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TOPSIS model based on entropy and similarity measure for market segment selection and evaluation

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Abstract

Purpose – The paper aims to propose a practical model for market segment selection and evaluation. The paper carries out a technique of order preference similarity to the ideal solution (TOPSIS) approach to make an operation systematic dealing with multi-criteria decision- making problem.

Design/methodology/approach – Introducing a multi-criteria decision-making problem based on TOPSIS approach. A new entropy and new similarity measure under neutrosopic environment are proposed to evaluate the weights of criteria and the relative closeness coefficient in TOPSIS model.

Findings – The outcomes show that the TOPSIS model based on new entropy and similarity measure is effective for evaluation and selection market segment. Profitability, growth of the market, the likelihood of sustainable differential advantages are the most important insights of criteria.

Originality/value – This paper put forward an effective multi-criteria decision-making dealing with uncertain information.

Keywords Multi-criteria decision-making, Market segment selection, Neutrosophic set, Entropy, Similarity measure

Paper type Research paper

1. Introduction

The selection and evaluation of market segments boost the competitive advantage of companies. Market segment is to split the customer market into small clusters or segments based on various characteristics such as locations, psychographics and consumer behavior. The company then evaluates which clusters or segments to be target markets with the highest opportunity. Market segmentation makes more advantages compared to mass marking, including: (1) expand firms' own market through improving the customer

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satisfaction (Aghdaie *et al.*, 2013), (2) increase profit or effectiveness of the firms (Chiu *et al.*, 2009), (3) manufacture more appropriate products or service from market segment.

Ever since Smith (1956) presented the benefits of market segment, numerous studies have been investigated in evaluating and selecting market segments (McDonald and Dunbar, 2004; Quinn and Dibb, 2010; Aghdaie *et al.*, 2013; Ghorabaee *et al.*, 2017; Duong *et al.*, 2020). With a view to evaluating a variety of market segments, decision makers are required to take into account appropriate criteria during the selection process. Wind (1978) believed that the selection procedure was complex to be addressed by managers who carried out some important features such as customer characteristics, competitive potentials and feasibility. Freytag and Clarke (2001) suggested some main elements for this process, including the expected profit in comparison with the related risk, the rivals, technology, the likelihood of gaining customers in the market, technology, governmental and public actions, the potentials to attain a competitive advantage. Ghorabaee *et al.* (2017) select the market segments using the Porter's five force of competition. Thao and Duong (2019) used the aspects of profitability, market size, attractiveness as criteria for market segments. Hence, the selection and evaluation of market segment can be viewed as a multiple criteria decision-making (MCDM) problem in which the vague and imprecise information of experts or decision makers should not be neglected.

Smarandache (1998) proposed a neutrosophic sets, which is one of the most powerful tools for modeling uncertainty in decision-making problems. The neutrosophic sets is an extension of fuzzy set and intuitionistic fuzzy sets. By using the neutrosophic sets, the MCDM approach can handle not only the vague, imprecise and incomplete information but also the indeterminate and inconsistent information, whereas the fuzzy set and the intuitionistic fuzzy set fail to work.

Several popular MCDM approaches using fuzzy sets, intuitionistic fuzzy sets and/or neutrosophic sets have been proposed in literature to solve the market segment selection and evaluation problems such as a technique of order preference similarity to the ideal solution (TOPSIS), analytic hierarchy process (AHP), quality function deployment (QFD) (Dat *et al.*, 2015; Aghdaie, 2015; Ghorabaee *et al.*, 2017; Tian *et al.*, 2018). Zandi *et al.* (2012) evaluated and selected market segmentation through a bi-level multi-objective optimization model, which combines the return on assets (ROA) and fuzzy cooperative n-person game theory. The imprecise and vague data were represented by a trapezoidal fuzzy number. Aghdaie *et al.* (2013) applied the fuzzy AHP methods in the sense of Chang's extent analysis (1992) in calculating the weight of each criterion and sub-criterion. The complex proportional assessment with gray relations (COPRAS-G) method was used to rank all the alternatives. In other research, Aghdaie (2015) combined AHP with TOPSIS for selecting target market with three cluster criteria, including related segments, financial and economic, technological aspects. For this purpose, Ghorabaee *et al.* (2017) approached the generalization of combinative distance-based assessment (CODAS) utilizing trapezoidal fuzzy numbers. Tian *et al.* (2018) proposed a hybrid single-valued neutrosophic QFD to support the market segment evaluation and selection. Many criteria have been used to assess the market segment, including segment growth rate, expected profit, competitive intensity, capital required and level of technology utilization.

