Multi-Strategy Decision-Making On Enhancing Customer Acquisition Using Neutrosophic Soft Relational Maps

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Abstract. Decision making by the business managerial on framing strategies to foster customer acquisition is a challenging task. The aim of this paper is to introduce a new method of Multi-Strategy Decision-Making (MSDM) integrated with neutrosophic soft relational maps to determine the significant and feasible strategies of customer acquisition and their inter impacts. The proposed method comprises of two-stage processes and it is validated with twenty strategies, five factors associated with customer acquisition and expert 's opinion based on multivalued neutrosophic soft sets.

Keywords: Multi-Strategy, Decision-Making, Neutrosophic soft sets, Relational maps.
AMS Mathematical Subject Classification [2010]: 94Dxx, 90B50.

1. Introduction

Decision theory is characterized by various Multi-Criteria Decision making (MCDM) (otherwise called as Multi-Objective or Multi-Attribute or Multi-Dimension Decision-Making) methods such as Analytical Hierarchy Process, ELECTRE, COPRAS, PROMTHEE, TOPSIS, SAW. MCDM methods are used in selection of alternatives subjected to criteria satisfaction. MCDM methods are extended to Fuzzy MCDM to handle uncertainty in decision making. The criterion alternative association is represented as fuzzy values in fuzzy MCDM. Wang et al.developed Fuzzy MCDM method for sustainable supplier selection and evaluation. Peng et al. [10], Saini et al. [12] developed intuitionistic MCDM (IFMCDM) approaches with intuitionistic representation comprising of membership and non-membership values. Neutrosophic sets introduced by Smarandache [13] comprises of truth , indeterminacy and falsity values and it has been extensively used in MCDM. Athar [5], Abdel-Basset [1, 2], Nada et al. [9], Garg et al. [6] developed neutrosophic MCDM models with neutrosophic representations of criterion alternative association. Another kind of sets that also play a key role in decision making is Soft sets introduced by Molodtsov [8], which was later extended to fuzzy soft sets by Maji [7]. Dey et al. [3] presented the applications of multi-fuzzy soft sets in decision-making. Tripathy et al. [14] described the key role of intuitionistic fuzzy soft sets in group decision making. Faruk Karaaslan [4] elicited the implications of neutrosophic soft sets in decision making. Abu and Omar [11] extended neutrosophic soft sets to Q-neutrosophic soft sets and these sets are applied in comprehensive decision-making. In these neutrosophic soft MCDM models, the optimal ranking of the alternatives are determined. But these model do not cater to determine the impact of exercising the alternatives. In this paper the new decision making approach based on MCDM is developed with the replacement of alternatives by strategies to make decisions and the criteria by the objectives to be fulfilled. The proposed method comprises of two-stage processes. The first stage ranks the proposed alternatives based on criteria satisfaction rate with the representation of neutrosophic soft sets and in the second stage the chosen alternatives are associated with the principles of decision making using neutrosophic soft relational maps. The integration of soft sets in relational maps is an innovative initiative of this research work. The

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proposed two-stage decision making process is a ground-breaking endeavor and it is validated by applying to decision making on customer acquisition strategies. Though researchers have explored strategically decision- making in various perspectives, the mathematical approach of strategy selection has not been explored so far to the best of our knowledge and this research work is an opening to it. The content of the paper is organized as follows: the methodology is presented in section 2, the application of the proposed approach is validated in section 3, the results are discussed in section 4, the last section concludes the work.

2. Materials & Methods

This section presents the significance and need of MSDM and the algorithmic approach of determining optimal solution.

