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DEMATEL

Decision Making Trial and Evaluation Laboratory

دکتر علی محتشمی

Step 1: Compute the average matrix. Each respondent was asked to evaluate the direct influence between any two factors by an integer score ranging from 0, 1, 2, and 3, representing “no influence”, “low influence”, “medium influence”, and “high influence”, respectively. The notation of x_{ij} indicates the degree to which the respondent believes factor i affects factor j . For $i = j$, the diagonal elements are set to zero. For each respondent, an $n \times n$ non-negative matrix can be established as $X^k = [x_{ij}^k]$, where k is the number of respondents with $1 \leq k \leq H$, and n is the number of factors. Thus, $X^1, X^2, X^3, \dots, X^H$ are the matrices from H respondents. To incorporate all opinions from H respondents, the average matrix $A = [a_{ij}]$ can be constructed as follows:

$$a_{ij} = \frac{1}{H} \sum_{k=1}^H x_{ij}^k. \quad (1)$$

Step 2: Calculate the normalized initial direct-relation matrix.
Normalize initial direct-relation matrix D by $D = A \times S$,
where $S = \frac{1}{\max_{1 \leq i \leq n} \sum_{j=1}^n a_{ij}}$. Each element in matrix D falls
between zero and one.

Step 3: Calculate the total relation matrix. The total relation matrix T is defined as $T = D(I - D)^{-1}$, where I is the identity matrix. Define r and c be $n \times 1$ and $1 \times n$ vectors representing the sum of rows and sum of columns of the total relation matrix T , respectively. Suppose r_i be the sum of i th row in matrix T , then r_i summarizes both direct and indirect effects given by factor i to the other factors. If c_j denotes the sum of j th column in matrix T , then c_j shows both direct and indirect effects by factor j from the other factors. When $j = i$, the sum $(r_i + c_j)$ shows the total effects given and received by factor i . That is, $(r_i + c_j)$ indicates the degree of importance that factor i plays in the entire system. On the contrary, the difference $(r_i - c_j)$ depicts the net effect that factor i contributes to the system. Specifically, if $(r_i - c_j)$ is positive, factor i is a net cause, while factor i is a net receiver or result if $(r_i - c_j)$ is negative [14,15].

Step 4: Set up a threshold value to obtain the digraph. Since matrix T provides information on how one factor affects another, it is necessary for a decision maker to set up a threshold value to filter out some negligible effects. In doing so, only the effects greater than the threshold value would be chosen and shown in digraph. In this study, the threshold value is set up by computing the average of the elements in matrix T . The digraph can be acquired by mapping the dataset of $(r + c, r - c)$.

مثال: شناسایی شاخص های کلیدی کیفیت خدمات بیمارستان

Table 2

The importance of 22 criteria.

پرسشنامه ۱

Criterion	Importance
1. Warm and comfortable environment in the hospital	4.1594
2. Tidy appearance of service personnel	4.1353
3. Well-equipped medical equipment	4.4638
4. Clear marked signs in the hospital	4.2367
5. Exact outpatient locations guided by service personnel	4.2899
6. Service personnel with good communication skills	4.3430
7. Trusted medical staff with professional competence of health care	4.4300
8. Patient meals services	4.0628
9. Service personnel with immediate problem-solving abilities	4.3575
10. Outpatient drug-picking services	4.1159
11. Ease of use of the hospital reservation system	4.2319
12. Outpatient waiting time for medical treatment	4.1498
13. Operating procedures of the emergency room	4.3092
14. Processes of hospitalized services	4.1353
15. Detailed description of the patient's condition by the medical doctor	4.4928
16. Medical staff with professional abilities	4.4976
17. Pharmacist's advices on taking medicine	4.4976
18. Medicine preservation advices by pharmacists	4.2899
19. Feeling a sense of security when medical services are provided	4.3140
20. Concern for individual needs by medical staff	4.2077
21. Caring attitude of medical staff	4.2850
22. Cordial attitude of service personnel	4.2802