Decision-making problem is an operation system dealing with finding the best solution, which involves conflicting criteria. Identifying the weights of criteria and the ranking of objects with respect to criteria are two key components of a typical decision-making model. To determine the weights of criteria, the fuzzy AHP approach is one of the most popular techniques. The fuzzy AHP approach organizes the pairwise judgments of criteria and sub-criteria, with the aim of making the relative priorities for a set of alternatives. However, the weakness of fuzzy AHP is time-consuming due to a large number of pairwise comparison be employed. To overcome this problem, this study proposes a new entropy and new similarity measures for neutrosophic sets to calculate the importance weight of criteria in MCDM approach. This study further develops the TOPSIS approach based on the new entropy and similarity measure for evaluating the market segment.

The rest of paperwork is divided into three parts. In Section 2, some related works are introduced thoroughly which we involve the neutrosophic set, fundamental of similarity, entropy and new entropy. Additionally, a new similarity, entropy in the neutrosophic sets is proposed. A new TOPSIS approach is presented in Section 3. An application for selecting the best market segment is allocated in Section 4, and conclusion is the final section.

2. A new entropy and similarity measure on the neutrosophic set

This section recalls some concepts of a single-valued neutrosophic set (SVNS), which was introduced by Wang *et al.* (2010) as well as introduce a new similarity and entropy measure of am SVNS.

2.1 Single-valued neutrosophic set

An SVNS A^* in X universal set is characterized by T_{A^*}, I_{A^*}, F_{A^*}, which represent the truth–membership, indeterminacy–membership, falsity–membership function, respectively. For each element x of X, then $T_{A^*}(x), I_{A^*}(x), F_{A^*}(x) \in [0,1]$, satisfying $T_{A^*}(x) + I_{A^*}(x) + F_{A^*}(x) \leq 3$ for all $x \in X$.

For convenience, denote an SVNS by $A^* = \{(x, T_{A^*}(x), I_{A^*}(x), F_{A^*}(x)) | x \in X\}$. The set of SVNS on X is denoted by $SVNS(X)$.

2.2 Similarity measure of neutrosophic sets

A similarity measure represents the similar degree of objects dealing with the problems in real life such as decision-making, machine learning, etc. Unlike similarity, entropy determines the fuzzy level of objects. In the MCDM context, similarity measure is used as distance measure tool, and entropy can be used to calculate the weights of attributes. For two sets $A^*, B^* \in SVNS(X)$, the similarity measure and entropy measure are defined as follows:

Definition 1 (Broumi and Smarandache, 2013). The function $s^* : SVNS(X) \times SVNS(X) \to [0,1]$ is called as a similarity measure on $SVNS(X)$ if satisfying the following conditions:

(1) $0 \leq s^*(A^*, B^*) \leq 1$;

(2) $s^*(A^*, B^*) = s^*(B^*, A^*)$;

(3) $s^*(A^*, B^*) = 1$ if only if $A^* = B^*$; and

(4) If $A^* \subset B^* \subset C*$ then $s^*(A^*, C*) \leq s^*(A^*, B^*)$ and $s^*(A^*, C*) \leq s^*(B^*, C*)$.

Definition 2 (Thao and Smarandache, 2020). An entropy on $SVNS(X)$ is a function $e^* : SVNS(X) \to [0,1]$ satisfying all following conditions:

(1) $e^*(A^*) = 0$ if A^* is a crisp set, i.e. $A*_i = (T_{A^*}(x_i), I_{A^*}(x_i), F_{A^*}(x_i)) = (1,0,0)$ or $A^*_i = (T_{A^*}(x_i), I_{A^*}(x_i), F_{A^*}(x_i)) = (0,0,1)$ for all $x_i \in X$.

(2) $e^*(A^*) = 1$ if $A^* = \{(x_i, 0.5, 0.5, 0.5) | x_i \in X\}$.

(3) $e^*(A) = e^*(A^C)$, for all $A \in SVNS(X)$.

(4) $e^*(A) \leq e^*(B)$ if either
$T_A(x_i) \leq T_B(x_i), I_A(x_i) \leq I_B(x_i), F_A(x_i) \leq F_B(x_i)$
when $\max\{T_B(x_i), I_B(x_i), F_B(x_i)\} \leq 0.5$ or $T_A(x_i) \geq T_B(x_i), I_A(x_i) \geq I_B(x_i)$, $F_A(x_i) \geq F_B(x_i)$ when $\min\{T_B(x_i), I_B(x_i), F_B(x_i)\} \geq 0.5$.

