Chapter V: Investment product preferences of investors using analytical hierarchy process and fuzzy multi criteria decision-making

In real life, the selection of a best alternative based on a number of criteria plays a vital role in success. There are number of traditional methods available in the literature if the association between the alternative and the criterion are in linguistic terms. Among them Fuzzy Analytical Hierarchy processes is an extremely helpful technique. In personal investment, a wrong decision may lead to a serious problem. As each of the alternatives has slight dissimilarity over the other, a selection of a choice wants fuzzy knowledge. In this chapter, six investment product have been taken and using the fuzzy mathematics one of them has been selected as the best one according to a number of attributes like safety of principle, Stability of return, liquidity, Tax benefit, capital appreciation, Inflation resistant, and concealability.

The investment product has more distinct characteristics than the consumer products. Mainly, they are elusive goods. Investment products have their own worth irrespective and independent of its promoter, seller or buyer, title belongs to the investors who buy them, and they can sell it in future or the same can be bought, pledge at various occasion, time and places.

While selecting a particular investment, the investors must have definite idea about the features of the product, which their portfolio should contain. These features must be constant with the investors’ common aim and in addition, should be affordable for them and provide all the incidental advantages and conveniences, which are likely to produce under the various circumstances.
The various criteria needed for an investment product have been studied by many researchers; they have suggested a range of methods, and distinct characteristics of an investment product, which are keenly taken into consideration by the investors to get most of the advantages from the product. Harlis, Peterson (1998) found that the investors who are more concerned about return will not bother about the transaction expenses. Likewise Alexander, Jones and Nigro (1998) found high revenue individuals switching between the investments products look forward for more return from the investment will compensate the increased transaction expenses. Jason Glazier, Kathryn Wilkens (1999) concluded that, it is essential for every investor to thoroughly calculate the expenses, when an increase is made in the investment. John F. Casey (2002) says that investors expect good product distribution, well built management policies, prompt customer service and efficient in money usage as prominent factors in selecting a investment advisory.

Only some of researchers had considered the concurrent influence of the criteria on the individual investment decisions. Arenas et al. had selected only the risk, liquidity and risk in an approach to find a portfolio selection using Fuzzy goal programming. Arthur et al (1997) studied the behavior of focus group in which the dynamics of financial behavior for various situations was analyzed.

Very often the selection of a financial product is done based on the input received from the surroundings and from one’s personal understanding about the range of strength and weaknesses of an investment product. Most of the researchers categorize the preference of an investment product based only on the income from the investment and
the extent of risk with it. Apart from the above there are more factors in selecting an investment product which are usually not studied. The set of factors or criteria which are considered are identified from the response of investors through a questionnaire format. Table 5.1 provide the final set of seven key criteria after duly rewording some of the elements and reducing some that convey the same importance.

Preferably, an investor will like all the essentials to be there, to a high level, in a prospective investment product, but at the same moment, the investor is improbable to locate such investment product which is superior on each of the above stated characteristics than all other potential investment products. Therefore an investor wants to make an option based on what is existing and what are owns personal priority ratings of the attribute he seek in an investment product. So, there is an obligation to recognize a method, so that the relative significance of the elements can be found out for any number of the products. Thus, there is a necessity to give importance of weights in an objective form to the seven elements in Table 5.1. The procedure that is projected here is the analytical hierarchy process, which is described in brief in the next section.

<table>
<thead>
<tr>
<th>Description</th>
<th>Safety of principal (SP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A suitable mechanism to protect against loss under realistic circumstances.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Liquidity (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At short notice, immediately, the instrument irrespective of the quantity is converted into cash</td>
<td></td>
</tr>
</tbody>
</table>
Table No.5.1 (Continued)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability of income (SI)</td>
<td>Consistent and guaranteed return to meet the investor requirements.</td>
</tr>
<tr>
<td>Capital growth (CG)</td>
<td>Fast increase in the capital value.</td>
</tr>
<tr>
<td>Tax benefit (TB)</td>
<td>The return is exempt from tax. So, the net return does not affect.</td>
</tr>
<tr>
<td>Inflation resistance (IR)</td>
<td>The return from the investment at all times protects the existing country’s price rises or inflation</td>
</tr>
<tr>
<td>Concealability (C)</td>
<td>To be protected from social disorders and taking away by the government.</td>
</tr>
</tbody>
</table>

**Source:** Bhalla V.K (1995)

Saaty (1980) developed the Analytic Hierarchy Process (AHP) to facilitate decision making in situations characterized by multiple attributes and alternatives. AHP allows assortment and priority ordering of alternatives based on multiple criteria. It is a decision tool that structures a complex decision problem in a hierarchical style, allows evaluation of tangible and intangible factors, and sets priority among alternative path of action (Foreman & Gass, 2001).

This part of study contains two sections. The first section briefs the final ranking of investment products based on the opinion of the financial experts and also the investors of Tiruchirapalli district. The second section contains the ranking of investment products based on the each criterion, by the financial experts and the investors.
Moreover the ranking of investment products by financial experts have been found using the Triangular fuzzy numbers (TFN) and by the same method the ranking of investment products by the investors are also found. Similarly, the ranking of investment products based on the each criterion is also found for both the financial experts and the investors. So this will make common investor to know, which is the investment product advised by the financial expert for a particular criteria is considered as important or which investment product to select if a criteria is given priority. So by finding the ranking order of the investment product for each criterion as opted by the financial experts and investors, both the ranking can be compared and studied to find the preference of the financial expert’s and the actual preference of the investors.

The decision making is a crucial problem for success. Let M1, M2… Mn is the ‘n’ alternatives available and C1, C2… Cm is the criteria concerned in the estimation of choice. Let Aij be the performance of alternative Mi with respect to criteria Cj and wj is the relative importance of criteria. So, the decision making problem is the classification of the optimum alternative with appropriate criteria.

In the traditional approach for a decision making problems Aij and wj are real numbers. There are number of methods available in literature. Among them Saaty’s Analytic Hierarchy Processes are the most applicable. According to this method the ratings of Ri for each Mi as how much it satisfies the decision maker can be found. According to Ri, the best alternative can be chosen.

In reality, Aij and wj will not be real numbers. They can be verbal linguistic terms like good, poor which are fuzzy in the reality. In a fuzzy translation, saaty’s AHP
technique was developed by using linguistic terms. In this paper, six investment products namely Gold, Real estate, Mutual Fund, Post office, Bank deposit and Equity have been compared with one another according to various criteria and one of them has been chosen, as the best. However they are all very close to one another based on those criteria.

The experts were selected from the Tiruchirapalli district. They were selected based on any one of the following expertise like certified financial planner, Association of Mutual Funds of India (AMFI certified members), Commodity Dealer certificate holder of National Commodity Exchange (NCDEX), Chartered financial Analyst. They are all from financial services industry working for reputed companies. Their companies had branches all over India.

<table>
<thead>
<tr>
<th>Financial Expert No.</th>
<th>Client Service history of the financial Expert (in No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I Year 2002-03</td>
</tr>
<tr>
<td>1</td>
<td>277</td>
</tr>
<tr>
<td>2</td>
<td>363</td>
</tr>
<tr>
<td>3</td>
<td>209</td>
</tr>
<tr>
<td>4</td>
<td>199</td>
</tr>
<tr>
<td>5</td>
<td>218</td>
</tr>
<tr>
<td>6</td>
<td>456</td>
</tr>
<tr>
<td>7</td>
<td>391</td>
</tr>
<tr>
<td>8</td>
<td>227</td>
</tr>
<tr>
<td>9</td>
<td>188</td>
</tr>
</tbody>
</table>

Source: Records of experts
The above table shows the experience profile of the financial experts for 7 years and seven financial experts has more than 400 clients and one financial expert has more than 500 clients.

Data collection methodology for the Investors

The kind of data collected is primary data. The respondents were chosen from the taxpayer’s register of the local administration office. Stratified random sampling method was used to pick the respondents. The respondents were invited through invitation before 15 days in advance for a group discussion in front of the local administration office followed by filling up of a questionnaire which had only linguistic terms.

The invitations were sent to the professional tax payers of the respective places stating the date, time and venue. The respondents were confirmed as investors as they have invested either one of the investment product under study. Before opening the group discussion the respondents were explained the need and actual topic of the group discussion. In every place, the group was told to select a group head, so the leader can reflect the consensus on a questionnaire provided to them. The respondents were asked to communicate each other. The highest time taken for debate by a group to submit a questionnaire was 60 minutes. There was no conflict reported among the members of the group at the end of debate or in completing the questionnaire. After the debate it took 5 minutes for the leader of the group to fill the questionnaire. Each response had satisfied Consistency Index. (Where, C.I < 0.1)
Table No.5.3: Age Profile of Financial Experts

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No. of Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-35</td>
<td>2</td>
</tr>
<tr>
<td>36-50</td>
<td>4</td>
</tr>
<tr>
<td>50 &amp; above</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Primary data

Two thirds of the financial experts interviewed were between the age group of 36 years and 50 years and rest of the financial experts were from between 20 and 35 years of age.

Table No.5.4: Experience Profile of Financial Experts

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>No. of Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 years -10 years</td>
<td>2</td>
</tr>
<tr>
<td>11 Years -15 Years</td>
<td>3</td>
</tr>
<tr>
<td>16 Years &amp; above</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Primary data

Seven financial experts were having experience of more than 10 years in their financial profession and the rest of the financial experts were having experience between 5 years and 10 years.
Table No.5.5: The number of Professional tax payers attended the group discussion from the Tiruchirapalli Corporation

<table>
<thead>
<tr>
<th>Zonal names of Tiruchirapalli corporation</th>
<th>No. of respondents attended the group discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Ariyamanagalam</td>
<td>18</td>
</tr>
<tr>
<td>2.K.Abhishekapuram</td>
<td>17</td>
</tr>
<tr>
<td>3.Srirangam</td>
<td>19</td>
</tr>
<tr>
<td>4.Ponmalai</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>77</td>
</tr>
</tbody>
</table>

Source: Primary data

Out of the 77 urban respondents, 23 were from the Ponmalai Zone of Trichirapalli Corporation and 17 were from K. Abhishekapuram zone. Similarly, 19 were from Srirangam zone and 18 were from Ariyamangalam zone.

