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AN ANALYTIC APPROACH IN SCM FOR HEALTH CENTRE BY USING TOPSIS WITH INTERVAL DATA

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Abstract

Competition is increasing day by day in the market, so strategies of companies/industries are likely to be changed for its improvement and flexibility, which includes using the supply chain management paradigm. Supply chain management is connected to the health Centre, industry and institute etc. in different ways. In this paper TOPSIS method with interval data is introduced for the improvement of health Centre. TOPSIS is a multi-criteria decision-making technique which establishes and selects the performance criteria and ranking them. This method of decision-making entails selecting the best option from among all the available options. Alternatives/criteria are selected for the improvements and rank those on the basis of technique for the order preference by similarity to ideal solution (TOPSIS). Health Centre are basic need for human beings. In the real world, data are not as deterministic due to missing or unavailable information. Therefore, TOPSIS with interval data is introduced.

1. Introduction

The implementation of Supply chain management in all sectors such as institute, industry, and health sector and business market are helpful for collecting the detail of information flow and material flow. The material and information flow from supplier to the end user through manufacturer, distributer and retailer is the basic steps. SCM ensures that the appropriate product is delivered in the right quantity, at the right time, and at the right price. Ultimately customers delight from this service, which is the basic aim of supply chain management. Some decision-making techniques which is more useful for analysis of all the service sectors. Here TOPSIS method with interval data is introduced for ranking the service quality dimension.

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1.1 Supply Chain Management

Supply chain management, according to Stevens, it is a collection of interrelated operations concerned with the planning, coordination, and control of materials, parts, and finished items as they move from supplier to consumer. A supply chain is made up of geographically dispersed facilities and the transportation links that connect them. In services like retail stores or delivery services like UPS or Federal Express, the supply chain is reduced to a distribution logistics challenge, with the starting point being a finished product that must be delivered to the client on time. As long as a business is solely focused on providing services, such as a financial services firm or a consulting firm, the information flow is the most important aspect of the supply chain.

1.2 Health Centre

Modern hospitals must focus on improving the patient experience as a long-term strategic aim that leads to continuous growth, rather than as a quick cure. According to Irwin Press, "improving patient happiness is critical to future survival" (Tequia Burt, 2006). The patient experience improvement in healthcare organisations can lead to better care, happier employees, fewer preventable medical errors, less malpractice, fewer litigation suits, and a healthier bottom line. It can also lead to a substantial competitive growth strategy (Frank J. Sardone and Sue Reinoehl, 2006). Health centre has basic service quality dimension such as Professionalism, Reliability, Tangible, Responsiveness, Assurance, and Empathy.

These service quality dimension further classified as (1) Professionalism include skill, experience, and innovation (2) Reliability include accuracy, expertise, image, and security (3) Tangible include building block, equipment, and hygiene (4) Responsiveness include time, completeness, and willingness (5) Assurance include cost, courtesy, and compensation (6) Empathy include caring, manner, and communication etc.

The district hospital is the health-care system's backbone. For the implementation of health policy, competent management of local health institutions such as district hospitals is critical. Local, regional, and national governments are seeking to get more bang for their buck when it comes to health-care spending. They are being asked to be more accountable for the

outcomes of their health-care expenditures as quality expectations rise. As a result, they serve a critical role in ensuring and improving the quality of health care in both the public and private sectors. On the other hand, as part of the process of providing health services, healthcare providers must assume increasing responsibility, which necessitates excellent skills, positive attitudes, increased knowledge, and exemplary behavior.

1.3 Indian Health Scenario

India has a population of 17 percent of the world's population, making it the world's second most populous country. India's economy has risen rapidly since it adopted structural adjustment measures and deregulation, while concerns about justice and poverty remain. With an average growth rate of over 8% over the last few years, the country has recently become one of the world's fastest growing economies. New public health challenges, such as shifting demography and environmental circumstances, novel infectious illnesses, and antimicrobial resistance, have evolved at the same time. Health-related behavioral difficulties and a growing focus on non-communicable diseases However, the country has made great progress in several areas of health, including improved life expectancy, lower maternal and infant mortality, and the eradication of smallpox, which must be recognized.

2. TOPSIS Method

Chen and Hwang describe the TOPSIS (technique for order preference by similarity to an ideal solution) method, with references to Hwang and Yoon. This is a multi-criteria decision-making strategy for finding solutions from a limited number of options. The primary notion is that the chosen alternative should be the closest to the positive ideal solution while being the furthest away from the negative ideal solution.

The following is the approach for using the TOPSIS method using interval data:

(1) Determine the decision matrix's normalized value.

(2) Construct the decision matrix of weighted normalized interval data.

(3) Identify positive and negative deal solutions.

(4) Calculate the separation of each alternative from the positive ideal solution and negative ideal solution, using then-dimensional Euclide and istance.

(5) Calculate the relative proximity coefficient, establish the ranking order of all options, and choose the best option from a list of feasible options.

2.1 Data collection

Table 1. With interval data, an expert's judgments on the service quality dimension is obtained.

		Expert I	Expert II	Expert III	Expert IV	Expert V
Professionalism	x_1^l	7	5	2	5	4
	x_1^u	9	8	6	7	6
Reliability	x_2^l	0	1	2	1	4
	x_2^u	2	4	5	4	7
Tangible	x_3^l	2	2	4	4	5
	x_3^u	6	5	8	6	8
Empathy	x_4^l	8	6	2	4	2
	x_4^u	9	7	5	8	7
Responsiveness	x_5^l	2	1	0	1	0
	x_5^u	5	4	2	5	1
Assurance	x_6^l	1	0	1	2	1
	x_6^u	4	2	3	4	3

Table 2. The normalized weighted matrix.

		Expert I	Expert II	Expert III	Expert IV	Expert V
Professionalism	v_1^l	0.875	0.833	0.500	1.000	0.800
	v_1^u	1.000	1.000	0.750	0.875	0.750
Reliability	v_2^l	0.000	0.166	0.500	0.200	0.800
	v_2^u	0.222	0.500	0.625	0.500	0.875
Tangible	v_3^l	0.250	0.333	1.000	0.800	1.000
	v_3^u	0.667	0.625	1.000	0.750	1.000
Empathy	v_4^l	1.000	1.000	0.500	0.800	0.400
	v_4^u	1.000	0.875	0.625	1.000	0.875
Responsiveness	v_5^l	0.250	0.166	0.000	0.200	0.000
	v_5^u	0.556	0.500	0.250	0.625	0.125
Assurance	v_6^l	0.125	0.000	0.250	0.400	0.200
	v_6^u	0.444	0.250	0.375	0.500	0.375

Table 3. TOPSIS method's final results with interval data.

	d_j^+	d_j^-	$d_j^- / d_j^- + d_j^+$	Ranking
Professionalism	0.487	1.903	0.796	1
Reliability	1.394	1.154	0.453	4
Tangible	0.825	1.762	0.681	3
Empathy	0.641	1.867	0.744	2
Responsiveness	1.705	0.761	0.309	6
Assurance	1.617	0.731	0.311	5

3. Result and Conclusion

Given the difficulty of establishing the exact value of attributes in some cases, the fact that their values are treated as intervals, the TOPSIS method with interval data is introduced in this work. The basic requirements for the health Centre in this paper are service quality dimensions. After using the TOPSIS approach, these criteria are ranked according to their proximity coefficient. As a result, ranking service quality dimensions and obtaining information is preferable.

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