2.3 Proposed entropy measure of the single-valued neutrosphic set

This section proposes a new entropy measure of an SVNS on X as the following:

Theorem 1. Let $A = \{(x_i, T_A(x_i), I_A(x_i), F_A(x_i))|x_i \in X\}$ be an SVNS set on X. Then, the entropy measure of the SVNS A is defined as follows:

$$E_T(A) = 1 - \frac{1}{n} \sum_{i=1}^{n} \frac{|T_A(x_i) - 0.5| + |F_A(x_i) - 0.5| + |I_A(x_i) - 0.5| + max\{|T_A(x_i) - 0.5|, |F_A(x_i) - 0.5|, |I_A(x_i) - 0.5|\}}{4} \tag{1}$$

Proof

(1) If A is a crisp set, then for all $x_i \in X$, then A = (1, 0, 0) or A = (0, 0, 1); therefore:

$$\mathrm{E}_T^i(\mathrm{A}) = \frac{|T_A(x_i) - 0.5| + |F_A(x_i) - 0.5| + |I_A(x_i) - 0.5| + max\{|T_A(x_i) - 0.5|, |F_A(x_i) - 0.5|, |I_A(x_i) - 0.5|\}}{4} = 1.$$

It implies that $E_T(A) = 0$.

(2) If $A = \{(x_i, 0.5, 0.5, 0.5)|x_i \in X\}$, then $\mathrm{E}_T^i(\mathrm{A}) = 0$. It implies $E_T(A) = 1$.

(3) It is easy to verify that $E(A) = E(A^C)$ for all $A \in SVNS(X)$.

(4) If either
$T_A(x_i) \leq T_B(x_i), I_A(x_i) \leq I_B(x_i), F_A(x_i) \leq F_B(x_i)$
when $\max\{T_B(x_i), I_B(x_i), F_B(x_i)\} \leq 0.5$
or $T_A(x_i) \geq T_B(x_i), I_A(x_i) \geq I_B(x_i), F_A(x_i) \geq F_B(x_i)$ when $\min\{T_B(x_i), I_B(x_i), F_B(x_i)\} \geq 0.5$,
then $|T_B(x_i) - 0.5| \leq |T_A(x_i) - 0.5|$, $|I_B(x_i) - 0.5| \leq |I_A(x_i) - 0.5|$, $|T_B(x_i) - 0.5| \leq |T_A(x_i) - 0.5|$,
and $|I_{B^C}(x_i) - 0.5| \leq |I_{A^C}(x_i) - 0.5|$ for all $x_i \in X$.

It means that $E_T(A) \leq E_T(B)$.

2.4 Proposed similarity measure of single-valued neutrosphic sets

This part introduces another approach to build the similarity measure of an SVNS. To do this, the similarity measure is determined through an entropy measure on the SVNS. For two given $A, B \in SVNS(X)$, defining a new SVSN $N(A, B)$ as following:

$$T_{N(A,B)}(x_i) = \frac{1 + |T_A(x_i) - T_B(x_i)|}{2}, I_{N(A,B)}(x_i) = \frac{1 + |I_A(x_i) - I_B(x_i)|}{2},$$
$$F_{N(A,B)}(x_i) = \frac{1 + |F_A(x_i) - F_B(x_i)|}{2} \tag{2}$$

for all $x_i \in X$.

In particular, $T_{N(A,B)}(x_i) \geq 0.5, I_{N(A,B)}(x_i) \geq 0.5$ and $F_{N(A,B)}(x_i) \geq 0.5$ for all $x_i \in X$.

Theorem 2 (*Thao and Smarandache, 2020*). The function $S(A,B) = E(N(A,B))$ determines a similarity measure of A and B on $SVNS(X)$ if E is an entropy.