تعداد ۲۰۶ پرسشنامه توسط
بیماران تکمیل شده و اهمیت
شاخص های مختلف بر روی
طیف لیکرت ۱-۵ مشخص
شده است

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از آنجائیکه بهبود تمامی شاخص های فوق به صورت همزمان با توجه به منابع محدود امکان پذیر نیست، از بین شاخص های فوق، ۷ شاخص با بالاترین درجه اهمیت انتخاب شده اند

Dimensions
A (well-equipped medical equipment)
B (service personnel with good communication skills)
C (trusted medical staff with professional competence of health care)
D (service personnel with immediate problem-solving abilities)
E (detailed description of the patient's condition by the medical doctor)
F (medical staff with professional abilities)
G (pharmacist's advices on taking medicine)

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پرسشنامه ۲

$$X^1 = \begin{bmatrix} 0 & 1 & 2 & 2 & 3 & 2 & 1 \\ 2 & 0 & 2 & 2 & 2 & 2 & 1 \\ 2 & 2 & 0 & 2 & 3 & 3 & 2 \\ 1 & 1 & 2 & 0 & 2 & 2 & 1 \\ 3 & 2 & 3 & 2 & 0 & 3 & 1 \\ 3 & 2 & 3 & 2 & 3 & 0 & 1 \\ 1 & 2 & 2 & 1 & 2 & 2 & 0 \end{bmatrix}, \quad X^2 = \begin{bmatrix} 0 & 0 & 2 & 1 & 0 & 2 & 0 \\ 2 & 0 & 1 & 2 & 1 & 1 & 1 \\ 1 & 0 & 0 & 1 & 1 & 3 & 1 \\ 1 & 3 & 1 & 0 & 1 & 1 & 1 \\ 1 & 0 & 2 & 0 & 0 & 2 & 1 \\ 2 & 0 & 2 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 & 0 \end{bmatrix},$$

$$X^3 = \begin{bmatrix} 0 & 1 & 2 & 1 & 1 & 1 & 2 \\ 0 & 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 2 & 2 & 2 \\ 2 & 2 & 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & 2 & 1 & 0 & 2 & 1 \\ 2 & 1 & 2 & 2 & 2 & 0 & 1 \\ 0 & 1 & 1 & 1 & 2 & 2 & 0 \end{bmatrix}, \quad X^4 = \begin{bmatrix} 0 & 2 & 2 & 2 & 2 & 2 & 2 \\ 2 & 0 & 2 & 2 & 2 & 2 & 2 \\ 2 & 1 & 0 & 2 & 2 & 2 & 2 \\ 2 & 2 & 2 & 0 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 & 0 & 2 & 2 \\ 2 & 1 & 2 & 1 & 2 & 0 & 2 \\ 1 & 1 & 2 & 1 & 2 & 2 & 0 \end{bmatrix},$$

$$X^5 = \begin{bmatrix} 0 & 2 & 2 & 3 & 3 & 2 & 0 \\ 2 & 0 & 3 & 3 & 3 & 3 & 3 \\ 3 & 3 & 0 & 3 & 3 & 3 & 2 \\ 2 & 3 & 3 & 0 & 2 & 3 & 2 \\ 2 & 3 & 2 & 3 & 0 & 3 & 1 \\ 2 & 3 & 3 & 3 & 3 & 0 & 3 \\ 1 & 3 & 2 & 3 & 1 & 2 & 0 \end{bmatrix}, \quad X^6 = \begin{bmatrix} 0 & 2 & 3 & 2 & 3 & 2 & 2 \\ 2 & 0 & 2 & 2 & 3 & 2 & 2 \\ 2 & 2 & 0 & 2 & 3 & 2 & 2 \\ 0 & 2 & 2 & 0 & 3 & 2 & 2 \\ 0 & 1 & 2 & 1 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 & 2 & 0 & 2 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \end{bmatrix},$$