2.1. Multi-Strategy Decision-Making. In the approach of MSDM, the primary aim is to rank the strategies. In general, all the productions sectors construct their goals and work towards accomplishing the same. The managerial formulate strategies to achieve the goals, but the major challenge is selection and implementation of feasible strategies to yield optimum benefits. The decision-making environment does not involve only selection of alternatives with respect to criteria satisfaction, rather it involves the other dimension of choosing the right optimizing strategies. Strategical decision making is another dominating phenomenon and it has to be focused and this is how the approach of MSDM has evolved. In this new approach the method of finding the optimal strategy is a two-step process. The first step ranks the strategies and the second step associates their inter relationship with the principles of decision making. The steps are as follows:

Characterization of decision-making problem

Selection of objectives of the firm

Formulation of strategies from expert's outlook

Construction of initial decision-making soft matrix

Computation of the cumulative satisfaction score

Ranking of the strategies

Relational map modeling of the strategies with the core domain of decision-making

Determination of inter relational impacts

3. Application of the proposed MSDM approach

This section applies the proposed two stage processes of MSDM to the decision making on customer acquisition strategies based on expert's opinion presented as below (Table 3.1).

S_1 Selection of Advertising medium to propagate the product,
S_2 Designing user friendly products,
S_3 Customizing the product's utility to the needs of the buyers,
S_4 Attending to the diverse needs of the customers,
S_5 Developing multi-faceted products reflecting the ethos of the customers,
S_6 Scaling the cost of the product to customer's budget,

S_7 Periodic Propagation of the attributes of the product,
S_8 Product outlook modification,
S_9 Creating smart products,
S_{10} Developing innovative kind of products suiting the dynamic needs of the consumers,
S_{11} Create an ambiance to purchase product by providing offers,
S_{12} Communicating the attributes of the product to the customers,
S_{13} On line engagement with the customers,
S_{14} Establishing Trade mark of the product,
S_{15} Provision of various kinds of payment portals,
S_{16} Enrichment of the quality of the product using modern technology,
S_{17} Strengthening the consistency and reliability of the product,
S_{18} Designing products with values adding to consumer's image,
S_{19} Periodical review of product sales and marketing,
S_{20} Integrating eco-friendly characteristics with the products.

In the perspective of soft sets, let $U = \{S_1, S_2, \ldots, S_{20}\}$ and $A = \{A_1, A_2, ..., A_5\}$ be the set of purchasing behavior influencing factors, where

$A_1 =$ Psychological, $A_2 =$ Personal, $A_3 =$ Product, $A_4 =$ Social, $A_5 =$ Cultural.

A multivalued neutrosophic soft mapping $G : A \longrightarrow P(U)$ is represented as follows:

$$\begin{aligned} G(A_1) = \; & \{\frac{(0.9,0.1,0.2),(0.8,0.3,0.2),(0.9,0.1,0.2)}{S_1}, \frac{(0.6,0.3,0.3),(0.6,0.1,0.3),(0.6,0.3,0.3)}{S_2}, \\ & \frac{(0.8,0.3,0.5),(0.9,0.3,0.5),(0.8,0.3,0.5)}{S_3}, \frac{(0.6,0.2,0.3),(0.6,0.2,0.3),(0.6,0.2,0.3)}{S_4}, \\ & \frac{(0.7,0.5,0.2),(0.6,0.4,0.2),(.07,0.5,0.2)}{S_5}, \frac{(0.9,0.1,0.1),(0.9,0.1,0.1),(0.9,0.1,0.1)}{S_6}, \\ & \frac{(0.8,0.3,0.5),(0.8,0.2,0.5),(0.8,0.3,0.5)}{S7}, \frac{(0.6,0.4,0.4),(0.6,0.4,0.3),(0.6,0.4,0.4)}{S_8}, \\ & \frac{(0.7,0.5,0.2),(0.6,0.1,0.2),(0.7,0.5,0.2)}{S_9}, \frac{(0.6,0.4,0.3),(0.6,0.4,0.3),(0.6,0.4,0.3)}{S_{10}}, \\ & \frac{(0.9,0.1,0.1),(0.9,0.1,0.1),(0.9,0.1,0.1)}{S_{11}}, \frac{(0.9,0.1,0.2),(0.9,0.1,0.1),(0.9,0.1,0.2)}{S_{12}}, \\ & \frac{(0.8,0.3,0.5),(0.8,0.3,0.5),(0.8,0.3,0.5)}{S_{13}}, \frac{(0.9,0.1,0.2),(0.9,0.1,0.2),(0.9,0.1,0.2)}{S_{14}}, \\ & \frac{(0.8,0.3,0.5),(0.8,0.2,0.4),(0.8,0.3,0.5)}{S_{15}}, \frac{(0.6,0.4,0.3),(0.6,0.5,0.3),(0.6,0.4,0.3)}{S_{16}}, \\ & \frac{(0.8,0.3,0.5),(0.8,0.2,0.5),(0.8,0.3,0.5)}{S_{17}}, \frac{(0.8,0.3,0.5),(0.8,0.2,0.5),(0.8,0.3,0.5)}{S_{18}}, \\ & \frac{(0.6,0.4,0.3),(0.6,0.4,0.4),(0.6,0.4,.3)}{S_{19}}, \frac{(0.7,0.5,0.2),(0.7,0.5,0.1),(0.7,0.5,0.2)}{S_{20}}\}, \end{aligned}$$

