,5787	3	0,5901	4	0,5636	3	0,5591	5	0,6004	3	0,5302	7
Unit 4	0,4402	7	0,5045	8	0,3811	9	0,5484	6	0,5415	4	0,5561	5
Unit 5	0,4254	8	0,5123	7	0,4520	7	0,4498	9	0,4736	7	0,4430	9
Unit 6	0,5691	4	0,5927	3	0,4211	8	0,6527	1	0,5341	5	0,6227	1
Unit 7	0,7634	1	0,5641	5	0,6464	1	0,5152	7	0,6151	2	0,5462	6
Unit 8	0,4785	6	0,5939	2	0,5862	2	0,5666	4	0,3804	9	0,5867	4
Unit 9	0,3825	10	0,3986	10	0,3352	11	0,3710	10	0,2725	11	0,3813	10
Unit 10	0,0539	12	0,0462	12	0,0208	12	0,0288	12	0,0218	12	0,0427	12
Unit 11	0,2978	11	0,2810	11	0,3366	10	0,2296	11	0,2852	10	0,2489	11
Unit 12	0,5216	5	0,5478	6	0,4648	6	0,5735	3	0,5127	6	0,4837	8
C_i^+ average	0,4645		0,4861		0,4393		0,4689		0,4442		0,4695	
Month	July		August		September		October		November		December	
Family Phy.	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence	C_i^+	Sequence
Unit 1	0,3674	8	0,4534	9	0,3547	9	0,4973	7	0,5241	6	0,4383	7
Unit 2	0,6831	2	0,7333	2	0,5632	5	0,6413	1	0,5162	7	0,6902	1
Unit 3	0,6222	3	0,5722	5	0,6236	2	0,5697	4	0,5432	5	0,5088	5
Unit 4	0,4712	7	0,5807	4	0,4483	7	0,3839	10	0,4789	9	0,3297	9
Unit 5	0,5838	4	0,6430	3	0,5677	4	0,4932	8	0,5614	4	0,5047	6
Unit 6	0,5107	5	0,8045	1	0,5685	3	0,6300	2	0,7737	1	0,5595	3
Unit 7	0,7055	1	0,5452	6	0,6951	1	0,5432	5	0,6217	2	0,5238	4
Unit 8	0,4830	6	0,5015	7	0,4617	6	0,6218	3	0,5096	8	0,6215	2
Unit 9	0,3662	9	0,4764	8	0,3510	10	0,4104	9	0,3414	10	0,3275	10
Unit 10	0,0510	12	0,0597	12	0,0287	12	0,0582	12	0,1049	12	0,0355	12
Unit 11	0,2617	11	0,2740	10	0,2218	11	0,2048	11	0,2229	11	0,2208	11
Unit 12	0,3244	10	0,2594	11	0,4307	8	0,5388	6	0,6091	3	0,4147	8
C_i^+ average	0,4525		0,4919		0,4429		0,4661		0,4839		0,4313	

Table 11 shows the annual performances made by averaging the monthly C_i^+ point s of all units to carry out an evaluation on annual basis over the monthly changes.

Table 11: Points and Sequences C_i^+ of 2012 Averages of Units

Sequences	Average Ci	Unit
1.	0,6343	Unit 2
2.	0,6071	Unit 7
3.	0,6033	Unit 6
4.	0,5718	Unit 3
5.	0,5326	Unit 8
6.	0,5092	Unit 5
7.	0,4734	Unit 12
8.	0,4720	Unit 4
9.	0,4665	Unit 1
10.	0,3678	Unit 9
11.	0,2571	Unit 11
12.	0,0460	Unit 10
$X_{average}$	0,4617	

Figure 1 shows the course of the distribution above mentioned.

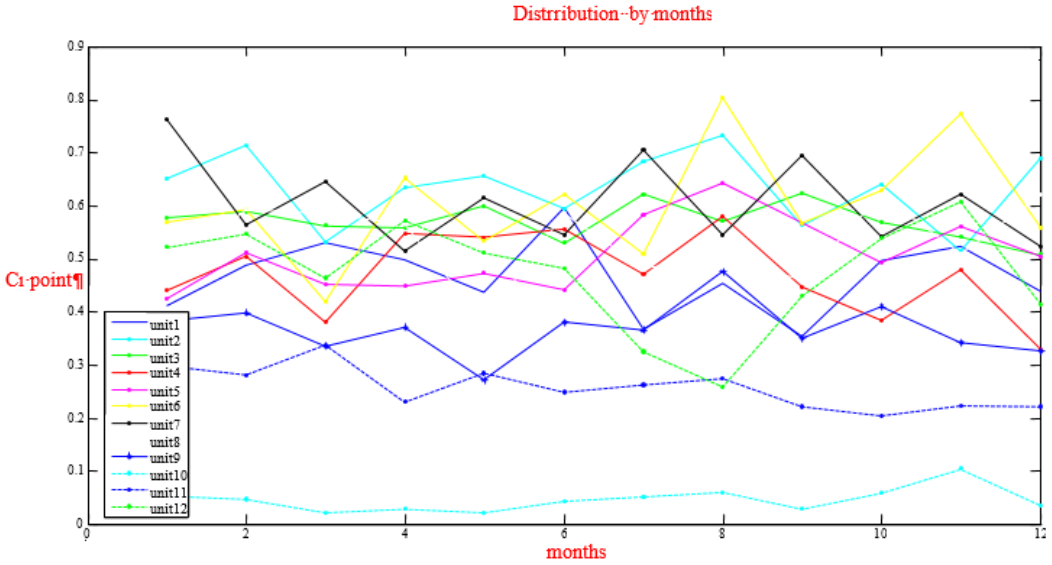

Figure 1 : C_i^+ points distribution of 2012 for Family Practice Units

Figure 2 shows the relation of point of each unit with current months' average point. In this way, compared comments about quantity of the unit's performance will be able to be obtained.