Table No.5.6: The number of Professional tax payers attended the group discussion from the special village panchayaths of Tiruchirapalli District

<table>
<thead>
<tr>
<th>Name of Special village panchayaths</th>
<th>No. of respondents attended the group discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Tiruverambur</td>
<td>15</td>
</tr>
<tr>
<td>2.Sirugamani</td>
<td>21</td>
</tr>
<tr>
<td>3.S.Kannanur</td>
<td>14</td>
</tr>
</tbody>
</table>
Out of the 69 rural respondents 21 were from Sirugamani village panchayath of Tiruchirapalli district and 14 were from S. Kannur panchayath. Similarly 19 respondents were from Ponampatti and 15 were from Tiruverambur Panchayath.

The following are the major steps in using the AHP technique:

1. The factors that affect the final decision of a problem is identified and this is called as Analytical Hierarchy Process decision model. Here in the following, case there are seven elements (Table 5.1) that construct up the first level of the hierarchy. The next level is the investor’s alternatives, i.e. the set of possible investment products.

   The inputs received from the decision makers were compared in a pair wise manner: pair wise evaluation of the elements will permit the derivation of priority/importance weights for the elements. While making a comparison between the two elements, a easy rule is followed as suggested by Saaty (1980), “while more complex methods using fuzzy triangular numbers are frequently used to impute values to linguistic variables. The values substituted to a comparison can vary from 1/9 to 9, where 1/9 would mean that the one element is exceedingly less important than the other, and 9 means that the element is exceedingly more important than the

<table>
<thead>
<tr>
<th>Table 5.6 (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Ponampatti</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: Primary data
other (Saaty, 1980). A case of equal weight is substituted by the value 1. Further, the significance of one element with respect to another is the reciprocal of the value given to the importance of the second compared to the first. Once a matrix of paired comparisons is derived, the priority weight vector is the Eigen vector of the matrix matching to the largest Eigen value. Thus while making a comparison two elements X and Y, the values are assigned in the subsequent method:

1 Is substituted, if X and Y are equally important; 3 is substituted, if X is weakly more important than Y; 5, is substituted if X is strongly more important than Y; 7 is substituted, if X is very strongly more important than Y; 9 is substituted, if X is absolutely more important that Y; Reciprocal values are used when X and Y are interchanged”

2. The relative importance of weight at the all stages of the hierarchy is evaluated, in the present study there are two stages one is the criteria of the investment and other the list of investment products.

3. The relative important weights are combined to get a overall ranking made from the alternative by the candidate.

In this case the alternatives are the probable investment product from which the investor identify one by using a synthesis route that compare alternatives in light of the relative weights of the criteria.
Figure No.5.1: Hierarchical arrangement of the investment product identification problem

Notes: RE = Real estate, PO = Post office; MF = Mutual fund, EQ = Equity, MF = Mutual fund, BD = Bank deposit and GO = Gold

From Figure 5.1: The top stage of the hierarchy represents the objective of the decision problem. In this case, grading of the investment product is the objective of the decision problem to be addressed. The gamut of choices from which an investment product has to be made is the final level of the hierarchy. In this case, the respondents are taking into account the six investment products. In this level there can be any number of alternatives as one desire, without shifting the process of obtaining the preference weights.
The various criteria that need to be satisfied and any categorization of such
criteria make up the middle level of the hierarchy. The problem formulated above is that
of ranking from the six alternatives, namely Post office, Real estate, Equity, Mutual fund,
Gold and Bank deposit. The decision will be based on the relative importance of the
elements for the respondents and the degree of performance of the elements by each of
the investment product. The investment product with highest overall rating, which is
obtained by means of a synthesis process, is the one to be ranked initially.

Preliminary Definition

A fuzzy number M is a fuzzy subset of reals which satisfies

a. M is a normalized fuzzy subset of \( \mathbb{R} \)

b. Each \( \alpha \)-cuts is a closed interval for each \( \alpha \in [0,1] \)

c. The support of M is bounded

A fuzzy number M is defined to be a triangular fuzzy number if its membership
function \( \mu_m: \mathbb{R} \rightarrow [0,1] \) is equal to

\[
\mu_m(x) = \begin{cases} 
\frac{1}{m-l} - \frac{1}{m-l} & \text{if } x \in [l,m] \\
\frac{1}{m-u} - \frac{1}{m-u} & \text{if } x \in [m,u] \\
0 & \text{else} 
\end{cases}
\]

Where \( l \leq m \leq u \) and \( l \) and \( u \) locate for the lower and upper values of the support of
the fuzzy number M correspondingly and \( m \) for the modal value. This fuzzy number is
denoted by \((l, m, u)\). Now \(\frac{1}{m-l}x - \frac{1}{m-l} \) and \(\frac{1}{m-u}x - \frac{1}{m-u} \) can be taken as left and right legs of the triangular fuzzy number \((l, m, u)\).

**Note:**

Let \(A = (l_1, m_1, n_1)\) and \(B = (l_2, m_2, n_2)\) be two fuzzy numbers. Then their sum \(A + B\) is given by \(A + B = (l_1+l_2, m_1+m_2, n_1+n_2)\).

Similarly \(\alpha A = (\alpha l_1, \alpha m_1, \alpha n_1)\), where \(\alpha\) is a real number.

Let \(M\) be a fuzzy number. Consider the lines \(L_1\) and \(L_2\) which are given by \(y = x\) and \(y=1-x\) respectively. The \(y\) coordinate of the intersection point of the line \(L_1\) with the right leg of \(M\) gives the right score \(R(M)\) of \(M\). The \(y\) coordinate of the intersection point of the line \(L_2\) with the left leg of \(M\) gives the left score \(L(M)\) of \(M\). From this the total score of \(M\) is given by \(T(M) = \frac{1+R(M)-L(M)}{2}\).

Let \(M_1\) and \(M_2\) be two fuzzy numbers. If \(T(M_1)\geq T(M_2)\), then \(M_1\geq M_2\).

The construction of the classic decision problem measured in this paper consists of 6 alternatives Post office, Real Estate, Gold, Mutual Fund, Equity and Bank Deposit and 7 decision criteria liquidity, safety of principle, stability of return, tax benefit, capital appreciation, concealability and Inflation resistant. Each option can be evaluated in terms of the decision criteria in fuzzy linguistic terms and the relative importance (or weight) of each criterion can be anticipated. Let \(a_{ij}\) \((i=1,2,3,...5)\) and \(j=1,2,3,...,5)\) indicate the performance of the \(i\)-th alternative (i.e., \(A_i\)) in terms of the \(j\)-th criterion (i.e., \(C_j\)) which is
fuzzy in nature. Let $W_j$ be the weight of the criterion $C_j$. Then, the nucleus of the typical MCDM problem can be represented by a decision matrix. From the above given decision matrix, the decision problem measured in this study is how to establish the finest alternative.

**Priorities of criteria**

In decision making problems, the decision will be different for different priorities of criteria. To find the priorities of criteria, Satty (1980) found that to a scale of relative importance is essential and useful in making a pair wise comparison in the AHP as in the following table 5.7

**Table No. 5.7: Table showing the Scale of Relative Importance**

<table>
<thead>
<tr>
<th>Verbal judgment of preference</th>
<th>Numerical Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equally Preferred</td>
<td>1</td>
</tr>
<tr>
<td>Equally to Moderately Preferred</td>
<td>2</td>
</tr>
<tr>
<td>Moderately Preferred</td>
<td>3</td>
</tr>
<tr>
<td>Moderately to Strongly Preferred</td>
<td>4</td>
</tr>
<tr>
<td>Strongly Preferred</td>
<td>5</td>
</tr>
<tr>
<td>Strongly to Very Strongly Preferred</td>
<td>6</td>
</tr>
<tr>
<td>Very Strongly Preferred</td>
<td>7</td>
</tr>
<tr>
<td>Very Strong to Extremely Preferred</td>
<td>8</td>
</tr>
<tr>
<td>Extremely Preferred</td>
<td>9</td>
</tr>
</tbody>
</table>

*Source: Saaty (1980)*
Table No. 5.8: Weights assigned on the criterions of investment product by the Financial Experts

<table>
<thead>
<tr>
<th>Criterion</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security of principal</td>
<td>0.2226</td>
<td>0.3668</td>
<td>0.2558</td>
<td>0.6869</td>
<td>0.3787</td>
<td>0.0739</td>
<td>0.1518</td>
<td>0.2379</td>
<td>0.0793</td>
</tr>
<tr>
<td>Liquidity</td>
<td>0.3807</td>
<td>0.0647</td>
<td>0.0318</td>
<td>0.1229</td>
<td>0.2192</td>
<td>0.0363</td>
<td>0.1104</td>
<td>0.0739</td>
<td>0.3873</td>
</tr>
<tr>
<td>Stability of income</td>
<td>0.1561</td>
<td>0.2350</td>
<td>0.3138</td>
<td>0.2368</td>
<td>0.1782</td>
<td>0.3976</td>
<td>0.0805</td>
<td>0.0971</td>
<td>0.1372</td>
</tr>
<tr>
<td>Capital growth</td>
<td>0.0430</td>
<td>0.1054</td>
<td>0.2036</td>
<td>0.3977</td>
<td>0.0919</td>
<td>0.1256</td>
<td>0.1989</td>
<td>0.3976</td>
<td>0.2768</td>
</tr>
<tr>
<td>Tax benefit</td>
<td>0.0711</td>
<td>0.0430</td>
<td>0.0586</td>
<td>0.0522</td>
<td>0.0707</td>
<td>0.0971</td>
<td>0.0616</td>
<td>0.0364</td>
<td>0.1051</td>
</tr>
<tr>
<td>Inflation Resistant</td>
<td>0.0866</td>
<td>0.1575</td>
<td>0.1067</td>
<td>0.0283</td>
<td>0.0353</td>
<td>0.2379</td>
<td>0.3706</td>
<td>0.0313</td>
<td>0.3295</td>
</tr>
<tr>
<td>Conceal ability</td>
<td>0.0398</td>
<td>0.0271</td>
<td>0.0293</td>
<td>0.0932</td>
<td>0.0305</td>
<td>0.0313</td>
<td>0.0259</td>
<td>0.1256</td>
<td>0.0331</td>
</tr>
</tbody>
</table>

Source: Primary data

From this, the pair wise comparison matrix between criteria has been formed and each entry is divided by its column sum. Now the average of their corresponding row entries is the priority vector with respect to each criterion which can be found.