$$\begin{aligned} G(A_2) = \; & \{\frac{(0.7,0.5,0.2),(0.6,0.4,0.2)),(0.7,0.5,0.2)}{S_1}, \frac{(0.7,0.5,0.2),(0.9,0.1,0.3),(0.9,0.1,0.2)}{S_2}, \\ & \frac{(0.8,0.2,0.4),(0.8,0.2,0.3),(0.8,0.2,0.4)}{S_3}, \frac{(0.9,0.1,0.2),(0.9,0.3,0.2),(0.9,0.1,0.2)}{S_4}, \\ & \frac{(0.8,0.2,0.4),(0.7,0.2,0.4),(0.8,0.2,0.4)}{S_5}, \frac{(0.6,0.4,0.3),(0.6,0.4,0.4),(0.6,0.4,0.3)}{S_6}, \\ & \frac{(0.6,0.4,0.3),(0.6,0.3,0.3),(0.6,0.4,0.3)}{S7}, \frac{(0.6,0.4,0.3),(0.6,0.2,0.3),(0.6,0.4,0.3)}{S_8}, \\ & \frac{(0.8,0.2,0.4),(0.7,0.2,0.4),(0.8,0.2,0.4)}{S_9}, \frac{(0.9,0.2,0.3),(0.9,0.2,0.3),(0.9,0.2,0.3)}{S_{10}}, \\ & \frac{(0.8,0.2,0.4),(0.8,0.2,0.4),(0.8,0.2,0.4)}{S_{11}}, \frac{(0.6,0.4,0.3),(0.6,0.4,0.3),(0.6,0.4,0.3)}{S_{12}}, \\ & \frac{(0.9,0.1,0.1),(0.9,0.2,0.1),(0.9,0.1,0.1)}{S_{13}}, \frac{(08,0.2,0.4),(0.7,0.2,0.4),(0.8,0.2,0.4)}{S_{14}}, \\ & \frac{(0.9,0.1,0.2),(0.8,0.1,0.2)(0.9,0.1,0.2)}{S_{15}}, \frac{(0.9,0.1,0.1),(0.9,0.1,0.2),(0.9,0.1,0.1)}{S_{16}}, \\ & \frac{(0.6,0.4,0.3),(0.6,0.4,0.2),(0.6,0.4,0.3)}{S_{17}}, \frac{(0.9,0.1,0.1),(0.9,0.1,0.3),(0.9,0.1,0.1)}{S_{18}}, \\ & \frac{(0.9,0.1,0.1),(0.9,0.1,0.1),(0.9,0.1,0.1)}{S_{19}}, \frac{(0.8,0.2,0.4),(0.8,0.1,0.3),(0.8,0.2,0.4)}{S_{20}}\}, \end{aligned}$$