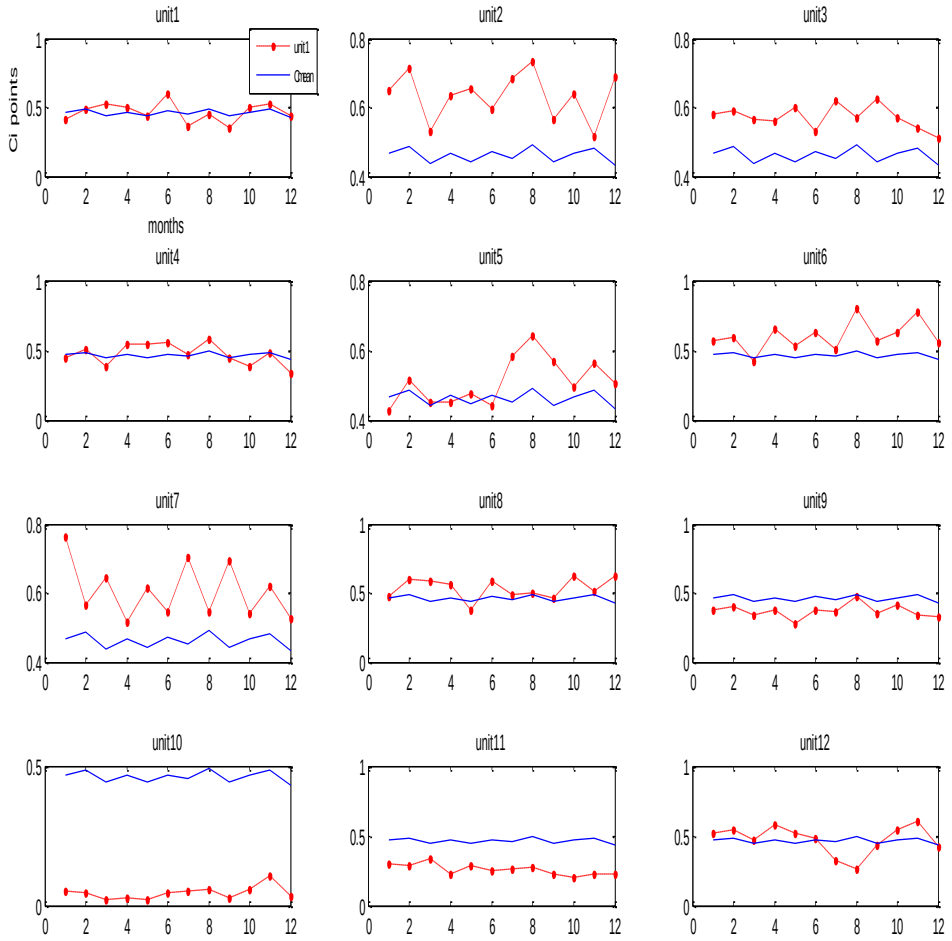

Figure 2: Comparison of Points of Each Family Practices C_i^+ points according to the Monthly Average points C_i^+

When the results are examined; while respectively performances of unit 2, unit 7 and unit 6 and unit 3 were considered as successful, performances of unit 10, unit 11 and unit 9 proved to be low. In addition, performance points of unit 1, unit 4, unit 5, unit 8 and unit 12 were seen closed to the mean and performances were measured on the mean level.

When it is calculated monthly base, unit 2, unit 7 and unit 6 showed four times the best performance of the month. Unit 10 became the unit showing each month the worst performance due to being an under-populated and new-opened residential area.

4. CONSTRAINTS OF RESEARCH

In research, there is a constraint in terms of method and application. However, it is considered as a constraint that the units have been tried to be measured on data, whose unit performances are observed (recorded), in spite of this environmental and personal factors are not taken into consideration, for the study. In addition; because the study have been made at a small location, not obtaining adequate sample results may be discussed in terms of generalization. In further studies, doing studies in different regions may contribute to the literature by increasing sample number.

5. CONCLUSION AND DISCUSSION

Importance of primary health care services, which is one of the most important steps in the transition to the preventive-protective health system from curative health system creating a big financial burden on the states in today's conditions, is increasing. In this context, family practice service, which Turkey Ministry of Health has commenced as of 2006, constitutes the most important dynamic of the intended purpose. Ministry of Health has started increase of productivity policy by developing Performance calculation methods in Family Practice

In this study, performance of the units was transformed to a single point showing general performance with TOPSIS method on data of these criteria by using 8 criteria in the performances of 2012 of 12 Family Practices unit and their performances was compared by being put in order among units.

When the result of the study was observed, performance points of the units showed a fluctuation within the year. However, putting in order of unit 9, unit 10 and unit 11 on the periods of analysis remained same in general and result for developing of low performances was detected.

Family Practice performance system in force does not award the unit showing a lot of performance but award the unit operating in full (full percentage). The system operates with a comprehensible logic in a level. Vaccinating more than required is problematic in terms of medical ethics. Measurement of expectation based performance constitutes logic of the system. Critical aspect of the system is to consider equal them when the unit applying more performance than units have the same number of patients, the unit showing less performance provide expected vaccine rate. This status makes performance assessment concept to be examined.

As a result, TOPSIS method allows for an objective assessment to the decision makers by gathering different assessment options in a common ground. For this reason results reached in this study may be used as an assistant application in measurement of Family practice performance.

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