Priorities of investment product

The pair wise comparative evaluation of investment products with respect to each criterion is created carefully using the subsequent fuzzy linguistic comparative words equally good, equally to fairly good, fairly good, equally to strongly good, strongly good, equally to very strongly good, very strongly good, equally to extremely good and
extremely good. These linguistic terms have been converted into fuzzy numbers according to the scale given in the following table 5.9

<table>
<thead>
<tr>
<th>Verbal judgment of preference</th>
<th>Fuzzy Numerical Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equally Good</td>
<td>(1, 1, 1)</td>
</tr>
<tr>
<td>Equally to Moderately Good</td>
<td>(1, 2, 3)</td>
</tr>
<tr>
<td>Moderately Good</td>
<td>(2, 3, 4)</td>
</tr>
<tr>
<td>Moderately to Strongly Good</td>
<td>(3, 4, 5)</td>
</tr>
<tr>
<td>Strongly Good</td>
<td>(4, 5, 6)</td>
</tr>
<tr>
<td>Strongly to Very Strongly Good</td>
<td>(5, 6, 7)</td>
</tr>
<tr>
<td>Very Strongly Good</td>
<td>(6, 7, 8)</td>
</tr>
<tr>
<td>Very Strong to Extremely Good</td>
<td>(7, 8, 9)</td>
</tr>
<tr>
<td>Extremely Good</td>
<td>(8, 9, 10)</td>
</tr>
</tbody>
</table>

Source: Secondary data

Now each entry of the above pair wise fuzzy comparison matrix with respect to each criterion is divided by its column sum. Now the row average of the resulting matrix is the fuzzy priority vector with respect to each criterion which can be found.
**Fuzzy score of investment product:**

Finally the fuzzy score of each investment product is the sum of the products of weights of criteria with their corresponding fuzzy numbers in fuzzy priority vectors.

For example,

The fuzzy score of post office investments = $w_1 \cdot$ Priority fuzzy number of post office investments with respect to security of principle $+ w_2 \cdot$ Priority fuzzy number of post office investments with respect to liquidity $+ w_3 \cdot$ Priority fuzzy number of post office investments with respect to stability of income $+ w_4 \cdot$ Priority fuzzy number of post office investments with respect to capital growth $+ w_5 \cdot$ Priority fuzzy number of post office investments with respect to tax benefit $+ w_6 \cdot$ Priority fuzzy number of post office investments with respect to Inflation resistant $+ w_7 \cdot$ Priority fuzzy number of post office investments with respect to conceal ability.

For example the expert 1 has the following criterion where, $w_1 = 0.222603$, $w_2 = 0.380678$, $w_3 = 0.156118$, $w_4 = 0.043084$, $w_5 = 0.071089$, $w_6 = 0.086587$ and $w_7 = 0.039841$. So the fuzzy score of post office investments = $w_1 \cdot (0.26785, 0.428482, 0.672466) + w_2 \cdot (0.031439, 0.051710, 0.088944) + w_3 \cdot (0.042641, 0.067752, 0.106607) + w_4 \cdot (0.031650, 0.049473, 0.082042) + w_5 \cdot (0.251572, 0.411134, 0.641721) + w_6 \cdot (0.021796, 0.032140, 0.051815) + w_7 \cdot (0.038750, 0.059522, 0.093023) = (0.136912, 0.219330, 0.347505)$.
Similarly the fuzzy scores of other investment product can be calculated.

The fuzzy score of Real estate = (0.082729, 0.129402, 0.210264)

The fuzzy score of Gold = (0.175789, 0.285737, 0.456215)

The fuzzy score of mutual fund = (0.058169, 0.096457, 0.164603)

The fuzzy score of equity = (0.078916, 0.148383, 0.24459)

The fuzzy score of Bank deposit = (0.078916, 0.148383, 0.24459)

The fuzzy score of the other experts are found as follows with the help crisp scores of investment products as follows:

The total crisp score for each investment product can be found from the earlier note. Let (a, b, c) be a triangular fuzzy number. Then left score L and right score R of this fuzzy number are given by

\[ L = \frac{1 - a}{1 + b - a} \quad \text{and} \quad R = \frac{c}{1 + c - b} \]
Table No.5.10: Total crisp score of investment avenues of financial experts 1

<table>
<thead>
<tr>
<th>Investment avenue</th>
<th>Total crisp score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post office (A₁)</td>
<td>0.255327</td>
</tr>
<tr>
<td>Real Estate (A₂)</td>
<td>0.159083</td>
</tr>
<tr>
<td>Gold (A₃)</td>
<td>0.3236</td>
</tr>
<tr>
<td>Mutual funds (A₄)</td>
<td>0.123501</td>
</tr>
<tr>
<td>Equity (A₅)</td>
<td>0.146614</td>
</tr>
<tr>
<td>Bank deposit (A₆)</td>
<td>0.182009</td>
</tr>
</tbody>
</table>

Source: Primary data

So the preference ordering of the Financial Expert-1 will be in the following form:

\[(A₃, A₁, A₆, A₂, A₅, A₄)\]

So, the same procedure is followed for the remaining financial experts and the crisp scores of each financial expert is followed as below
Table No.5.11: Crisp scores of investment products using Triangular fuzzy number by financial experts

<table>
<thead>
<tr>
<th>Investment Product</th>
<th>Financial Experts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>PO</td>
<td>0.255327</td>
</tr>
<tr>
<td>RE</td>
<td>0.159083</td>
</tr>
<tr>
<td>G</td>
<td>0.3236</td>
</tr>
<tr>
<td>MF</td>
<td>0.123501</td>
</tr>
<tr>
<td>S</td>
<td>0.146614</td>
</tr>
<tr>
<td>BD</td>
<td>0.182009</td>
</tr>
</tbody>
</table>

Source: Primary data

And the preference orderings of nine experts are given by

\( (A_3, A_1, A_6, A_2, A_5, A_4) ; (A_1, A_6, A_5, A_3, A_2, A_4) ; (A_6, A_1, A_3, A_2, A_4, A_5) ; (A_3, A_5, A_6, A_2, A_1, A_4) ; (A_6, A_2, A_4, A_5, A_3, A_1) ; (A_2, A_1, A_6, A_4, A_5, A_3) ; (A_2, A_1, A_3, A_5, A_6, A_4) ; (A_1, A_2, A_6, A_5, A_3, A_4) \) and \( (A_3, A_1, A_6, A_4, A_5, A_2) \),

Where \( A_1 \) is Post Office, \( A_2 \) is Real Estate, \( A_3 \) is Gold, \( A_4 \) is Mutual Fund, \( A_5 \) is Shares and \( A_6 \) is Bank Deposit.

Now the social preference relation matrix \( S = (S_{ij}) \), where \( S_{ij} = (N(x_i, x_j)) / n \) is given by
\[ S = \begin{bmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 5/9 & 5/9 & 8/9 & 7/9 & 6/9 \\
A_3 & 4/9 & 5/9 & 0 & 7/9 & 5/9 & 4/9 \\
A_4 & 1/9 & 1/9 & 2/9 & 0 & 4/9 & 0/9 \\
\end{bmatrix} \]

\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set are given by

1. \( S = \{(A_6, A_5)\} \),
2. \( S = \{(A_1, A_4), (A_2, A_4), (A_6, A_4)\} \),
3. \( S = \{(A_1, A_4), (A_1, A_5), (A_2, A_4), (A_3, A_4)(A_6, A_4)(A_6, A_5)\} \),
4. \( S = \{(A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_4), (A_2, A_5), (A_3, A_4), (A_6, A_2) (A_6, A_4). (A_6, A_5)\} \),
\[ S = \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_5), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_3), (A_4, A_5), (A_4, A_6), (A_5, A_2), (A_5, A_3), (A_5, A_4), (A_5, A_6), (A_6, A_1), (A_6, A_3), (A_6, A_4), (A_6, A_5) \} \]

\[ S = \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_6), (A_2, A_1), (A_2, A_3), (A_2, A_4), (A_2, A_5), (A_2, A_6), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_1), (A_4, A_2), (A_4, A_3), (A_4, A_5), (A_4, A_6), (A_5, A_1), (A_5, A_2), (A_5, A_3), (A_5, A_4), (A_5, A_6), (A_6, A_1), (A_6, A_2), (A_6, A_3), (A_6, A_4), (A_6, A_5) \} \]

\[ S = \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_1), (A_2, A_3), (A_2, A_4), (A_2, A_5), (A_2, A_6), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_1), (A_4, A_2), (A_4, A_3), (A_4, A_5), (A_4, A_6), (A_5, A_1), (A_5, A_2), (A_5, A_3), (A_5, A_4), (A_5, A_6), (A_6, A_1), (A_6, A_2), (A_6, A_3), (A_6, A_4), (A_6, A_5) \} \]

From the total orderings formed with possible combination as per the pairs in each \( \alpha \) - Cuts, it could be found that only at \( 0.55 \) intersects with the total orderings. So, the single crisp ordering is \( (A_1, A_6, A_3, A_2, A_5, A_4) \)
Hence, the nine expert decision makers agreed the above crisp ordering at the level of 0.55.