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\begin{aligned}
G(A_3) = \; & \{\frac{(0.8,0.3,0.5),(0.8,0.1,0.3),(0.8,0.3,0.5)}{S_1}, \frac{(0.8,0.2,0.4),(0.7,0.2,0.4),(0.8,0.2,0.4)}{S_2}, \\
& \frac{(0.5,0.4,0.6),(0.6,0.4,0.3),(0.5,0.4,0.6)}{S_3}, \frac{(0.8,0.2,0.4),(0.7,0.5,0.3),(0.8,0.2,0.4)}{S_4}, \\
& \frac{(0.9,0.2,0.3),(0.7,0.5,0.3),(0.9,0.2,0.3)}{S_5}, \frac{(0.7,0.5,0.2),(0.9,0.3,0.2),(0.7,0.5,0.2)}{S_6}, \\
& \frac{(0.6,0.4,0.3),(0.6,0.3,0.3),(0.6,0.4,0.3)}{S7}, \frac{(0.7,0.5,0.2),(0.8,0.5,0.2),(0.7,0.5,0.2)}{S_8}, \\
& \frac{(0.9,0.2,0.3),(0.8,0.1,0.4),(0.9,0.2,0.3)}{S_9}, \frac{(0.8,0.2,0.4),(0.7,0.3,0.2),(0.8,0.2,0.4)}{S_{10}}, \\
& \frac{(0.8,0.2,0.4),(0.8,0.5,0.2),(0.8,0.2,0.4)}{S_{11}}, \frac{(0.6,0.4,0.3),(0.4,0.5,0.2),(0.7,0.5,0.2)}{S_{12}}, \\
& \frac{(0.9,0.1,0.2),(0.9,0.1,0.3),(0.7,0.5,0.2)}{S_{13}}, \frac{(0.9,0.1,0.2),(0.9,0.1,0.3),(0.7,0.5,0.2)}{S_{14}}, \\
& \frac{(0.6,0.4,0.3),(0.6,0.4,0.3),(0.7,0.5,0.2)}{S_{15}}, \frac{(0.9,0.2,0.3),(0.7,0.5,0.1),(0.7,0.5,0.2)}{S_{16}}, \\
& \frac{(0.9,0.1,0.2),(0.7,0.5,0.1),(0.7,0.5,0.2)}{S_{17}}, \frac{(0.6,0.4,0.3),(0.7,0.5,0.1),(0.7,0.5,0.2)}{S_{18}}, \\
& \frac{(0.7,0.5,0.2),(0.9,0.2,0.2),(0.9,0.2,0.3)}{S_{19}}, \frac{(0.9,0.1,0.1),(0.6,0.4,0.4),(0.6,0.4,0.3)}{S_{20}}\},
\end{aligned}
$$

$$
\begin{aligned}
G(A_4) = \; & \{\frac{(0.6,0.4,0.3),(0.5,0.2,0.3),(0.6,0.4,0.3)}{S_1}, \frac{(0.9,0.1,0.1),(0.9,0.1,0.1),(0.9,0.1,0.1)}{S_2}, \\
& \frac{(0.7,0.5,0.2),(0.7,0.4,0.2),(0.7,0.5,0.2)}{S_3}, \frac{(0.7,0.5,0.2),(0.7,0.5,0.3),(0.7,0.5,0.2)}{S_4}, \\
& \frac{(0.7,0.5,0.2),(0.7,0.5,0.3),(0.7,0.5,0.2)}{S_5}, \frac{(0.9,0.1,0.2),(0.9,0.3,0.2),(0.9,0.1,0.2)}{S_6}, \\
& \frac{(0.5,0.4,0.6),(0.5,0.4,0.7),(0.5,0.4,0.6)}{S_7}, \frac{(0.7,0.5,0.2),(0.8,0.5,0.2),(0.7,0.5,0.2)}{S_8}, \\
& \frac{(0.8,0.2,0.4),(0.8,0.1,0.4),(0.8,0.2,0.4)}{S_9}, \frac{(0.7,0.5,0.2),(0.7,0.3,0.2),(0.7,0.5,0.2)}{S_{10}}, \\
& \frac{(0.7,0.5,0.2),(0.8,0.5,0.2),(0.7,0.5,0.2)}{S_{11}}, \frac{(0.7,0.5,0.2),(0.4,0.5,0.2),(0.7,0.5,0.2)}{S_{12}}, \\
& \frac{(0.9,0.1,0.2),(0.9,0.1,0.3),(0.9,0.1,0.2)}{S_{13}}, \frac{(0.9,0.4,0.3),(0.7,0.2,0.3),(0.6,0.4,0.3)}{S_{14}}, \\
& \frac{(0.7,0.5,0.2),(0.6,0.4,0.3),(0.7,0.5,0.2)}{S_{15}}, \frac{(0.7,0.5,0.2),(0.7,0.5,0.1),(0.9,0.2,0.3)}{S_{16}}, \\
& \frac{(0.7,0.5,0.2),(0.7,0.5,0.1),(0.9,0.1,0.2)}{S_{17}}, \frac{(0.7,0.5,0.2),(0.7,0.5,0.4),(0.6,0.4,0.3)}{S_{18}}, \\
& \frac{(0.9,0.2,0.3),(0.9,0.2,0.2),(0.9,0.2,0.3)}{S_{19}}, \frac{(0.6,0.2,0.3),(0.9,0.2,0.1),(0.9,0.2,0.3)}{S_{20}}\}
\end{aligned}
$$