$$X^7 = \begin{bmatrix} 0 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 0 & 3 & 2 & 2 & 2 & 2 \\ 1 & 2 & 0 & 2 & 3 & 3 & 2 \\ 1 & 2 & 3 & 0 & 3 & 3 & 1 \\ 2 & 2 & 2 & 2 & 0 & 2 & 2 \\ 1 & 2 & 2 & 2 & 2 & 0 & 2 \\ 1 & 2 & 2 & 2 & 2 & 2 & 0 \end{bmatrix}, \quad X^8 = \begin{bmatrix} 0 & 1 & 3 & 3 & 2 & 3 & 2 \\ 2 & 0 & 3 & 3 & 3 & 2 & 3 \\ 3 & 3 & 0 & 3 & 3 & 3 & 3 \\ 2 & 3 & 3 & 0 & 3 & 3 & 2 \\ 1 & 3 & 3 & 2 & 0 & 3 & 2 \\ 2 & 3 & 3 & 3 & 3 & 0 & 2 \\ 1 & 3 & 3 & 2 & 2 & 3 & 0 \end{bmatrix},$$

پرسشنامه ارزیابی اثرات متقابل
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$$X^9 = \begin{bmatrix} 0 & 2 & 3 & 2 & 3 & 3 & 3 \\ 3 & 0 & 3 & 3 & 3 & 3 & 3 \\ 2 & 2 & 0 & 2 & 3 & 3 & 3 \\ 3 & 3 & 3 & 0 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 & 0 & 3 & 3 \\ 3 & 3 & 3 & 3 & 3 & 0 & 3 \\ 3 & 3 & 3 & 3 & 3 & 3 & 0 \end{bmatrix}, \quad X^{10} = \begin{bmatrix} 0 & 1 & 1 & 2 & 2 & 2 & 1 \\ 3 & 0 & 2 & 2 & 3 & 2 & 1 \\ 3 & 2 & 0 & 2 & 2 & 2 & 1 \\ 3 & 2 & 2 & 0 & 2 & 2 & 1 \\ 3 & 2 & 2 & 2 & 0 & 2 & 1 \\ 3 & 2 & 2 & 2 & 2 & 0 & 1 \\ 3 & 2 & 2 & 2 & 2 & 1 & 0 \end{bmatrix}, \quad X^{19} = \begin{bmatrix} 0 & 1 & 2 & 2 & 3 & 2 & 1 \\ 2 & 0 & 2 & 2 & 2 & 2 & 1 \\ 2 & 2 & 0 & 2 & 3 & 3 & 2 \\ 1 & 1 & 2 & 0 & 2 & 2 & 1 \\ 3 & 2 & 3 & 2 & 0 & 3 & 1 \\ 3 & 2 & 3 & 2 & 3 & 0 & 1 \\ 1 & 2 & 2 & 1 & 2 & 2 & 0 \end{bmatrix}.$$

$$X^{11} = \begin{bmatrix} 0 & 2 & 1 & 3 & 3 & 3 & 1 \\ 2 & 0 & 1 & 3 & 3 & 3 & 1 \\ 2 & 2 & 0 & 2 & 2 & 2 & 2 \\ 2 & 3 & 1 & 0 & 2 & 2 & 2 \\ 3 & 3 & 1 & 2 & 0 & 2 & 2 \\ 2 & 2 & 1 & 2 & 2 & 0 & 2 \\ 1 & 2 & 2 & 2 & 1 & 2 & 0 \end{bmatrix}, \quad X^{12} = \begin{bmatrix} 0 & 1 & 2 & 0 & 1 & 1 & 0 \\ 1 & 0 & 2 & 3 & 3 & 2 & 1 \\ 2 & 1 & 0 & 2 & 2 & 3 & 1 \\ 0 & 1 & 1 & 0 & 2 & 2 & 1 \\ 1 & 2 & 2 & 2 & 0 & 2 & 1 \\ 2 & 2 & 2 & 2 & 2 & 0 & 2 \\ 0 & 1 & 1 & 1 & 0 & 1 & 0 \end{bmatrix},$$