So the nine financial experts agreed the crisp ordering at the level of 0.55 in the following order:

1. Post Office
2. Bank Deposit
3. Gold
4. Real estate
5. Shares

Similarly the above procedure is repeated to find the overall final ranking of investment products by the investors. The response of the each group leader is subjected to the above procedure.

Each eight group leaders found the criterion weights using the scale of relative importance as mentioned in table 5.7.
Table No. 5.12: Weights assigned on the criterions of investment product by the Group leaders

<table>
<thead>
<tr>
<th>Criterion</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security of principal</td>
<td>0.232107</td>
<td>0.049408</td>
<td>0.306949</td>
<td>0.276753</td>
<td>0.207154</td>
<td>0.125663</td>
<td>0.14319</td>
<td>0.449461</td>
</tr>
<tr>
<td>Liquidity</td>
<td>0.085578</td>
<td>0.023617</td>
<td>0.191354</td>
<td>0.102829</td>
<td>0.034142</td>
<td>0.397628</td>
<td>0.053776</td>
<td>0.111851</td>
</tr>
<tr>
<td>Stability of income</td>
<td>0.297692</td>
<td>0.173502</td>
<td>0.041437</td>
<td>0.070742</td>
<td>0.064186</td>
<td>0.237945</td>
<td>0.280877</td>
<td>0.045076</td>
</tr>
<tr>
<td>Capital growth</td>
<td>0.031655</td>
<td>0.297749</td>
<td>0.033775</td>
<td>0.135756</td>
<td>0.126226</td>
<td>0.036403</td>
<td>0.034407</td>
<td>0.035883</td>
</tr>
<tr>
<td>Tax benefit</td>
<td>0.063362</td>
<td>0.23413</td>
<td>0.028352</td>
<td>0.05883</td>
<td>0.029747</td>
<td>0.0971</td>
<td>0.113087</td>
<td>0.061031</td>
</tr>
<tr>
<td>Inflation Resistant</td>
<td>0.120254</td>
<td>0.126672</td>
<td>0.247305</td>
<td>0.025342</td>
<td>0.375172</td>
<td>0.031353</td>
<td>0.352434</td>
<td>0.084237</td>
</tr>
<tr>
<td>Conceal ability</td>
<td>0.169353</td>
<td>0.094923</td>
<td>0.150828</td>
<td>0.329747</td>
<td>0.163374</td>
<td>0.073909</td>
<td>0.04229</td>
<td>0.212461</td>
</tr>
</tbody>
</table>

Source: Primary Data

After finding fuzzy priority score and fuzzy score, finally crisp score is found for all eight groups as given below
Table No. 5.13: Crisp scores of investment products using triangular fuzzy numbers by Group Leaders

<table>
<thead>
<tr>
<th>Investment product</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>0.160036</td>
<td>0.237684</td>
<td>0.225476</td>
<td>0.06089</td>
<td>0.231118</td>
<td>0.209355</td>
<td>0.210099</td>
<td>0.216008</td>
</tr>
<tr>
<td>RE</td>
<td>0.256466</td>
<td>0.211203</td>
<td>0.216251</td>
<td>0.232296</td>
<td>0.200382</td>
<td>0.098115</td>
<td>0.226274</td>
<td>0.294583</td>
</tr>
<tr>
<td>G</td>
<td>0.069843</td>
<td>0.250353</td>
<td>0.188036</td>
<td>0.069837</td>
<td>0.111222</td>
<td>0.215852</td>
<td>0.149109</td>
<td>0.343507</td>
</tr>
<tr>
<td>MF</td>
<td>0.105267</td>
<td>0.146648</td>
<td>0.092189</td>
<td>0.181855</td>
<td>0.214383</td>
<td>0.201736</td>
<td>0.112801</td>
<td>0.129905</td>
</tr>
<tr>
<td>S</td>
<td>0.163827</td>
<td>0.188728</td>
<td>0.196807</td>
<td>0.151512</td>
<td>0.13427</td>
<td>0.20032</td>
<td>0.257869</td>
<td>0.097446</td>
</tr>
<tr>
<td>BD</td>
<td>0.129255</td>
<td>0.142482</td>
<td>0.241203</td>
<td>0.351847</td>
<td>0.301866</td>
<td>0.277785</td>
<td>0.232427</td>
<td>0.098751</td>
</tr>
</tbody>
</table>

Source: Primary Data

Now from the crisp scores, the ordering is formed for each of the group.

Then the fuzzy preference orderings of the eight groups are given by

$$(A_3, A_5, A_1, A_6, A_4, A_3); (A_3, A_1, A_2, A_4, A_5, A_6); (A_6, A_1, A_2, A_4, A_3, A_5); (A_6, A_2, A_4, A_5, A_3, A_1); (A_6, A_1, A_2, A_3, A_5, A_4); (A_6, A_3, A_1, A_4, A_5, A_2); (A_5, A_6, A_2, A_1, A_3, A_4); (A_1, A_3, A_2, A_4, A_6, A_5)$$

Where $A_1$ is Post Office, $A_2$ is Real Estate, $A_3$ is Gold, $A_4$ is Mutual Fund, $A_5$ is Shares and $A_6$ is Bank Deposit.

Now the social preference relation matrix $S = (S_{ij})$, where $S_{ij} = (N(x_i, x_j)) / n$ is given by
\[ S = \begin{array}{ccccccc}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_4 & 1/8 & 1/8 & 3/8 & 0   & 5/8 & 2/8 \\
\end{array} \]

\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set are given by

\[ .875 \ S = \{ (A_1, A_4), (A_2, A_4) \}, \]

\[ .75 \ S = \{ (A_1, A_4), (A_2, A_4), (A_2, A_5)(A_6, A_3)(A_6, A_4) \}, \]

\[ .625 \ S = \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_2, A_3)(A_2, A_4)(A_2, A_5)(A_3, A_4), (A_3, A_5), (A_4, A_5), (A_6, A_1), (A_6, A_2), (A_6, A_3), (A_6, A_4), (A_6, A_5) \}, \]

\[ .50 \ S = \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_2, A_3), (A_2, A_4)(A_2, A_5)(A_3, A_4), (A_3, A_5), (A_4, A_5), (A_6, A_1), (A_6, A_2), (A_6, A_3), (A_6, A_4), (A_6, A_5) \}, \]

\[ .375 \ S = \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_1)(A_2, A_3), (A_2, A_4), (A_2, A_5)(A_2, A_6), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_4, A_3), (A_4, A_5), (A_5, A_1), (A_5, A_3)(A_5, A_4), (A_5, A_6), (A_6, A_1), (A_6, A_2), (A_6, A_3), (A_6, A_4), (A_6, A_5) \}, \]

\[ .25 \ S = \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_1)(A_2, A_3), (A_2, A_4), (A_2, A_5), (A_2, A_6), (A_3, A_1), (A_3, A_2)(A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_3), (A_4, A_5), (A_4, A_6), (A_5, A_1), (A_5, A_2), (A_5, A_3), (A_5, A_4), (A_5, A_6), (A_6, A_3), (A_6, A_4), (A_6, A_5) \}. \]
\[
S = \{ \text{(A}_1, \text{A}_2), (\text{A}_1, \text{A}_3), (\text{A}_1, \text{A}_4), (\text{A}_1, \text{A}_5), (\text{A}_1, \text{A}_6), (\text{A}_2, \text{A}_1), (\text{A}_2, \text{A}_3), (\text{A}_2, \text{A}_4), (\text{A}_2, \text{A}_5), (\text{A}_2, \text{A}_6), (\text{A}_3, \text{A}_1), (\text{A}_3, \text{A}_2), (\text{A}_3, \text{A}_4), (\text{A}_3, \text{A}_5), (\text{A}_3, \text{A}_6), (\text{A}_4, \text{A}_1), (\text{A}_4, \text{A}_2), (\text{A}_4, \text{A}_3), (\text{A}_4, \text{A}_4), (\text{A}_4, \text{A}_5), (\text{A}_4, \text{A}_6), (\text{A}_5, \text{A}_1), (\text{A}_5, \text{A}_2), (\text{A}_5, \text{A}_3), (\text{A}_5, \text{A}_4), (\text{A}_5, \text{A}_5), (\text{A}_6, \text{A}_1), (\text{A}_6, \text{A}_2), (\text{A}_6, \text{A}_3), (\text{A}_6, \text{A}_4), (\text{A}_6, \text{A}_5) \} \]

From the total orderings formed with possible combination as per the pairs in each \(\alpha\) - Cuts, it could be found that only 0.55 intersects with the total orderings. So the single crisp ordering is \((\text{A}_6, \text{A}_1, \text{A}_2, \text{A}_3, \text{A}_4, \text{A}_5)\)

Hence, the eight group’s decision makers agreed the above crisp ordering at the level of 0.55. So the eight group’s decision makers agreed the crisp ordering at the level of 0.55 as

1. Bank Deposit
2. Post Office
3. Real estate
4. Gold
5. Mutual fund schemes
6. Shares
I. Investment Product Preference of the Financial Experts over the Criterion

The product preference of financial experts over each criterion is studied. The findings may be useful to know, which product the financial experts advice to select if an investor is concerned about a particular criteria.