and

$$
\begin{aligned}
G(A_5) = \; & \{\frac{(0.9,0.2,0.3),(0.9,0.1,0.2),(0.9,0.2,0.3)}{S_1}, \frac{(0.7,0.5,0.2),(0.8,0.5,0.2),(0.7,0.5,0.2)}{S_2}, \\
& \frac{(0.8,0.2,0.4),(0.7,0.2,0.4),(0.8,0.2,0.4)}{S_3}, \frac{(0.9,0.2,0.3),(0.9,0.2,0.4),(0.9,0.2,0.3)}{S_4}, \\
& \frac{(0.8,0.2,0.4),(0.8,0.2,0.5),(0.8,0.2,0.4)}{S_5}, \frac{(0.7,0.5,0.2),(0.8,0.5,0.2),(0.7,0.5,0.2)}{S_6}, \\
& \frac{(0.9,0.2,0.3),(0.9,0.2,0.1),(0.9,0.2,0.3)}{S_7}, \frac{(0.8,0.2,0.4),(0.8,0.2,0.4),(0.8,0.2,0.4)}{S_8}, \\
& \frac{(0.9,0.1,0.1),(0.9,0.2,0.1),(0.9,0.1,0.1)}{S_9}, \frac{(0.9,0.2,0.3),(0.8,0.2,0.3),(0.9,0.2,0.3)}{S_{10}}, \\
& \frac{(0.8,0.2,0.4),(0.8,02,0.4),(0.8,0.2,0.4)}{S_{11}}, \frac{(0.8,0.2,0.4),(0.7,0.2,0.4),(0.8,0.2,0.4)}{S_{12}}, \\
& \frac{(0.7,0.5,0.2),(0.8,0.3,0.2),(0.7,0.5,0.2)}{S_{13}}, \frac{(0.9,0.1,0.1),(0.9,0.2,0.1),(0.9,0.1,0.1)}{S_{14}}, \\
& \frac{(0.7,0.5,0.2),(0.7,0.4,0.2),(0.7,0.5,0.2)}{S_{15}}, \frac{(0.8,0.2,0.4),(0.8,0.2,0.3),(0.8,0.2,0.4)}{S_{16}}, \\
& \frac{(0.9,0.2,0.3),(0.8,0.2,0.3),(0.9,0.2,0.3)}{S_{17}}, \frac{(0.9,0.2,0.3),(0.9,0.2,0.2),(0.9,0.2,0.3)}{S_{18}}, \\
& \frac{(0.8,0.2,0.4),(0.8,0.2,0.3),(0.8,0.2,0.4)}{S_{19}}, \frac{(0.9,0.2,0.3),(0.8,0.1,0.3),(0.9,0.2,0.3)}{S_{20}}\}.
\end{aligned}
$$

The score values of each of the strategies with respect to the respective association with the factors are determined by using the algorithm was discussed in [5] (see figure 1). The following factors are considered as the core factors for the next step.