Using equations (1) and (2), the new similarity measures of two SVNSs $A, B \in NS(X)$ are defined as follows:

$$S_T(A,B) = 1 - \frac{1}{8n}\sum_{i=1}^{n}\left\{\begin{array}{l} |T_A(x_i) - T_B(x_i)| + |F_A(x_i) - F_B(x_i)| + |I_A(x_i) - I_B(x_i)| + \\ \max\{|T_A(x_i) - T_B(x_i)|, |F_A(x_i) - F_B(x_i)|, |I_A(x_i) - I_B(x_i)|\} \end{array}\right\} \quad (3)$$

In general, if $\omega = (\omega_1, \omega_2, \ldots, \omega_n)$ is the weight vector on X, then the similarity measure generating from equation (3) is:

$$S_T(A,B) = 1 - \sum_{i=1}^{n}\frac{\omega_i}{8}\left\{\begin{array}{l} |T_A(x_i) - T_B(x_i)| + |F_A(x_i) - F_B(x_i)| + |I_A(x_i) - I_B(x_i)| + \\ \max\{|T_A(x_i) - T_B(x_i)|, |F_A(x_i) - F_B(x_i)|, |I_A(x_i) - I_B(x_i)|\} \end{array}\right\} \quad (4)$$

3. The expand of TOPSIS model based on entropy and similarity measure for evaluation and selection market segments

One of the most popular MCDM models is TOPSIS, which was proposed by Hwang and Yoon (1981). The fundamental concept of the TOPSIS method is that the most alternative is by all means near to the positive ideal solution and simultaneously farthest negative ideal solution. So far, this model has gained attention of researchers for its effectiveness. The weighted determination of criteria and the distance measure are two main steps in the TOPSIS model. In this part, we carry out an extension of the TOPSIS model to cope with the MCDM issue. Unlike the traditional TOPSIS model using the Euclidean or Hamming distances for calculation the distance from each alternative to ideal solution, this model uses the new similarity measure under a neutrosophic environment. An innovative entropy is also taken into consideration for accomplishing the weights of criteria.

Initially, consider m market segments $A = \{A_1, A_2, \ldots, A_m\}$ versus n criteria $C = \{C_1, C_2, \ldots, C_n\}$ with the support of decision makers. The process of extension TOPSIS is outlined as follows.

3.1 Determine the decision matrix

Execute the single-valued neutrosophic decision matrix of alternatives under criteria in form of $D = [x_{ij}]_{mn}$ in which the neutrosophic number $x_{ij} = (T_{ij}, I_{ij}, F_{ij})$ is used to externalize the judgment of alternatives $A_i (i = 1, 2, \ldots, m)$ with respect to criteria C_j.

3.2 Determine the weight ω_j of criteria C_j

The prior preference determination is given by decision makers for the relative importance of criteria, which can lead to subjective identify. The evaluation of each alternative under features have put forward to gain the objective weights of criteria. Let $C_j = \{x_{j1}, x_{j2}, \ldots, x_{jm} | j = 1, \ldots, n\}$ is the importance weight of criteria C_j. Using equation (1), the entropy measures e_j of $C_j, j = 1, 2, \ldots, n$ are calculated. The weight ω_j of each criterion C_j is determined by:

$$\omega_j = \frac{1 - e_j}{\sum_{j=1}^{n} (1 - e_j)} \tag{5}$$

for all $j = 1, 2, \ldots, n$.

3.3 *Identify the best solution and the worst solution*

The best solution A^* and the worst solution A^* are taken depending on the type of attribute, cost or benefit criterion. The neutrosophic numbers are used for representation of the best and worst solution as follows:

$$\begin{aligned} A^* &= \{(C_j, T_j^*, I_j^*, F_j^*) | C_j \in C\} \\ &= \begin{cases} (C_j, \min\limits_{i=1,\ldots,m} T_{ij}, \max\limits_{i=1,\ldots,m} \mathrm{I}_{ij}, \max\limits_{i=1,\ldots,m} F_{ij}) & \text{if } C_j \text{ is a cost criterion} \\ (C_j, \max\limits_{i=1,\ldots,m} T_{ij}, \min\limits_{i=1,\ldots,m} I_{ij}, \min\limits_{i=1,\ldots,m} F_{ij}) & \text{if } C_j \text{ is a benefit criterion} \end{cases} \end{aligned} \tag{6}$$

$$\begin{aligned} A^* &= \left\{\left(C_j, T_j', I_j', F_j'\right) | C_j \in C\right\} \\ &= \begin{cases} (C_j, \min\limits_{i=1,\ldots,m} T_{ij}, \max\limits_{i=1,\ldots,m} \mathrm{I}_{ij}, \max\limits_{i=1,\ldots,m} F_{ij}) & \text{if } C_j \text{ is a cost criterion} \\ (C_j, \max\limits_{i=1,\ldots,m} T_{ij}, \min\limits_{i=1,\ldots,m} I_{ij}, \min\limits_{i=1,\ldots,m} F_{ij}) & \text{if } C_j \text{ is a benefit criterion} \end{cases} \end{aligned} \tag{7}$$

3.4 *Determine the relative closeness coefficient*

The traditional TOPSIS approaches distance function such as Hamming distance, Euclidean distance for achievement geometric distance from alternatives to positive ideal solution A^* and negative ideal solution A^*. In this study, the proposed similarity measure is applied.