I (a). Financial Experts preference of investment product over the criteria,

Security of principal

The preference orderings of nine experts are given by

\((A_1, A_3, A_2, A_4, A_6, A_5) ; (A_1, A_6, A_3, A_5, A_4, A_2); (A_2, A_5, A_3, A_4, A_6, A_1); (A_3, A_6, A_1, A_2, A_5, A_4) ; (A_5, A_3, A_6, A_2, A_4, A_1); (A_3, A_2, A_5, A_1, A_6, A_4); (A_4, A_2, A_3, A_6, A_1, A_5) ; (A_2, A_1, A_6, A_4, A_5, A_3) \) and \((A_6, A_1, A_4, A_3, A_2, A_5)\),

Where \(A_1\) is Post Office, \(A_2\) is Real Estate, \(A_3\) is Gold, \(A_4\) is Mutual Fund, \(A_5\) is Shares and \(A_6\) is Bank Deposit.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = (N(x_i, x_j)) / n\) is given by
\[ S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
\end{pmatrix} \]

- Cuts of $S$ for all $\alpha$ in the level set were found but in $0.55_S$ which is given as

\[ 0.55_S = \{(A_1, A_4), (A_1, A_5), (A_2, A_1), (A_2, A_4), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), (A_5, A_4), (A_6, A_1), (A_6, A_4), (A_6, A_5)\} \]

From the total orderings formed with possible combination as per the pairs in each $\alpha$ - Cuts, it could be found that only $0.55_S$ intersects with the total orderings. So the single crisp ordering is $(A_2, A_3, A_6, A_1, A_5, A_4)$
Hence, the nine experts agreed the above crisp ordering for the criteria, **Security of principal** at the level of 0.625.

**I(b). Financial Experts preference of investment product over the criteria.**

**Liquidity**

The preference orderings of nine experts over the criteria, **Liquidity** are given by

\[(A_3, A_6, A_5, A_4, A_1, A_2); (A_3, A_6, A_2, A_4, A_5, A_1); (A_5, A_4, A_6, A_3, A_1, A_2); (A_3, A_6, A_1, A_2, A_5, A_4); (A_2, A_3, A_6, A_5, A_4, A_1); (A_6, A_3, A_5, A_4, A_2, A_1); (A_3, A_2, A_4, A_6, A_1, A_5); (A_2, A_6, A_5, A_4, A_1, A_3)\]

and \[(A_3, A_6, A_2, A_1, A_4, A_5),\]

Where \(A_1\) is Post Office, \(A_2\) is Real Estate, \(A_3\) is Gold, \(A_4\) is Mutual Fund, \(A_5\) is Shares and \(A_6\) is Bank Deposit.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = (N(x_i, x_j)) / n\) is given by
\[ S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 3/9 & 1/9 & 2/9 & 3/9 & 0/9 \\
A_3 & 8/9 & 7/9 & 0 & 7/9 & 7/9 & 6/9 \\
A_5 & 6/9 & 3/9 & 2/9 & 6/9 & 0 & 1/9 \\
A_6 & 9/9 & 6/9 & 3/9 & 7/9 & 8/9 & 0 
\end{pmatrix} \]

\( \mathbf{\alpha} \) - Cuts of \( S \) for all \( \mathbf{\alpha} \) in the level set were found but in \( 0.66 S \) which is given as

\[ 0.66 S = \{(A_2, A_4), (A_2, A_5), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), \\
(A_4, A_1), (A_5, A_1), (A_5, A_4), (A_6, A_1), (A_6, A_2), (A_6, A_4), (A_6, A_5)\} \]

From the total orderings formed with possible combination as per the pairs in each

\( \mathbf{\alpha} \) - Cuts, it could be found that only \( 0.66 S \) intersects with the total orderings. So the

Single crisp ordering is (A_3, A_6, A_2, A_5, A_4, A_1)
Hence, the nine expert’s decision agreed the above crisp ordering for the criteria, **Liquidity** at the level of 0.66

**I(C). Financial Experts preference of investment product over the criteria.**

**Stability of Return**

The preference orderings of nine experts for the criteria, **Stability of return** are given by

\[(A_1, A_6, A_2, A_4, A_5, A_3) ; (A_6, A_2, A_1, A_5, A_4, A_3) ; (A_6, A_1, A_2, A_4, A_5, A_3) ; \]
\[(A_2, A_6, A_1, A_5, A_4, A_3) ; (A_6, A_2, A_5, A_4, A_1, A_3) ; (A_2, A_1, A_6, A_4, A_5, A_3) ; (A_1, A_6, A_4, A_2, A_5, A_3) ; (A_1, A_6, A_3, A_2, A_5, A_4) \] and
\[(A_3, A_4, A_1, A_6, A_5, A_2), \]

Where \( A_1 \) is Post Office, \( A_2 \) is Real Estate, \( A_3 \) is Gold, \( A_4 \) is Mutual Fund, \( A_5 \) is Shares and \( A_6 \) is Bank Deposit.

Now the social preference relation matrix \( S = (S_{ij}) \), where \( S_{ij} = (N (x_i, x_j)) / n \) is given by
\[ S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 5/9 & 8/9 & 7/9 & 8/9 & 5/9 \\
A_2 & 4/9 & 0 & 7/9 & 7/9 & 8/9 & 2/9 \\
A_3 & 1/9 & 2/9 & 0 & 2/9 & 2/9 & 1/9 \\
A_4 & 2/9 & 2/9 & 7/9 & 0 & 5/9 & 1/9 \\
A_5 & 1/9 & 1/9 & 7/9 & 4/9 & 0 & 0/9 \\
A_6 & 4/9 & 7/9 & 8/9 & 8/9 & 9/9 & 0 
\end{pmatrix} \]

\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( 0.55 \) which is given as \( 0.55 \)

\[ \{ (A_1, A_2), (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_3), (A_2, A_4), (A_2, A_5), \\
(A_4, A_5), (A_5, A_3), (A_6, A_2), (A_6, A_3), (A_6, A_4), (A_6, A_5) \} , \]

From the total orderings formed with possible combination as per the pairs in each \( \alpha \) - Cuts, it could be found that only \( 0.55 \) intersects with the total orderings. So the Single crisp ordering is \( (A_1, A_6, A_2, A_4, A_5, A_3) \)

Hence, the nine experts agreed the above crisp ordering for the criteria, Stability of return at the level of 0.55.
I(d). Financial Experts preference of investment product over the criteria.

Capital Appreciation

The preference orderings of nine experts for the criteria, Capital appreciation are given by

\((A_2, A_3, A_5, A_4, A_1, A_6)\); \((A_5, A_3, A_2, A_6, A_4, A_1)\); \((A_2, A_3, A_5, A_4, A_6, A_1)\); \((A_5, A_3, A_2, A_6, A_4, A_1)\);

\((A_5, A_4, A_3, A_2, A_1, A_6)\); \((A_2, A_5, A_4, A_3, A_6, A_1)\); \((A_3, A_2, A_5, A_4, A_1, A_6)\);

\((A_1, A_6, A_2, A_3, A_5, A_4)\) and \((A_3, A_1, A_6, A_2, A_4, A_5)\),

Where \(A_1\) is Post Office, \(A_2\) is Real Estate, \(A_3\) is Gold, \(A_4\) is Mutual Fund, \(A_5\) is Shares and \(A_6\) is Bank Deposit.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = (N(x_i, x_j)) / n\) is given by
\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( 0.55 \) which is given as

\[
S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 2/9 & 1/9 & 2/9 & 2/9 & 5/9 \\
A_2 & 7/9 & 0 & 4/9 & 8/9 & 6/9 & 7/9 \\
A_3 & 8/9 & 5/9 & 0 & 7/9 & 5/9 & 8/9 \\
A_4 & 7/9 & 1/9 & 2/9 & 0 & 1/9 & 5/9 \\
A_5 & 7/9 & 3/9 & 4/9 & 8/9 & 0 & 7/9 \\
A_6 & 4/9 & 2/9 & 1/9 & 4/9 & 2/9 & 0
\end{pmatrix}
\]

\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( 0.55 \) which is given as

\[0.55 S = \{ (A_1, A_6), (A_2, A_1), (A_2, A_4), (A_2, A_5), (A_2, A_6), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_1), (A_4, A_6), (A_5, A_1), (A_5, A_4), (A_5, A_6) \}, \]

From the total orderings formed with possible combination as per the pairs in each \( \alpha \) - Cuts, it could be found that only \( 0.55 \) intersects with the total orderings. So the single crisp ordering is \( (A_3, A_2, A_5, A_4, A_1, A_6) \)

Hence, the nine experts agreed the above crisp ordering for the criteria, **Capital appreciation** at the level of 0.55.
Financial Experts preference of investment product over the criteria, Tax Benefit

The preference orderings of nine experts for the criteria, Tax Benefit are given by

\[(A_1, A_2, A_3, A_5, A_4, A_6); (A_1, A_6, A_5, A_4, A_3, A_2); (A_3, A_4, A_5, A_6, A_1, A_2); (A_1, A_6, A_3, A_5, A_4, A_2); (A_6, A_1, A_5, A_3, A_4, A_2); (A_1, A_5, A_6, A_2, A_3, A_4); (A_5, A_1, A_4, A_6, A_3, A_2); (A_1, A_6, A_2, A_4, A_5, A_3) \text{ and } (A_1, A_6, A_5, A_4, A_3, A_2),\]

where \(A_1\) is Post Office, \(A_2\) is Real Estate, \(A_3\) is Gold, \(A_4\) is Mutual Fund, \(A_5\) is Shares and \(A_6\) is Bank Deposit.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = (N(x_i, x_j)) / n\) is given by
\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( 0.55 S \) which is given as \( .55 S \). 

\[
S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 9/9 & 8/9 & 8/9 & 7/9 & 7/9 \\
A_2 & 0/9 & 0 & 3/9 & 3/9 & 2/9 & 1/9 \\
A_3 & 1/9 & 6/9 & 0 & 5/9 & 3/9 & 2/9 \\
A_5 & 2/9 & 7/9 & 6/9 & 7/9 & 0 & 4/9 \\
A_6 & 2/9 & 8/9 & 7/9 & 6/9 & 5/9 & 0
\end{pmatrix}
\]

From the total orderings formed with possible combination as per the pairs in each \( \alpha \) - Cuts, it could be found that only \( .55 S \) intersects with the total orderings. So the Single crisp ordering is \((A_1, A_6, A_5, A_3, A_4, A_2)\) 

Hence, the nine experts agreed the above crisp ordering for the criteria, **Tax Benefit** at the level of 0.55.
I(f). Financial Experts preference of investment product over the criteria.

