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RESEARCH ARTICLE OPEN ACCESS

Evolving Financial Decisions Using Topsis Technique With Reference To Investment in Selected It Companies

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ABSTRACT:
Financial decision making is traditionally made by taking into account of fundamental analysis and technical analysis. These statistical analyses help the decision makers to make approximately the decisions. The TOPSIS is the mathematical method which can be of use to the decision makers to take decisions nearer to the point of definiteness. The TOPSIS method is the most useful mathematical method which is expected to gain popularity and wide spread use in the years to come.

KEY WORDS: TOPSIS Method, Financial Ratios, Decision making

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I. INTRODUCTION

The decision making in the modern dynamic setup becomes more difficult and complicated. In the LPG era technological developments had taken place rapidly. Competition has become stiff. Consumer profiles and business models had undergone rapid transformation. In such changing situation, decision making requires more effective and efficient parameters. Off late TOPSIS method is found to be the more useful method which will enable the decision makers to take financial decisions nearest to the point of definiteness [2, 7, 10].

The TOPSIS method enables selection of the best among alternatives. This method was propounded by Hwang and Yoon [5] in 1981. When applying this method, the alternative which is close to the positive ideal solution is far away from the negative ideal solution. The alternative selected by applying this method should imbibe an element of definiteness. Among the alternatives the best one is that which is close to the ideal solution and is expected to be nearer to the positive ideal solution. In this research study the most suitable and profitable investment among the IT companies will be determined by applying the TOPSIS method [1, 4, 6, 9 12].

II. STEPS IN TOPSIS METHOD

i. Decision matrix:

$$D = (x_{ij}^{+})_{m \times n} = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix}$$

ii. Normalized decision matrix:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^{2}}}$$

ii. Weighted normalized decision matrix

$$v_{ij} = w_{ij} * r_{ij}$$

iii. Positive and negative ideal solution

$$P^{+} = \{V_1^{+}, V_2^{+}, V_3^{+}, \ldots\ldots V_n^{+}\},\ N^{-} = \{V_1^{-}, V_2^{-}, V_3^{-}, \ldots\ldots V_n^{-}\}$$

where $v_j^{+} = (1,1,1)$ and

$v_j^{-} = (0,0,0)$

iv. Separation Measure

$$d_i^+ = \sum_{j=1}^{n} d\left(v_{ij}, v_j^+\right), \; i = 1,2,....., \; m$$

$$d_i^- = \sum_{j=1}^{n} d\left(v_{ij}, v_j^-\right), \; j = 1,2,....., \; n$$

v. The closeness co-efficient

$$CC_i = \frac{d_i^-}{d_i^+ + d_i^-}, \; i = 1, 2, 3,....., \; m$$

III. NUMERICAL EXAMPLE

The investment decision making criteria in IT companies are evaluated on the basis of four variables. These variables are extended by $A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9$ and A_{10} and the committee of three investors D_1, D_2 and D_3 has been formed to proceed with an evaluation to find out the appropriate [14].

(1) Return on Equity (C_1)

(2) Current Ratio (C_2)

(3) Debt Ratio (C_3)

(4) Earnings per share (C_4)

The assessment of the criteria by the decision makers are given in the following table.

Table 1: Initial matrix

		C_1	C_2	C_3	C_4
$D =$	A_1	0.35	3.66	0.004	0.21
	A_2	0.32	4.03	0.000	0.17
	A_3	0.21	2.24	0.022	0.15
	A_4	0.27	2.16	0.01	0.15
	A_5	0.21	1.78	0.02	0.14
	A_6	0.17	3.79	0.00	0.30
	A_7	0.16	3.08	0.06	0.23
	A_8	0.21	3.0	0.02	0.19
	A_9	0.37	1.24	0.02	0.23
	A_{10}	0.20	1.52	0.61	0.08

The normalized decision matrix $\tilde{R} = (r_{ij})$ is calculated, then for each criterion is given in the table below:

Table 2: The normalized decision matrix

		C_1	C_2	C_3	C_4
$R = r_{ij}$	A_1	0.14	0.14	0.01	0.12
	A_2	0.13	0.15	0.00	0.1
	A_3	0.13	0.08	0.03	0.09
	A_4	0.11	0.08	0.01	0.09

	A_5	0.09	0.07	0.03	0.08
	A_6	0.07	0.14	0.00	0.18
	A_7	0.06	0.12	0.08	0.14
	A_8	0.09	0.11	0.03	0.11
	A_9	0.15	0.05	0.03	0.14
	A_{10}	0.08	0.06	0.79	0.05

Calculating the normalized decision matrix $\tilde{V} = \left(\tilde{v}_{ij} \right)$ for each criterion and reducing to three terms, we get:

Table 3: weighted normalized decision matrix

		C_1	C_2	C_3	C_4
$V = v_{ij}$	A_1	7.899	6.3574	0.0374	4.9
	A_2	7.2072	7.0000	0.0000	3.9669
	A_3	4.7281	3.8906	0.047	3.5
	A_4	6.0784	3.752	0.0929	3.5
	A_5	4.7281	3.0919	0.1859	3.2669
	A_6	3.6018	6.5828	0.0000	7.000
	A_7	3.6019	5.3501	0.5579	5.3669
	A_8	4.7281	5.2108	0.1859	4.4331
	A_9	8.33	2.1539	0.1859	5.3669
	A_{10}	4.5023	2.6404	5.67	1.8669

Take the fuzzy positive and fuzzy negative ideal solutions to be $P^+ = \{V_1^+, V_2^+, V_3^+, \ldots\ldots\ V_n^+\}$,
$N^- = \{V_1^-, V_2^-, V_3^-, \ldots\ldots\ V_n^-\}$ respectively such that $v_j^+ = (1,1,1)$ and $v_j^- = (0,0,0)$.

Now the distance of each alternative A_i from the positive solution is $d_i^+ = \sum_{j=1}^{n} d\left(v_{ij}, v_j^+\right)$, $i = 1,2,\ldots\ldots,\ m$

and the distance of each alternative A_i from the negative solution is $d_i^- = \sum_{j=1}^{n} d\left(v_{ij}, v_j^-\right)$, $j = 1,2,\ldots\ldots,\ n$.

Therefore, the separation measures from the positive and negative solutions are calculated as given under:

Table: 4 Separation measures

Alternatives	d_i^+	d_i^-
A_1	3.4495	0.0187
A_2	3.1036	0.000

A_3	1.8641	0.1024
A_4	2.5392	0.0465
A_5	1.8641	0.093
A_6	3.0000	0.00
A_7	2.1835	0.2789
A_8	2.1054	0.0929
A_9	3.665	0.0929
A_{10}	2.335	0.9335

The closeness coefficient $CC_i = \dfrac{d_i^-}{d_i^+ + d_i^-}$

$CC_1 = 0.0054$, $CC_2 = 0.000$, $CC_3 = 0.0521$, $CC_4 = 0.018$, $CC_5 = 0.0475$

$CC_6 = 0.000$, $CC_7 = 0.1133$, $CC_8 = 0.0423$, $CC_9 = 0.047$, $CC_{10} = 0.2856$

IV. RESULT

According to the closeness co-efficient [17], the ranking order of the three alternatives is $A_{10} > A_7 > A_3 > A_5 > A_8 > A_9 > A_4 > A_1 > A_2 > A_6$. Therefore the last alternative is the company A_{10} .

V. CONCLUSION

In the modern competitive world both internal and external factors interact and influence the financial decisions taken by the investors. The study confines to the internal factors which decides the fundamental strength of IT companies. The external factors which are beyond the control have not been considered in this study. They are also responsible for the volatile and the highly fluid capital market. TOPSIS is one of the suitable method of all the available alternatives in the complex and conflicting situations.

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