$$X^{13} = \begin{bmatrix} 0 & 2 & 3 & 2 & 3 & 3 & 2 \\ 2 & 0 & 2 & 2 & 3 & 3 & 2 \\ 3 & 3 & 0 & 2 & 3 & 3 & 2 \\ 2 & 3 & 2 & 0 & 3 & 3 & 2 \\ 3 & 3 & 3 & 2 & 0 & 3 & 2 \\ 2 & 3 & 2 & 2 & 3 & 0 & 2 \\ 2 & 3 & 3 & 3 & 3 & 3 & 0 \end{bmatrix}, \quad X^{14} = \begin{bmatrix} 0 & 1 & 1 & 1 & 2 & 1 & 0 \\ 1 & 0 & 1 & 2 & 1 & 1 & 1 \\ 2 & 2 & 0 & 1 & 2 & 2 & 2 \\ 0 & 2 & 2 & 0 & 2 & 2 & 1 \\ 3 & 2 & 2 & 2 & 0 & 2 & 2 \\ 3 & 2 & 2 & 2 & 3 & 0 & 2 \\ 1 & 1 & 1 & 1 & 2 & 1 & 0 \end{bmatrix},$$

$$X^{15} = \begin{bmatrix} 0 & 2 & 2 & 2 & 2 & 2 & 2 \\ 0 & 0 & 2 & 2 & 2 & 2 & 1 \\ 1 & 2 & 0 & 2 & 2 & 2 & 2 \\ 1 & 2 & 2 & 0 & 2 & 2 & 2 \\ 1 & 1 & 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 0 \end{bmatrix}, \quad X^{16} = \begin{bmatrix} 0 & 2 & 2 & 1 & 3 & 2 & 1 \\ 1 & 0 & 2 & 2 & 3 & 3 & 1 \\ 2 & 2 & 0 & 3 & 3 & 2 & 1 \\ 1 & 2 & 3 & 0 & 3 & 3 & 1 \\ 1 & 2 & 3 & 1 & 0 & 3 & 1 \\ 3 & 2 & 3 & 2 & 3 & 0 & 1 \\ 1 & 2 & 1 & 1 & 1 & 0 & 0 \end{bmatrix},$$

$$X^{17} = \begin{bmatrix} 0 & 3 & 3 & 3 & 3 & 3 & 3 \\ 2 & 0 & 2 & 3 & 3 & 2 & 2 \\ 1 & 2 & 0 & 2 & 2 & 2 & 2 \\ 1 & 2 & 2 & 0 & 2 & 2 & 2 \\ 2 & 2 & 2 & 2 & 0 & 2 & 2 \\ 2 & 2 & 2 & 2 & 2 & 0 & 2 \\ 2 & 2 & 2 & 2 & 2 & 2 & 0 \end{bmatrix}, \quad X^{18} = \begin{bmatrix} 0 & 2 & 3 & 3 & 3 & 1 & 2 \\ 0 & 0 & 3 & 3 & 3 & 2 & 1 \\ 2 & 3 & 0 & 3 & 3 & 3 & 3 \\ 1 & 2 & 2 & 0 & 2 & 2 & 2 \\ 1 & 2 & 2 & 1 & 0 & 1 & 0 \\ 2 & 2 & 1 & 1 & 0 & 0 & 1 \\ 1 & 2 & 3 & 2 & 0 & 2 & 0 \end{bmatrix},$$

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پرسشنامه ۲

پرسشنامه ارزیابی اثرات متقابل
شاخص ها توسط ۱۹ نفر از
مدیران جهت ارزیابی
DEMATEL تکمیل شد