**Inflation Resistant**

The preference orderings of nine experts for the criteria, better Inflation resistant are given by

\[(A_2, A_3, A_5, A_4, A_6, A_1); (A_5, A_2, A_4, A_3, A_1, A_6);\]

\[(A_1, A_6, A_2, A_3, A_5, A_4); (A_6, A_2, A_1, A_5, A_4, A_3);\]

\[(A_5, A_4, A_1, A_6, A_2, A_3); (A_2, A_6, A_4, A_1, A_5, A_3); (A_2, A_1, A_6, A_4, A_5, A_3);\]

\;(A_2, A_5, A_4, A_3, A_6, A_1) and (A_5, A_4, A_6, A_1, A_3, A_2),\]

Where \(A_1\) is Post Office, \(A_2\) is Real Estate, \(A_3\) is Gold, \(A_4\) is Mutual Fund, \(A_5\) is Shares and \(A_6\) is Bank Deposit.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = \frac{N(x_i, x_j)}{n}\) is given by
\[ S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_2 & 6/9 & 0 & 8/9 & 7/9 & 6/9 & 5/9 \\
A_3 & 3/9 & 1/9 & 0 & 2/9 & 2/9 & 3/9 \\
A_4 & 6/9 & 2/9 & 7/9 & 0 & 2/9 & 5/9 \\
A_5 & 5/9 & 3/9 & 7/9 & 7/9 & 0 & 5/9 \\
\end{pmatrix} \]

\[ \alpha - \text{Cuts of } S \text{ for all } \alpha \text{ in the level set were found but in } 0.55S \text{ which is given as } 0.55 \ S \]

\[ = \{ (A_1, A_3), (A_2, A_3), (A_2, A_4), (A_2, A_5), (A_2, A_6), (A_4, A_1), (A_4, A_3), (A_4, A_6), (A_5, A_1), (A_5, A_3), (A_5, A_4), (A_5, A_6), (A_6, A_1), (A_6, A_3), \} \]

From the total orderings formed with possible combination as per the pairs in each \( \alpha - \text{Cuts}, \text{ it could be found that only } 0.55S \text{ intersects with the total orderings. So the Single crisp ordering is } (A_2, A_5, A_4, A_6, A_1, A_3) \]

Hence, the nine experts agreed the above crisp ordering for the criteria, better inflation resistant at the level of 0.55.
I (g). Financial Experts preference of investment product over the criteria, Conceal ability

The preference orderings of nine experts for the criteria, Conceal ability are given by

\[(A_4, A_3, A_2, A_5, A_1, A_6); (A_3, A_1, A_6, A_2, A_5, A_4);\]

\[(A_3, A_1, A_6, A_2, A_4, A_5); (A_1, A_6, A_3, A_2, A_5, A_4);\]

\[(A_6, A_2, A_4, A_5, A_1, A_3); (A_3, A_1, A_2, A_6, A_4, A_5);\]

\[(A_3, A_1, A_2, A_6, A_4, A_5), (A_5, A_2, A_4, A_3, A_1, A_6) \text{ and } (A_1, A_6, A_3, A_5, A_4, A_2),\]

Where \(A_1\) is Post Office, \(A_2\) is Real Estate, \(A_3\) is Gold, \(A_4\) is Mutual Fund, \(A_5\) is Shares and \(A_6\) is Bank Deposit.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = (N(x_i, x_j)) / n\) is given by
\( S = \) \[
\begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_2 & 3/9 & 0 & 2/9 & 7/9 & 7/9 & 4/9 \\
A_3 & 6/9 & 7/9 & 0 & 6/9 & 7/9 & 6/9 \\
A_5 & 3/9 & 2/9 & 2/9 & 4/9 & 0 & 2/9 \\
A_6 & 2/9 & 5/9 & 3/9 & 7/9 & 7/9 & 0
\end{pmatrix}
\]

**α** - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( 0.55 \), which is given as

\[ .55 \ S = \ \{(A_1, A_2), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_4), (A_2, A_5), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_5), (A_5, A_6), (A_6, A_2), (A_6, A_4), (A_6, A_5)\} \]

From the total orderings formed with possible combination as per the pairs in each

**α** - Cuts, it could be found that only \( .55 \) \( S \) intersects with the total orderings. So the Single crisp ordering is \( (A_3, A_1, A_6, A_2, A_4, A_5) \)

Hence, the nine experts agreed the above crisp ordering for the criteria, **Conceal ability** at the level of 0.55.
II. Investment Product Preference of the Investors over the Criterion

The product preference of investors over the each criterion is studied. The findings may be useful to know, which product the investors could select for a particular criteria.

II(a). **Investor preference of investment product over the criteria, Security of Principal**

The preference orderings of investment products of eight groups based on the criteria, **Security of principal** are given by,

= (A₂, A₁, A₆, A₄, A₅, A₃); (A₄, A₂, A₃, A₁, A₆, A₅);

(A₄, A₂, A₅, A₁, A₆, A₃); (A₆, A₄, A₂, A₅, A₁, A₃); (A₂, A₄, A₁, A₆, A₅, A₃);

(A₆, A₁, A₃, A₄, A₂, A₅); (A₁, A₆, A₃, A₅, A₄, A₂);

(A₂, A₃, A₁, A₄, A₅, A₆)

**Where** A₁ is **Post Office**, A₂ is **Real Estate**, A₃ is **Gold**, A₄ is **Mutual Fund**, A₅ is **Shares** and A₆ is **Bank Deposit**.

Now the social preference relation matrix S = (Sᵢⱼ), where Sᵢⱼ= (N (xᵢ, xⱼ)) / n is given by
\[ \alpha - \text{Cuts of } S \text{ for all } \alpha \text{ in the level set were found but in } 0.625 \text{ which is given as} \]

\[ 0.625 S = \{ (A_1, A_3), (A_1, A_5), (A_1, A_6), (A_2, A_1), (A_2, A_3), (A_2, A_5), (A_2, A_6), (A_4, A_2), (A_4, A_3), (A_4, A_5), (A_6, A_3), (A_6, A_5) \} , \]

From the total orderings formed with possible combination as per the pairs in each \( \alpha - \text{Cuts, it could be found that only } 0.625 S \text{ intersects with the total orderings. So the Single crisp ordering is } (A_3, A_2, A_1, A_6, A_4, A_5) \]

Hence, the eight group’s decision makers agreed the above crisp ordering for security of principal at the level of 0.625.
II(b). **Investor preference of investment product over the criteria, Liquidity**

The preference orderings of investment products by the eight groups based on the criteria, *Liquidity* are given by

\[(A_5, A_6, A_2, A_4, A_1, A_3) \); (A_3, A_2, A_5, A_6, A_1, A_4)\);

\[(A_6, A_3, A_5, A_4, A_2, A_1)\); (A_2, A_3, A_6, A_5, A_4, A_1)\);

\[(A_2, A_1, A_6, A_3, A_5, A_4)\); (A_5, A_4, A_6, A_3, A_1, A_2)\);

\[(A_3, A_6, A_5, A_4, A_1, A_2)\); (A_3, A_5, A_1, A_4, A_6, A_2)\)

*Where A_1* is *Post Office*, *A_2* is *Real Estate*, *A_3* is *Gold*, *A_4* is *Mutual Fund*, *A_5* is *Shares* and *A_6* is *Bank Deposit*.

Now the social preference relation matrix \( S = (S_{ij}) \), where \( S_{ij} = (N (x_i, x_j)) / n \) is given by
\[
\begin{array}{cccccc}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 3/8 & 2/8 & 3/8 & 1/8 & 2/8 \\
A_4 & 5/8 & 4/8 & 2/8 & 0 & 0/8 & 2/8 \\
A_5 & 7/8 & 5/8 & 2/8 & 8/8 & 0 & 4/8 \\
\end{array}
\]

\[ S = \]

\[ \alpha \text{ - Cuts of } S \text{ for all } \alpha \text{ in the level set were found but in } 0.625S \text{ which is given as } 0.625 S = \]

\[ \{ (A_2, A_1), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_4, A_1), (A_5, A_1), (A_5, A_2), (A_5, A_4), (A_6, A_1), (A_6, A_2), (A_6, A_4) \}, \]

From the total orderings formed with possible combination as per the pairs in each \( \alpha \text{- Cuts}, \) it could be found that only \( 0.625S \) intersects with the total orderings. So the Single crisp ordering is (A_3, A_6, A_5, A_2, A_4, A_1)
Hence, the eight group’s decision makers agreed the above crisp ordering for the criteria, **Liquidity** at the level of **0.625**.

