Identification Of The Main Development Factor And To The Most Income Range Of The Middle Class Family By Using Fuzzy Matrix.

E. P. Siva[1*], C. Ramkumar[2]

Abstract
Nowadays so many middle class families are finding many difficult factors like understanding between husband and wife, minimize the cost of living index, increasing the income sources, well education status between husband and wife, family planning, joint family, good business or job, well social relationship, reducing expenditure, relations interfere and so on. Here we identify the factor which developing the middle class family mostly, also we identify the most income range to which the factor is most supported. To study the passenger transportation problem, the matrix theory was developed in the year 1998 by Dr. W.B. Vasantha and V. Indira. Now we use this model to identify the factor, which supported mostly the middle class family, and also we identify the main income range of the supported families.

Keywords: PID matrix, RD matrix, RID matrix, CEID matrix, RFD matrix, CEFD matrix.

[1*]Department Of Mathematics, Faculty Of Engineering And Technology Kattankulathur – 603203, Srm Institute Of Science And Technology Chengalpattu District, Tamil Nadu, India.
Email Id: Sivae@Srmist.Edu.In
[2]Department Of Mathematics, Vel Tech Multi Tech Dr. Rangarajan Dr. Sakunthala Engineering College, Avadi, Chennai-600 062, Tamilnadu, India. Email Id: Scpram@Gmail.Com

***Corresponding Author:-** E. P. Siva
[*]Department Of Mathematics, Faculty Of Engineering And Technology Kattankulathur – 603203, Srm Institute Of Science And Technology Chengalpattu District, Tamil Nadu, India.
Email Id: Sivae@Srmist.Edu.In

1. The method of application of PID matrix.

A very simple but a very effective technique is used on the collected data of 582 families with different income group and their most development factor of their family. We take the data as it is and transform into percentage income dependent data matrix by taking along the row the income of the family and along the column the different factors by which they improve their life. Using the Raw Data matrix we make it into percentage income dependent data matrix (a_{ij}). This matrix represents a data that is totally uniform. At the third stage we estimate the average of every column in the IFD matrix. Using the average t_j of each j^{th} column, we choose a [5] parameter α from the interval [0,1] and form the Refined Income Dependent matrix, [2]using the formula

if $a_{ij} < (t_j - \alpha \times \sqrt{\frac{tj}{n}})$ then $e_{ij} = -1$ else if $a_{ij} \in (t_j - \alpha \times \sqrt{\frac{tj}{n}}, t_j + \alpha \times \sqrt{\frac{tj}{n}})$ then $e_{ij} = 0$

else if $a_{ij} > (t_j + \alpha \times \sqrt{\frac{tj}{n}})$ then $e_{ij} = +1$.

we redefined the PID matrix into Refined Income Dependent Fuzzy matrix. For this matrix the entries are -1, 0, 1. Now the row sum of this matrix gives the main income range of the middle class family, which is developed by the unidentified factor. We also combine these matrices by varying α Є [0,1] , so that we get the combine effective income dependent data matrix. The row sum is obtained for CEID matrix and conclusion taken by based on the row sum. To identify the most developing factor, we use the raw data matrix. Using the average t_i of each i^{th} row. We choose a [5] parameter β from [0,1] and form the refined factor dependent matrix, [2] using the formula if $a_{ij} <$

$(t_i - \beta \times \sqrt{\frac{ti}{n}})$ then $e_{ij} = -1$ else if $a_{ij} \in (t_i - \beta \times \sqrt{\frac{ti}{n}}, \; ti + \beta \times \sqrt{\frac{ti}{n}})$ then $e_{ij} = 0$ else if $a_{ij} > (t_i + \beta \times \sqrt{\frac{ti}{n}})$ then $e_{ij} = +1$.

we redefine the raw matrix into refined factor fuzzy matrix. For this matrix the entries are -1,0,1. Now the column sum of this matrix gives the most developing factor of the middle class family. We also combine these matrices by varying β Є [0,1]. Hence we get the combined effect factor dependent matrix. The column sum is obtained for CEFD matrix and the conclusion is taken by based on the column sums.