CS_1 Developing multi-faceted products reflecting the ethos of the customers,

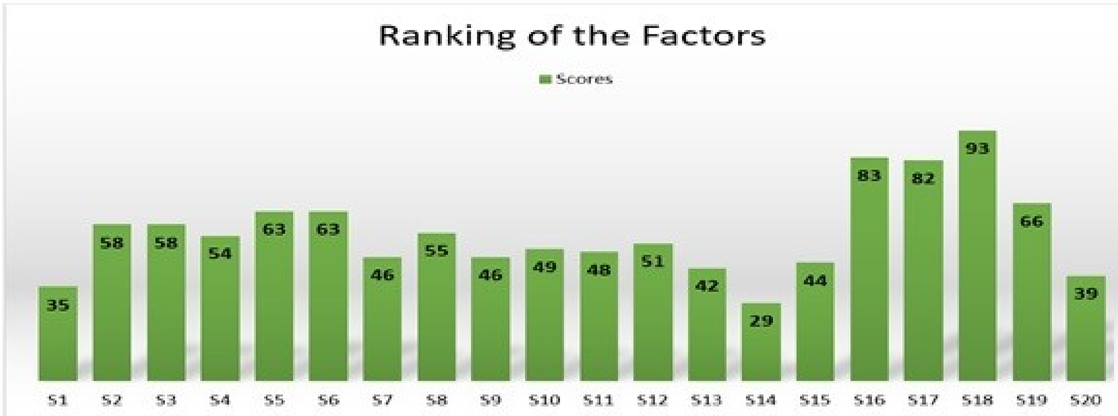

FIGURE 1. Ranking of the Factors.

TABLE 1. Quantification of Linguistic Variable

Linguistic Variable	**Neutrosophic Triangular Number**	**Crisp Value**
Very Low (VL)	((0,0.10,0.15,0.20),0.6,0.2,0.3)	0.06
Low (L)	((0.15,0.2,0.25,0.3),0.6,0.1,0.1)	0.14
Medium (M)	((0.3,0.35,0.4,0.5),0.7,0.1,0.2)	0.23
High (H)	((0.5,0.6,0.7,0.8),0.8,0.2,0.1)	0.41
Very High (VH)	((0.8,0.9,0.95,1),0.9,0.1,0.1)	0.62

CS_2 Scaling the cost of the product to customer's budget,
CS_3 Enrichment of the quality of the product using modern technology,
CS_4 Strengthening the consistency and reliability of the product,
CS_5 Designing products with values adding to consumer's image,
CS_6 Periodical review of product sales and marketing.

These factors are related to the various management systems of the business. The relational impacts are represented linguistic neutrosophic sets and are quantified using neutrosophic triangular fuzzy number as presented in Table 1.

Let $U = \{CS_1, CS_2, \ldots, CS_6\}$ and $M = \{M_1, M_2, M_3, M_4\}$ be the set of management systems of business, where

M_1 = Product Quality Management, M_2 = Customer Loyalty Management,
M_3 = Customer Relationship Management, M_4 = Marketing Management.

A single valued neutrosophic soft mapping $H : M \longrightarrow P(U)$ is represented as follows:

$H(M_1) = \{\frac{VH}{CS_1}, \frac{L}{CS_2}, \frac{VH}{CS_3}, \frac{H}{CS_4}, \frac{M}{CS_5}, \frac{H}{CS_6}\}$, $H(M_2) = \{\frac{H}{CS_1}, \frac{L}{CS_2}, \frac{H}{CS_3}, \frac{VH}{CS_4}, \frac{VH}{CS_5}, \frac{M}{CS_6}\}$,
$H(M_3) = \{\frac{H}{CS_1}, \frac{H}{CS_2}, \frac{H}{CS_3}, \frac{VH}{CS_4}, \frac{VH}{CS_5}, \frac{M}{CS_6}\}$, $H(M_4) = \{\frac{L}{CS_1}, \frac{M}{CS_2}, \frac{M}{CS_3}, \frac{H}{CS_4}, \frac{M}{CS_5}, \frac{VH}{CS_6}\}$.