**II(c). Investor preference of investment over the criteria, Stability of Return**

The preference orderings of investment products by the eight groups based on the criteria, **Stability of return** are given by

\[(A_1, A_6, A_3, A_2, A_5, A_4); (A_1, A_6, A_5, A_2, A_4, A_3); (A_2, A_1, A_6, A_4, A_5, A_3); (A_6, A_2, A_5, A_4, A_1, A_3); (A_3, A_6, A_1, A_4, A_5, A_2);

(A_6, A_1, A_4, A_5, A_2, A_3); (A_6, A_3, A_2, A_1, A_5, A_4);

(A_2, A_5, A_1, A_4, A_6, A_3)\]

Where \(A_1\) is **Post Office**, \(A_2\) is **Real Estate**, \(A_3\) is **Gold**, \(A_4\) is **Mutual Fund**, \(A_5\) is **Shares** and \(A_6\) is **Bank Deposit**.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = (N(x_i, x_j))/n\) is given by
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<th></th>
<th>A₁</th>
<th>A₂</th>
<th>A₃</th>
<th>A₄</th>
<th>A₅</th>
<th>A₆</th>
</tr>
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<td>6/8</td>
<td>7/8</td>
<td>6/8</td>
<td>4/8</td>
</tr>
<tr>
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<td>6/8</td>
<td>5/8</td>
<td>2/8</td>
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<tr>
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<td>3/8</td>
<td>0</td>
<td>3/8</td>
<td>3/8</td>
<td>1/8</td>
</tr>
<tr>
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<td>2/8</td>
<td>5/8</td>
<td>0</td>
<td>3/8</td>
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</tr>
<tr>
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<td>1/8</td>
</tr>
<tr>
<td>A₆</td>
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<td>6/8</td>
<td>7/8</td>
<td>7/8</td>
<td>7/8</td>
<td>0</td>
</tr>
</tbody>
</table>

\[ S = \]

\[ \alpha - \text{Cuts of } S \text{ for all } \alpha \text{ in the level set were found but in } .625_S \text{ which is given as} \]

\[ .625_S = \{ (A₁, A₃), (A₁, A₄), (A₁, A₅), (A₂, A₃), (A₂, A₄), (A₂, A₅), (A₄, A₃), (A₅, A₄), (A₆, A₂), (A₆, A₃), (A₆, A₄), (A₆, A₅) \} , \]

From the total orderings formed with possible combination as per the pairs in each

\[ \alpha - \text{Cuts, it could be found that only } .625_S \text{ intersects with the total orderings. So the} \]

Single crisp ordering is \( (A₆, A₁, A₂, A₅, A₄, A₃) \)

Hence, the eight group’s decision makers agreed the above crisp ordering for the criteria, **Stability of return** at the level of \( 0.625 \).
II(d). **Investor preference of investment product over the criteria, Capital Appreciation**

The preference orderings of investment products by the eight groups based on the criteria, **Capital appreciation** are given by

\[(A_6, A_2, A_3, A_5, A_1, A_4); (A_3, A_2, A_4, A_5, A_1, A_6); \]

\[(A_2, A_5, A_4, A_3, A_6, A_1); (A_5, A_4, A_3, A_2, A_1, A_6); \]

\[(A_5, A_2, A_3, A_6, A_4, A_1); (A_2, A_3, A_5, A_4, A_6, A_1); (A_2, A_3, A_5, A_4, A_1, A_6); \]

\[(A_6, A_3, A_1, A_5, A_4, A_2); \]

**Where** \(A_1\) is **Post Office**, \(A_2\) is **Real Estate**, \(A_3\) is **Gold**, \(A_4\) is **Mutual Fund**, \(A_5\) is **Shares** and \(A_6\) is **Bank Deposit**.

Now the social preference relation matrix \(S = (s_{ij})\), where \(s_{ij} = (n (x_i, x_j)) / n\) is given by
\[ S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 1/8 & 0/8 & 1/8 & 1/8 & 3/8 \\
A_4 & 7/8 & 2/8 & 2/8 & 0 & 1/8 & 4/8 \\
\end{pmatrix} \]

\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( .625 \) which is given as

\[
.625 \quad S = \{ (A_2, A_3), (A_2, A_4), (A_2, A_5), (A_2, A_6), (A_3, A_1), \\
(A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_1), (A_5, A_1), (A_5, A_4), (A_5, A_6), (A_6, A_1) \},
\]

From the total orderings formed with possible combination as per the pairs in each

\( \alpha \) - Cuts, it could be found that only \( .625 \) intersects with the total orderings. So the Single crisp ordering is \( (A_2, A_3, A_5, A_4, A_6, A_1) \)

Hence, the eight group’s decision makers agreed the above crisp ordering for the criteria, \textbf{Capital appreciation} at the level of \( 0.625 \).
II(e). **Investor preference of investment product over the criteria, Tax Benefit**

The preference orderings of investment product by eight groups based on the criteria, **Tax benefit** are given by

\[(A_1, A_6, A_3, A_2, A_5, A_4); (A_1, A_6, A_5, A_2, A_4, A_3); (A_2, A_1, A_6, A_4, A_5, A_3); (A_6, A_2, A_5, A_4, A_1, A_3); (A_3, A_6, A_1, A_4, A_5, A_2); (A_6, A_1, A_4, A_5, A_2, A_3); (A_6, A_3, A_2, A_1, A_5, A_4); (A_2, A_5, A_1, A_4, A_6, A_3)\]

Where $A_1$ is **Post Office**, $A_2$ is **Real Estate**, $A_3$ is **Gold**, $A_4$ is **Mutual Fund**, $A_5$ is **Shares** and $A_6$ is **Bank Deposit**.

Now the social preference relation matrix $S = (S_{ij})$, where $S_{ij} = (N(x_i, x_j)) / n$ is given by
\[ S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
\end{pmatrix} \]

\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in 0.55 which is given as

\[ 0.55 S = \{ (A_1, A_3), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_5, A_2), (A_5, A_3), (A_6, A_2), (A_6, A_3), (A_6, A_4), (A_6, A_5) \} \]

From the total orderings formed with possible combination as per the pairs in each

\( \alpha \) - Cuts, it could be found that only 0.55 intersects with the total orderings.

So the crisp ordering is (A_6 or A_1, A_6 or A_1, A_4 or A_5, A_2 or A_3 or A_4, A_2 or A_3 or A_4).
Hence, the eight group’s decision makers agreed the above crisp ordering for the criteria, **Tax benefit** at the level of **0.55**.

**II(f). Investor preference of investment product over the criteria, Inflation Resistant**

The preference orderings of investment products by the eight groups based on the criteria, **Inflation Resistant** are given by

- \((A_2, A_5, A_4, A_3, A_6, A_1)\); \((A_2, A_1, A_6, A_5, A_4, A_3)\); \((A_6, A_1, A_2, A_4, A_5, A_3)\);
- \((A_2, A_5, A_4, A_1, A_6, A_3)\); \((A_6, A_3, A_1, A_5, A_4, A_2)\);
- \((A_1, A_6, A_2, A_3, A_5, A_4)\);
- \((A_5, A_2, A_4, A_3, A_1, A_6)\); \((A_1, A_3, A_6, A_4, A_5, A_2)\)

Where **A_1** is **Post Office**, **A_2** is **Real Estate**, **A_3** is **Gold**, **A_4** is **Mutual Fund**, **A_5** is **Shares** and **A_6** is **Bank Deposit**.

Now the social preference relation matrix \(S = (S_{ij})\), where \(S_{ij} = (N(x_i, x_j)) / n\) is given by
\[ S = \begin{pmatrix}
A_1 & A_2 & A_3 & A_4 & A_5 & A_6 \\
A_1 & 0 & 4/8 & 5/8 & 5/8 & 5/8 \\
\end{pmatrix} \]

\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( .625 \) which is given as

\[ .625 \ S = \{ \ (A_1, A_3), \ (A_1, A_4), \ (A_1, A_5), \ (A_1, A_6), \ (A_2, A_3), \ (A_2, A_4), \ (A_2, A_5), \ (A_2, A_6), \ (A_4, A_3), \ (A_5, A_3), \ (A_5, A_4), \ (A_5, A_6), \ (A_6, A_3), \ (A_6, A_4), \ (A_6, A_5) \} \]

From the total orderings formed with possible combination as per the pairs in each

\( \alpha \) - Cuts, it could be found that only \( .625 \) intersects with the total orderings. So the Single crisp ordering is \( (A_2, A_1, A_6, A_5, A_4, A_3) \)
Hence, the eight group’s decision makers agreed the above crisp ordering for the criteria, **Inflation proof** at the level of 0.625.

**II(g). Investor preference of investment product over the criteria, Concealability**

The preference orderings of investment product by the eight groups based on the criteria, **Conceal ability** are given by

\[(A_5, A_2, A_4, A_3, A_1, A_6); (A_3, A_1, A_2, A_6, A_4, A_5); (A_3, A_1, A_2, A_4, A_5, A_5); (A_6, A_2, A_4, A_5, A_1, A_3); (A_1, A_6, A_2, A_3, A_5, A_4); (A_3, A_1, A_6, A_2, A_4, A_5); (A_3, A_1, A_6, A_2, A_5, A_4); (A_3, A_1, A_4, A_6, A_2, A_5)\]

*Where* $A_1$ *is Post Office, $A_2$ is Real Estate, $A_3$ is Gold, $A_4$ is Mutual Fund, $A_5$ is Shares* and $A_6$ *is Bank Deposit.*

Now the social preference relation matrix $S = (S_{ij})$, where $S_{ij} = (N(x_i, x_j)) / n$ is given by
\( \alpha \) - Cuts of \( S \) for all \( \alpha \) in the level set were found but in \( .625S \) which is given as

\[
.625 S = \{(A_1, A_2), (A_1, A_4), (A_1, A_5), (A_1, A_6), (A_2, A_4), (A_2, A_5), (A_3, A_1), (A_3, A_2), (A_3, A_4), (A_3, A_5), (A_3, A_6), (A_4, A_5), (A_6, A_2), (A_6, A_4), (A_6, A_5)\},
\]

From the total orderings formed with possible combination as per the pairs in each \( \alpha \) - Cuts, it could be found that only \( .625S \) intersects with the total orderings. So the Single crisp ordering is \( (A_2, A_3, A_5, A_4, A_6, A_1) \)