The average matrix A can be constructed based on Eq. (1):

$$A = \begin{bmatrix} 0.0000 & 1.5789 & 2.0526 & 1.7895 & 2.2632 & 2.0000 & 1.3158 \\ 1.5263 & 0.0000 & 2.0526 & 2.3684 & 2.3684 & 2.0526 & 1.6316 \\ 1.9474 & 1.9474 & 0.0000 & 2.0526 & 2.4211 & 2.5263 & 1.9474 \\ 1.3684 & 2.2632 & 2.1053 & 0.0000 & 2.2105 & 2.2632 & 1.5789 \\ 1.8421 & 2.0000 & 2.2105 & 1.7895 & 0.0000 & 2.2105 & 1.4737 \\ 2.0526 & 1.8421 & 2.1579 & 1.8421 & 2.2105 & 0.0000 & 1.6842 \\ 1.0526 & 1.7368 & 1.8421 & 1.6316 & 1.5263 & 1.7368 & 0.0000 \end{bmatrix} \quad \begin{matrix} 11 \\ 11.9999 \\ 12.8422 \\ 11.7895 \\ 11.5263 \\ 11.7894 \\ 9.5262 \end{matrix}$$

Max= 12.8422

Step 2 is to calculate the normalized initial direct-relation matrix D , depicted below:

$$D = A \times \frac{1}{\max_{1 \leq i \leq 7} \sum_{j=1}^7 a_{ij}} = \begin{bmatrix} 0.0000 & 0.1230 & 0.1598 & 0.1393 & 0.1762 & 0.1557 & 0.1025 \\ 0.1189 & 0.0000 & 0.1598 & 0.1844 & 0.1844 & 0.1598 & 0.1270 \\ 0.1516 & 0.1516 & 0.0000 & 0.1598 & 0.1885 & 0.1967 & 0.1516 \\ 0.1066 & 0.1762 & 0.1639 & 0.0000 & 0.1721 & 0.1762 & 0.1230 \\ 0.1434 & 0.1557 & 0.1721 & 0.1393 & 0.0000 & 0.1721 & 0.1148 \\ 0.1598 & 0.1434 & 0.1680 & 0.1434 & 0.1721 & 0.0000 & 0.1311 \\ 0.0820 & 0.1352 & 0.1434 & 0.1270 & 0.1189 & 0.1352 & 0.0000 \end{bmatrix}$$

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In Step 3, calculate matrix T by the following formula:

$$T = D(I - D)^{-1}$$

$$I-D = \begin{array}{c} \begin{array}{cccccccc} & & & I & & & & \\ & & & & & & & D \\ \left| \begin{array}{cccccccc} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \end{array} \right| - \left| \begin{array}{cccccccc} 0 & 0.1229 & 0.1598 & 0.1393 & 0.1762 & 0.1557 & 0.1025 & \\ 0.1189 & 0 & 0.1598 & 0.1844 & 0.1844 & 0.1598 & 0.127 & \\ 0.1516 & 0.1516 & 0 & 0.1598 & 0.1885 & 0.1967 & 0.1516 & \\ 0.1066 & 0.1762 & 0.1639 & 0 & 0.1721 & 0.1762 & 0.1229 & \\ 0.1434 & 0.1557 & 0.1721 & 0.1393 & 0 & 0.1721 & 0.1148 & \\ 0.1598 & 0.1434 & 0.168 & 0.1434 & 0.1721 & 0 & 0.1311 & \\ 0.082 & 0.1352 & 0.1434 & 0.127 & 0.1189 & 0.1352 & 0 & \end{array} \right| = \\ \left| \begin{array}{ccccccc} & & & I-D & & & \\ & & & & & & \\ \begin{array}{ccccccc} 1 & -0.1229 & -0.1598 & -0.1393 & -0.1762 & -0.1557 & -0.1025 \\ -0.1189 & 1 & -0.1598 & -0.1844 & -0.1844 & -0.1598 & -0.127 \\ -0.1516 & -0.1516 & 1 & -0.1598 & -0.1885 & -0.1967 & -0.1516 \\ -0.1066 & -0.1762 & -0.1639 & 1 & -0.1721 & -0.1762 & -0.1229 \\ -0.1434 & -0.1557 & -0.1721 & -0.1393 & 1 & -0.1721 & -0.1148 \\ -0.1598 & -0.1434 & -0.168 & -0.1434 & -0.1721 & 1 & -0.1311 \\ -0.082 & -0.1352 & -0.1434 & -0.127 & -0.1189 & -0.1352 & 1 \end{array} \end{array} \right| \end{array}$$