2. Description of the problem

The middle class family is to be developed by different factor is common in all over the world. In particularly take 582 middle class families in the Tamilnadu state. These families have been developing by the factors like understanding between husband and wife, minimize the cost of living index, increasing the income sources, well educational status between husband and wife, family planning, joint family, good business or job, well social relationship, reducing expenditure, relations interfere and so on. Here we take 10 factors as attributes. Hence we use the effective tool fuzzy matrix [3] to identify the most important affecting factor and also we identify the most range of income of the developing middle class family.

3. Identification of the most developing factor of the most income range of the middle class family by using 6 x 10 matrices.

Using the linguistic questionnaire we have taken the following fifteen attributes ($X_1, X_2, X_3, \dots X_{10}$)

X_1 - Minimizing the Cost of living index. X_2 – well social relationship. X_3 – well educational status between husband and wife. X_4 –family planning. X_5 –Reducing the

expenditure. X_6 – Joint family. X_7 – Relations interfere. X_8 – Good business or job. X_9 – Increasing the income sources. X_{10} – Understanding between husband and wife.
We have collected 582 data from 582 middle class families with the six different ranges of income as follows 104 families in the income range 4000 – 6000. 85 families in the income range 6001 – 8000. 100 families in the income range 8001 – 10,000. 90 families in the income range 10,001 – 12,000. 97 families in the income range 12,001 – 14,000. 106 families in the income range 14,001 – 16,000.
The income ranges are taken as rows and the improving factors are taken as columns in the initial raw data matrix.

Initial Raw Data matrix of middle class family of order 6 X 10.

Attributes Income	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
4,000 – 6,000	21	6	6	18	3	0	6	12	21	11
6,001 – 8,000	18	6	5	15	6	3	5	21	3	3
8,001 - 10,000	9	6	5	9	18	6	9	5	24	9
10,001 – 12,000	16	3	6	6	5	12	12	14	11	5
12,001 –14,000	8	5	5	18	24	15	6	5	6	5
14,001- 16,000	3	3	5	3	18	5	18	5	25	21

Percentage Income Dependent Matrix of middle class family of order 6 X 10

Attributes Income	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
4,001 – 6,000	20.19	5.76	5.76	17.30	2.88	0	5.76	11.53	20.19	10.57
6,001 – 8,000	21.17	7.05	5.88	17.64	7.05	3.52	5.88	24.70	3.52	3.52
8,001 - 10,000	9	6	5	9	18	6	9	5	24	9
10,001 – 12,000	17.77	3.33	6.66	6.66	5.55	13.33	13.33	15.55	12.22	5.55
12,001 – 14,000	8.24	5.15	5.15	18.55	24.74	15.46	6.18	5.15	6.18	5.15
14,001 - 16,000	2.83	2.83	4.71	2.83	16.98	4.71	16.98	4.71	23.58	19.81

The average of the above PFD matrix

Average	13.2	4.02	5.52	11.99	12.52	7.17	9.52	11.10	14.94	8.93

The RID matrix for α = 0.15

$$\begin{pmatrix} 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 0 \\ 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & 1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 \end{pmatrix}$$

The row sum matrix

$$\begin{pmatrix} 4 \\ 0 \\ -3 \\ 0 \\ -2 \\ -2 \end{pmatrix}$$

The RID matrix for α = 0.40

$$\begin{pmatrix} 1 & 1 & 0 & 1 & -1 & -1 & -1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 0 \\ 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & 1 & 0 & 1 & 1 & 1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 \end{pmatrix}$$

The row sum matrix

$$\begin{pmatrix} 2 \\ -1 \\ -3 \\ 0 \\ -1 \\ -2 \end{pmatrix}$$

The RID matrix for α = 0.6

$$\begin{pmatrix} 1 & 1 & 0 & 1 & -1 & -1 & -1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & 1 & 0 & -1 & 1 & -1 & 0 & -1 & 1 & 0 \\ 1 & -1 & 1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 \\ -1 & 1 & 0 & 1 & 1 & 1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 \end{pmatrix}$$