For each market segment, the similarity measures of S_i^+ and S_i^- from A_i to A^* and A^* are calculated by using equation (4). Then, the relative closeness coefficient of $A_i (i = 1, 2, \ldots, m)$ is defined as follows (Hwang and Yoon, 1981):

$$CC_i = \frac{S_i^+}{S_i^+ + S_i^-} \tag{8}$$

S_i^+ and S_i^- are similarity measures from A_i to A^* and A^* for all $i = 1, 2, \ldots, m$.

3.5 *Ranking of market segments*

The best market segment is nearest A^* and farthest A^*, therefore the ranking of market segments $A = \{A_1, A_2, \ldots, A_m\}$ with $A_i \succ A_k$ if $CC_i \succ CC_k$ for all $i, k = 1, 2, \ldots, m$.

4. Result and discussion

In this section, we apply the proposed model for the evaluation and selection market segment in four segmentations A_1, A_2, A_3, A_4. For demonstration of the proposed model, the data were gained by Thao and Duong (2019) with eight benefit criteria for assessment market segments, including identify profitability (C_1), the growth of the market (C_2), size of market (C_3), likely customer satisfaction (C_4), sales volume (C_5), likelihood of sustainable differential advantage (C_6), development opportunities (C_7) and the differentiation of product (C_8). The model is implemented as follows:

The decision makers determine market segments with respect to criteria using linguistic variables. The SVNS is employed for transferring the rating scale of linguistic variables, which is showed in Table 1 (Tian *et al.*, 2018).

From the evaluation of each expert for each market segment using the neutrosophic number, the integrated value is implemented for the final assessment of each market segment using the basic operators in Wang *et al.* (2010). The neutrosophic decision matrix is shown in Table 2, the integrated values are shown in the last column of Table 2.

From Table 2, the weight vector is calculated following equations (1) and (5), which is $\omega = (0.1549, 0.151, 0.1317, 0.066, 0.0832, 0.159, 0.1278, 0.1264)$. According to the weights of criteria, identify profitability and likelihood of sustainable differential advantage criteria, which are seen as the two most heavily used criteria for selection market segment, followed by the growth of the market, size of market. In terms of business side, profit, growth and size

Table 1. Linguistic variables for rating scale on market segment

Linguistic scale for perform an alternatives	Interval intuitionistic fuzzy scale
Very low (Vl)	(0.1, 0.85, 0.9)
Low (L)	(0.2, 0.75.0.8)
Medium (M)	(0.5, 0.5, 0.45)
Good (H)	(0.8, 0.2, 0.15)
Very good (Vh)	(0.9, 0.1, 0.05)

Table 2. The neutrosophic decision matrix

Criteria	Segment	Decision makers	Averaged values	Segment	Decision makers	Averaged values
C_1	A_1	Vh, Vh, H, H	(0.85, 0.15, 0.1)	A_3	H, H, H, Vh	(0.825, 0.175, 0.125)
C_2		H, H, Vh, Vh	(0.85, 0.15, 0.1)		Vh, Vh, Vh, Vh	(0.9.0.1.0.05)
C_3		H, Vh, H, F	(0.75, 9.25, 0.2)		Vh, Vh, H, H	(0.85, 0.15, 0.1)
C_4		F, H, F, F	(0.575, 0.425, 0.375)		H, Vh, Vh, Vh	(0.875, 0.125, 0.075)
C_5		H, F, F, F	(0.575, 0.425, 0.375)		Vh, Vh, Vh, Vh	(0.9, 0.1, 0.05)
C_6		Vh, H, Vh, Vh	(0.875, 0.125, 0.075)		H, H, Vh, H	(0.825, 0.175, 0.125)
C_7		H, H, Vh, H	(0.825, 0.175, 0.125)		H, H, Vh, Vh	(0.85, 0.15, 0.1)
C_8		H, H, Vh, Vh	(0.85, 0.15, 0.1)		H, Vh, Vh, H	(0.85, 0.15, 0.1)
C_1	A_2	H, F, H, H	(0.725, 0.275, 0.225)	A_4	Vh, Vh, H, H	(0.85, 0.15, 0.1)
C_2		H, F, F, F	(0.575, 0.425, 0.375)		Vh, Vh, H, H	(0.85, 0.15, 0.1)
C_3		F, H, H, F	(0.65, 0.35, 0.3)		H, H, H, Vh	(0.825, 0.175, 0.125)
C_4		F, F, F, F	(0.5, 0.5, 0.45)		F, F, F, F	(0.5, 0.5, 0.45)
C_5		H, F, F, F	(0.575, 0.425, 0.375)		H, F, F, F	(0.575, 0.425, 0.375)
C_6		H, H, H, F	(0.725, 0.275, 0.225)		Vh, Vh, H, H	(0.85, 0.15, 0.1)
C_7		H, H, F, F	(0.65, 0.35, 0.3)		F, F, H, H	(0.65, 0.35, 0.3)
C_8		H, F, F, H	(0.65, 0.35, 0.3)		F, L, L, L	(0.275, 0.688, 0.713)