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In Step 3, calculate matrix T by the following formula:

$$T = D(I - D)^{-1}$$

$$(I-D)^{-1} = \begin{pmatrix} 1.992566 & 1.229627 & 1.345897 & 1.248315 & 1.409694 & 1.377662 & 1.060392 \\ 1.174535 & 2.207937 & 1.439604 & 1.370414 & 1.513008 & 1.477159 & 1.154997 \\ 1.260126 & 1.406156 & 2.374832 & 1.419296 & 1.591627 & 1.578889 & 1.232093 \\ 1.15122 & 1.341295 & 1.424899 & 2.198153 & 1.485707 & 1.471007 & 1.138099 \\ 1.159216 & 1.301397 & 1.405557 & 1.296445 & 2.31268 & 1.441859 & 1.111131 \\ 1.18763 & 1.310636 & 1.422545 & 1.31767 & 1.479955 & 2.315331 & 1.139395 \\ 0.947572 & 1.103426 & 1.18613 & 1.102801 & 1.212244 & 1.210556 & 1.850598 \end{pmatrix}$$

$$T = D(I-D)^{-1} = \begin{pmatrix} 0.992566 & 1.229627 & 1.345897 & 1.248315 & 1.409694 & 1.377662 & 1.060392 & 8.664153 \\ 1.174535 & 1.207937 & 1.439604 & 1.370414 & 1.513008 & 1.477159 & 1.154997 & 9.337655 \\ 1.260126 & 1.406156 & 1.374832 & 1.419296 & 1.591627 & 1.578889 & 1.232093 & 9.863021 \\ 1.15122 & 1.341295 & 1.424899 & 1.198153 & 1.485707 & 1.471007 & 1.138099 & 9.21038 \\ 1.159216 & 1.301397 & 1.405557 & 1.296445 & 1.31268 & 1.441859 & 1.111131 & 9.028287 \\ 1.18763 & 1.310636 & 1.422545 & 1.31767 & 1.479955 & 1.315331 & 1.139395 & 9.173162 \\ 0.947572 & 1.103426 & 1.18613 & 1.102801 & 1.212244 & 1.210556 & 0.850598 & 7.613327 \end{pmatrix}$$

C

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								r
$T=D(I-D)^{-1} =$	0.992566	1.229627	1.345897	1.248315	1.409694	1.377662	1.060392	8.664153
	1.174535	1.207937	1.439604	1.370414	1.513008	1.477159	1.154997	9.337655
	1.260126	1.406156	1.374832	1.419296	1.591627	1.578889	1.232093	9.863021
	1.15122	1.341295	1.424899	1.198153	1.485707	1.471007	1.138099	9.21038
	1.159216	1.301397	1.405557	1.296445	1.31268	1.441859	1.111131	9.028287
	1.18763	1.310636	1.422545	1.31767	1.479955	1.315331	1.139395	9.173162
	0.947572	1.103426	1.18613	1.102801	1.212244	1.210556	0.850598	7.613327
	C	7.872865	8.900475	9.599465	8.953094	10.00492	9.872464	7.686706

	r_i+c_j	r_i-c_j
A	16.53702	0.791288
B	18.23813	0.43718
C	19.46249	0.263556
D	18.16347	0.257285
E	19.0332	-0.97663
F	19.04563	-0.6993
G	15.30003	-0.07338