The relational impacts are determined by using the procedure discussed in [15] (see Table 2).

4. Results and Discussions

The multivalued neutrosophic soft representation takes in the opinion of three experts into consideration. The twenty strategies taken for study are confined to six strategies based on the final scores of the association rate with the factors. The six core factors are related with the principles of business management in various dimensions. Each of the core factors is kept in on position. The associational impacts are analyzed and the fixed points are determined. If the core factor CS_1 is kept in on position, the limit point (1110)(100110) is obtained. The factor

Table 2. Fixed points of the vectors

Initial Vector	**Fixed Point**
$X = (100000)$	$X^*M = (0.620.410.410.14)(1110) := X1$ $X1^*MT = (1.440.691.441.651.470.87) = (100110) := Y$ $Y^*M = (1.261.651.650.78)(1110) := X2$ $X2^*MT = (1.440.691.441.651.470.87) = (100110) := Y1$ $(1110)(100110)$
$X = (010000)$	$X^*M = (0.140.140.410.23)(0011) := X_1$ $X1^*MT = (0.550.640.641.030.850.85) = (010111) := Y$ $Y^*M = (1.191.611.881.49)(0110) := X_2$ $X_2^*MT = (0.820.550.821.241.240.46) = (111110) := Y_1$ $Y_1^*M = (2.022.22.471.24)(0110) := X3$ $X_3^*MT = (0.820.550.821.241.240.46) = (111110) := Y_2$ $(0110)(111110)$
$X = (001000)$	$X^*M = (0.620.410.410.23)(1110) := X_1$ $X_1^*MT = (1.440.691.441.651.470.87) = (100110) := Y$ $Y^*M = (1.261.651.650.78)(1110) := X_2$ $X_2^*MT = (1.440.691.441.651.470.87) = (100110) := Y1$ $(1110)(100110)$
$X = (000100)$	$X^*M = (0.410.620.620.41)(1111) := X_1$, $X_1^*MT = (1.580.921.672.061.71.49) = (000110) := Y$ $Y^*M = (0.641.241.240.64)(1111) := X_2$ $X_2^*MT = (1.580.921.672.061.71.49) = (000110) := Y_1$ $(1111)(000110)$
$X = (000010)$	$X^*M = (0.230.620.620.23)(1111) := X_1$ $X_1^*MT = (1.580.921.672.061.71.49) = (000110) := Y$ $Y^*M = (0.641.241.240.64)(1111) := X_2$ $X_2^*MT = (1.580.921.672.061.71.49) = (000110) := Y_1$ $(1111)(000110)$
$X = (000001)$	$X^*M = (0.410.230.230.62)(1001) := X_1$ $X_1^*MT = (0.760.370.850.820.461.03) = (001001) := Y$ $Y^*M = (1.030.640.640.85)(1001) := X_2$ $X_2^*MT = (0.760.370.850.820.461.03) = (001001) := Y_1$ $(1001)(001001)$

CS_1 is highly associated with CS_4, CS_5 and M_1, M_2, M_3. By repeating the same mechanism, the associational impacts between the other core factors are determined. This approach of Multi-Strategy Decision-Making with neutrosophic soft sets representations facilitate the decision-making process and it eases the procedure of minimizing the number of strategies. The decision makers evolve many strategies, but implementing all the strategies is not possible, it is quite mandatory to explore the core strategies and to detect its relation with other decision-making principles. To make the process much comprehensive, MSDM approach is constructed in this research work.

Conclusions

This paper introduces the approach of Multi-Strategy Decision-Making with two stage process of decision-making. The proposed approach is validated with the decision-making environment of enhancing the customer acquisition strategies. The multivalued neutrosophic soft set representations in the first stage results in confining the number of strategies and the neutrosophic soft relational maps in the second stage is used to determine the relational impacts. This approach can be extended with other kinds of representation. This MSDM approach can be applied to any kind of decision-making environment.

Acknowledgement

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