of the market are the most market attractiveness factors for market segment. These are consistent with the finding of Simkin and Dibb (1998).

Using equations (6) and (7), the SVNS best solution A^* and the SVNS worst solution A^* are shown in Table 3.

The similarity measures S_i^+ and S_i^- from A_i to A^* and A^* are gained by using equation (4), which are described in Table 4.

The relative closeness coefficient of $A_i, (i = 1, 2, ..., 5)$ using equation (8) is shown in Table 5. Four segments are ranked by $A_3 \succ A_1 \succ A_4 \succ A_2$.

According to the characteristic of TOPSIS, the segment A_3 has the highest relative closeness coefficient allocated at the first position, followed by A_1, A_4, A_2. Therefore, the segment A_3 is the most appropriate one for investment. This order is suitable with the ranking four market segment comparing to Thao and Duong's outcome (2019); this confirms to select A_3 with high degree of reliability, and it also shows that our model is valid.

5. Conclusion

Market segment evaluation and selection is one of the most important problems that need to be thoroughly solved to determine a right marketing strategy in roughly competitive environments. It is better to utilize economic segmentation methods before using the costly marketing mixed part. Since the first debase of Smith about the benefits of market segment, various segment excogitations were employed. However, managers have difficulties how to choose the best appropriate segment to serve. Therefore, a mathematical system allows

	A^*	A_*
C_1	(0.85, 0.15, 0.1)	(0.725, 0.275, 0.225)
C_2	(0.9, 0.1, 0.05)	(0.575, 0.425, 0.375)
C_3	(0.85, 0.15, 0.1)	(0.65, 0.35, 0.3)
C_4	(0.85, 0.125, 0.075)	(0.5, 0.5, 0.45)
C_5	(0.9, 0.1, 0.05)	(0.575, 0.425, 0.375)
C_6	(0.85, 0.125, 0.075)	(0.725, 0.275, 0.225)
C_5	(0.85, 0.125, 0.075)	(0.65, 0.35, 0.3)
C_6	(0.85, 0.15, 0.1)	(0.275, 0.6875, 0.7125)

Table 3. The positive ideal solution A^* and the negative ideal solution A_*

	A_1	A_2	A_3	A_4
$S_i^+ = S(A_i, A^*)$	0.9331	0.7765	0.9849	0.8292
$S_i^- = S(A_i, A_*)$	0.7930	0.9497	0.7413	0.8970

Table 4. The similarity measures S_i^+ and S_i^- from A_i to A^* by using equation (5)

	A_1	A_2	A_3	A_4
CC_i	0.5406	0.4498	0.5706	0.4802
Ranking	2	4	1	3

Table 5. The relative closeness coefficient of $A_i, (i=1, 2, ..., 5)$ and their ranking

simple choice, which brings many advantages. The multiple conflicting criteria along with subjective and imprecise assessment cause difficulty in the target market selection process. In this paper, we have scrupulously extended a TOPSIS model based on the entropy and similarity within the neutrosophic environment. The neutrosophic has been recognized as an effective and flexible tool to shed light on uncertain, inconsistent information. A combination of neutrosophic set and MCDM model contributes to improve the model accuracy both in terms of research and practice. In this work, a novel entropy and novel similarity measure is proposed for a neutrosophic set. Entropy tackles and identifies the weights of criteria; meanwhile, the aforementioned similarity allows the relative closeness coefficient aim. The finding shows that profitability, growth of the market, the likelihood of sustainable differential advantages are the most important insights of criteria. Four market segments as well as eight criteria are applied to select the best market segment. The proposed model can be modified to apply for arbitrary market segment numbers with various conflicting criteria. In addition, the model extends the scope not only for market segment but also for other real practices.

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