اهمیت r شاخص بر اساس مقادیر $r+c$

C	19.46249
F	19.04563
E	19.0332
B	18.23813
D	18.16347
A	16.53702
G	15.30003

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								r
$T=D(I-D)^{-1} =$	0.992566	1.229627	1.345897	1.248315	1.409694	1.377662	1.060392	8.664153
	1.174535	1.207937	1.439604	1.370414	1.513008	1.477159	1.154997	9.337655
	1.260126	1.406156	1.374832	1.419296	1.591627	1.578889	1.232093	9.863021
	1.15122	1.341295	1.424899	1.198153	1.485707	1.471007	1.138099	9.21038
	1.159216	1.301397	1.405557	1.296445	1.31268	1.441859	1.111131	9.028287
	1.18763	1.310636	1.422545	1.31767	1.479955	1.315331	1.139395	9.173162
	0.947572	1.103426	1.18613	1.102801	1.212244	1.210556	0.850598	7.613327
	C	7.872865	8.900475	9.599465	8.953094	10.00492	9.872464	7.686706

		r_i+c_j	r_i-c_j
	A	16.53702	0.791288
	B	18.23813	0.43718
علت خالص ←	C	19.46249	0.263556
	D	18.16347	0.257285
	E	19.0332	-0.97663
معلول خالص ←	F	19.04563	-0.6993
	G	15.30003	-0.07338

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								r
$T=D(I-D)^{-1} =$	0.992566	1.229627	1.345897	1.248315	1.409694	1.377662	1.060392	8.664153
	1.174535	1.207937	1.439604	1.370414	1.513008	1.477159	1.154997	9.337655
	1.260126	1.406156	1.374832	1.419296	1.591627	1.578889	1.232093	9.863021
	1.15122	1.341295	1.424899	1.198153	1.485707	1.471007	1.138099	9.21038
	1.159216	1.301397	1.405557	1.296445	1.31268	1.441859	1.111131	9.028287
	1.18763	1.310636	1.422545	1.31767	1.479955	1.315331	1.139395	9.173162
	0.947572	1.103426	1.18613	1.102801	1.212244	1.210556	0.850598	7.613327
	C	7.872865	8.900475	9.599465	8.953094	10.00492	9.872464	7.686706