The row sum matrix

$$\begin{pmatrix} 2 \\ -1 \\ -1 \\ 0 \\ -1 \\ -2 \end{pmatrix}$$

The CEID matrix

$$\begin{pmatrix} 3 & 3 & 1 & 3 & -3 & -3 & -3 & 1 & 3 & 3 \\ 3 & 3 & 1 & 3 & -3 & -3 & -3 & 3 & -3 & -3 \\ -3 & 3 & -2 & -3 & 3 & -3 & -2 & -3 & 3 & 0 \\ 3 & -3 & 3 & -3 & -3 & 3 & 3 & 3 & -3 & -3 \\ -3 & 3 & -1 & 3 & 3 & 3 & -3 & -3 & -3 & -3 \\ -3 & -3 & -3 & -3 & 3 & -3 & 3 & -3 & 3 & 3 \end{pmatrix}$$

The row sum matrix

$$\begin{pmatrix} 8 \\ -2 \\ -7 \\ 0 \\ -4 \\ -6 \end{pmatrix}$$

Average of the Factor Dependent matrix

$$\begin{pmatrix} 9.99 \\ 9.99 \\ 10 \\ 9.99 \\ 9.99 \\ 9.99 \end{pmatrix}$$

The RFD matrix for β = 0.15

$$\begin{pmatrix} 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\ -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 \end{pmatrix}$$

Column sum matrix $(0 \ -6 \ -6 \ 0 \ 0 \ -2 \ -2 \ 0 \ 2 \ -2)$

The RFD matrix for β = 0.4

$$\begin{pmatrix} 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 1 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\ -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 \end{pmatrix}$$

Column sum matrix $(0 \ -6 \ -6 \ 0 \ 0 \ -2 \ -2 \ 0 \ 2 \ -2)$

The RFD matrix for β = 0.6

$$\begin{pmatrix} 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & 1 & 0 \\ 1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & -1 & -1 & 1 & -1 \\ 1 & -1 & -1 & -1 & -1 & 1 & 1 & 1 & 1 & -1 \\ -1 & -1 & -1 & 1 & 1 & 1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & 1 & -1 & 1 & -1 & 1 & 1 \end{pmatrix}$$

The Column sum matrix $(0 \ -6 \ -6 \ 0 \ 0 \ -2 \ -2 \ 0 \ 2 \ -3)$

The CEFD matrix

$$\begin{pmatrix} 3 & -3 & -3 & 3 & -3 & -3 & -3 & 3 & 3 & 2 \\ 3 & -3 & -3 & 3 & -3 & -3 & -3 & 3 & -3 & -3 \\ -3 & -3 & -3 & -3 & 3 & -3 & -3 & -3 & 3 & -3 \\ 3 & -3 & -3 & -3 & -3 & 3 & 3 & 3 & 3 & -3 \\ -3 & -3 & -3 & 3 & 3 & 3 & -3 & -3 & -3 & -3 \\ -3 & -3 & -3 & -3 & 3 & -3 & 3 & -3 & 3 & 3 \end{pmatrix}$$

The Column sum matrix

$$\begin{pmatrix} 0 & -18 & -18 & 0 & 0 & -6 & -6 & 0 & 6 & -7 \end{pmatrix}$$

4. Results and Discussion:

From the above analysis, we observe that the highest value [4] in the column matrix has not changed with the change of value of the parameter α from 0 to 1. Hence we infer that its corresponding income range Rs. 4000/- to Rs.6000/- of the family is to be developed mostly[1] . The Combined Effect Income Dependent matrix also confirms the same. Also we observe that the highest value in the Row matrix has not changed with the change of value of the parameter β from 0 to 1. Hence we infer that its corresponding factor that is to increase the income sources. The Combined Effect Factor Dependent matrix also confirms the same.

5. Conclusion:

Here we used a very effective fuzzy technique on the collected data of 582 families in Tamilnadu with different income group of the family from Rs.4000/- to Rs. 16,000/- and the developing factors of the family like understanding between husband and wife, well social relationship, well educational status between husband and wife, family planning, Joint family, good business or job, reducing expenditure, minimize the Cost of living index, Relations interfere. Hence we conclude from the above results and discussion that the middle class family whose income range of Rs 4001/- to Rs 6000/- is mostly need to increasing the income sources to develop their family.

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