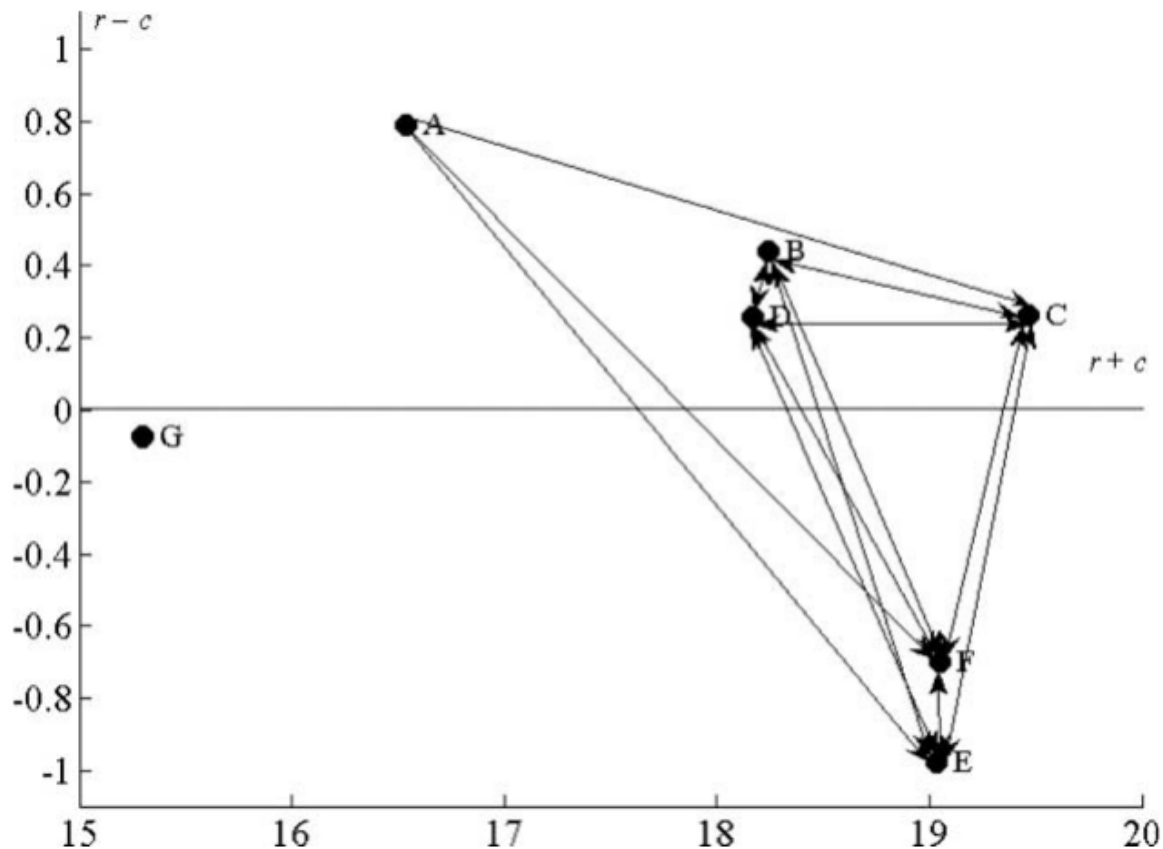
Threshold 1.283469

	A	B	C	D	E	F	G
A	0.992566	1.229627	1.345897	1.248315	1.409694	1.377662	1.060392
B	1.174535	1.207937	1.439604	1.370414	1.513008	1.477159	1.154997
C	1.260126	1.406156	1.374832	1.419296	1.591627	1.578889	1.232093
D	1.15122	1.341295	1.424899	1.198153	1.485707	1.471007	1.138099
E	1.159216	1.301397	1.405557	1.296445	1.31268	1.441859	1.111131
F	1.18763	1.310636	1.422545	1.31767	1.479955	1.315331	1.139395
G	0.947572	1.103426	1.18613	1.102801	1.212244	1.210556	0.850598

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	A	B	C	D	E	F	G
A	0.992566	1.229627	1.345897	1.248315	1.409694	1.377662	1.060392
B	1.174535	1.207937	1.439604	1.370414	1.513008	1.477159	1.154997
C	1.260126	1.406156	1.374832	1.419296	1.591627	1.578889	1.232093
D	1.15122	1.341295	1.424899	1.198153	1.485707	1.471007	1.138099
E	1.159216	1.301397	1.405557	1.296445	1.31268	1.441859	1.111131
F	1.18763	1.310636	1.422545	1.31767	1.479955	1.315331	1.139395
G	0.947572	1.103426	1.18613	1.102801	1.212244	1.210556	0.850598

Dimensions	$r+c$	$r-c$
A (well-equipped medical equipment)	16.5386	0.7913
B (service personnel with good communication skills)	18.2399	0.4373
C (trusted medical staff with professional competence of health care)	19.4643	0.2635
D (service personnel with immediate problem-solving abilities)	18.1651	0.2573
E (detailed description of the patient's condition by the medical doctor)	19.0350	-0.9767
F (medical staff with professional abilities)	19.0475	-0.6994
G (pharmacist's advices on taking medicine)	15.3015	-0.0733



• سازمان باید توجه خود را بیشتر بر روی چهار علت (A, B, C و D) متمرکز کند.

• شاخص A یک شاخص کلیدی است، چرا که نه تنها یک علت است و بالاترین درجه علت را دارد، بلکه توسط هیچ شاخص دیگری تحت تأثیر قرار نگرفته است.

• بهبود شاخص A، منجر به بهبود شاخص های C، E و F می شود.