Hence, the eight group’s decision makers agreed the above crisp ordering for the criteria, **Conceal ability** at the level of 0.625.
III. Summary of the investment product preference of the Financial Experts and the Investors

From the above fuzzy analysis, the product preference of the investors and the financial experts based on the criterion are compared as follow:

Table No. 5.14: Investment product Ranking preference of Investors and Financial Experts over the criteria, Security of principal

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>1</td>
<td>Real estate</td>
</tr>
<tr>
<td>Real Estate</td>
<td>2</td>
<td>Gold</td>
</tr>
<tr>
<td>Post office</td>
<td>3</td>
<td>Bank deposit</td>
</tr>
<tr>
<td>Bank Deposit</td>
<td>4</td>
<td>Post office</td>
</tr>
<tr>
<td>Mutual Fund Schemes</td>
<td>5</td>
<td>Equity</td>
</tr>
<tr>
<td>Equity</td>
<td>6</td>
<td>Mutual fund schemes</td>
</tr>
</tbody>
</table>

Source: Primary data

Regarding the criterion, security of the principal which is given in the above table, it is evident from the table that the investors mostly prefer to gold and are least preferred to the equity. But the financial experts give first preference to the real estate investments and least preference to the mutual fund. From this table it can be concluded that the mostly preferred real estate by the financial experts is not mostly preferred by the investors. So the financial product for the criteria security of principle, preferences of the investor’s are slightly different form the recommendations of the financial experts.
Liquidity:

Table No.5.15: Investment product Ranking preference of financial products by Investors and Financial Experts over the criteria, Liquidity

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>1</td>
<td>Gold</td>
</tr>
<tr>
<td>Bank deposit</td>
<td>2</td>
<td>Bank deposit</td>
</tr>
<tr>
<td>Equity</td>
<td>3</td>
<td>Real Estate</td>
</tr>
<tr>
<td>Real Estate</td>
<td>4</td>
<td>Equity</td>
</tr>
<tr>
<td>Mutual Fund Schemes</td>
<td>5</td>
<td>Mutual Fund Schemes</td>
</tr>
<tr>
<td>Post office</td>
<td>6</td>
<td>Post office</td>
</tr>
</tbody>
</table>

Source: Primary data

Regarding the criterion, Liquidity, it is evident from the above table, that the investors mostly prefer gold and least prefer the post office. The experts also prefer mostly the gold and give least preference to the post office investment. The preferences of the investor’s experts are nearly similar to that of the expert.
**Stability of income**

Table No.5.16: Investment product Ranking preference of financial products by Investors and Financial Experts over the criteria, stability of return

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank deposit</td>
<td>1</td>
<td>Post office</td>
</tr>
<tr>
<td>Post office</td>
<td>2</td>
<td>Bank deposit</td>
</tr>
<tr>
<td>Real estate</td>
<td>3</td>
<td>Real estate</td>
</tr>
<tr>
<td>Equity</td>
<td>4</td>
<td>Mutual fund schemes</td>
</tr>
<tr>
<td>Mutual fund schemes</td>
<td>5</td>
<td>Equity</td>
</tr>
<tr>
<td>Gold</td>
<td>6</td>
<td>Gold</td>
</tr>
</tbody>
</table>

Source: Primary data

Regarding the criterion, stability of return, from the above table, it is clear that the investors mostly prefer the bank deposit and least preference to the gold. The financial experts mostly prefer the post office and least prefer the gold. Even though the mostly preferred and the least preferred are not the one and the same, still the preferences are near to each other.
Capital appreciation

Table No.5.17: Investment product Ranking preference of financial products by Investors and Financial Experts over the criteria, Capital appreciation

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td>1</td>
<td>Gold</td>
</tr>
<tr>
<td>Gold</td>
<td>2</td>
<td>Real estate</td>
</tr>
<tr>
<td>Equity</td>
<td>3</td>
<td>Equity</td>
</tr>
<tr>
<td>Mutual fund schemes</td>
<td>4</td>
<td>Mutual fund schemes</td>
</tr>
<tr>
<td>Bank deposit</td>
<td>5</td>
<td>Post office</td>
</tr>
<tr>
<td>Post office</td>
<td>6</td>
<td>Bank deposit</td>
</tr>
</tbody>
</table>

Source: Primary data

Regarding the criterion, capital appreciation, it is evident from the above table that, the investors prefer mostly the real estate and by least, the post office. The experts mostly prefer the gold and least prefer the bank deposit. The mostly preferred and the least preferred by the investors and the financial experts are not the one and the same. But still the preference level between them is nearly similar.
Table No.5.18: Investment product Ranking preference of Investors and Financial Experts over the criteria, Tax Benefit

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post office (or) Bank Deposit</td>
<td>1</td>
<td>Post office</td>
</tr>
<tr>
<td>Post office (or) Bank Deposit</td>
<td>2</td>
<td>Bank Deposit</td>
</tr>
<tr>
<td>Mutual fund schemes or Equity</td>
<td>3</td>
<td>Equity</td>
</tr>
<tr>
<td>Real Estate (or) Gold (or) Mutual fund schemes</td>
<td>4</td>
<td>Gold</td>
</tr>
<tr>
<td>Real Estate (or) Gold (or) Mutual fund schemes</td>
<td>5</td>
<td>Mutual Fund Schemes</td>
</tr>
<tr>
<td>Real Estate (or) Gold (or) Mutual fund schemes</td>
<td>6</td>
<td>Real Estate</td>
</tr>
</tbody>
</table>

Source: Primary data

Regarding the criteria, Tax benefit, it is evident from the above table that the investor’s preferences are mixed in all the rank positions. They mostly prefer the post office or bank deposit and least prefer the real estate or gold or mutual fund. The experts mostly prefer the post office and least prefer the real estate.

The multi preference of the products by the investors for all the ranks may be attributed to the difference in the type of occupation and the corresponding method to adjust the tax they incur on their income.
Inflation resistant:

Table No.5.19: Investment product Ranking preference of Investors and Financial Experts over the criteria, better Inflation resistant

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td>1</td>
<td>Real Estate</td>
</tr>
<tr>
<td>Post office</td>
<td>2</td>
<td>Equity</td>
</tr>
<tr>
<td>Bank Deposit</td>
<td>3</td>
<td>Mutual fund schemes</td>
</tr>
<tr>
<td>Equity</td>
<td>4</td>
<td>Bank Deposit</td>
</tr>
<tr>
<td>Mutual fund schemes</td>
<td>5</td>
<td>Post office</td>
</tr>
<tr>
<td>Gold</td>
<td>6</td>
<td>Gold</td>
</tr>
</tbody>
</table>

Source: Primary data

Regarding the criteria, inflation resistance, it is evident from the above table that the investors mostly prefer real estate and least prefer the gold. The financial experts mostly prefer the real estate and least prefer the gold.

Even though there is a similar preference between the financial experts and the investors, the other preference order for the other ranks are different. So we can conclude that there is only a slight similarity between the preference pattern of the investors and the financial experts.
Concealability:

Table No.5.20: Investment product Ranking preference of Investors and Financial Experts over the criteria, Concealability

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate</td>
<td>1</td>
<td>Gold</td>
</tr>
<tr>
<td>Gold</td>
<td>2</td>
<td>Post office</td>
</tr>
<tr>
<td>Equity</td>
<td>3</td>
<td>Bank deposit</td>
</tr>
<tr>
<td>Mutual fund schemes</td>
<td>4</td>
<td>Real Estate</td>
</tr>
<tr>
<td>Bank deposit</td>
<td>5</td>
<td>Mutual fund schemes</td>
</tr>
<tr>
<td>Post office</td>
<td>6</td>
<td>Equity</td>
</tr>
</tbody>
</table>

Source: Primary data

Regarding the criteria, concealability, it is evident from the table that the investors prefer mostly the real estate and least prefer the post office. The financial experts mostly prefer the gold and least prefer the equity. The mostly preferred gold by the experts is in the second rank in order of preference for the investors. Similarly the least preferred, equity for the financial experts is in the third rank, in the preference order for the investors. So, there is no similarity in preference pattern between the experts and the investors.
Over all product preference:

Table No.5.21: Overall final Investment product Ranking preference of Investors and Financial Experts

<table>
<thead>
<tr>
<th>Investor Preference</th>
<th>Rank</th>
<th>Financial Expert Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank deposit</td>
<td>1</td>
<td>Post office</td>
</tr>
<tr>
<td>Post office</td>
<td>2</td>
<td>Bank deposit</td>
</tr>
<tr>
<td>Real estate</td>
<td>3</td>
<td>Gold</td>
</tr>
<tr>
<td>Gold</td>
<td>4</td>
<td>Real estate</td>
</tr>
<tr>
<td>Mutual fund schemes</td>
<td>5</td>
<td>Equity</td>
</tr>
<tr>
<td>Equity</td>
<td>6</td>
<td>Mutual fund schemes</td>
</tr>
</tbody>
</table>

Source: Primary data

The overall preference order, it is evident from the above table that the investors mostly prefer the bank deposit and least prefer the equity. The experts on the other hand mostly prefer the post office and least prefer the mutual fund. So, it can be concluded that there is more similar preference pattern exists between the investors and the financial experts.

The six investment avenues namely, real estate, gold, equity, mutual fund, bank deposits and post office are ranked by the investors and experts using fuzzy model.

The features of the investment products are given priority by the investors in the following proportion, Security of principal (14.5%), liquidity (14.5%), stability of return
(14.5%), capital appreciation (12.8%), tax benefit (14.5%), inflation resistant (14.5%) and concealability (14.5%).

The features of the investment products are given priority by the experts in the following proportion, security of principal (15.5%), liquidity (16.4%), stability of return (13.6%), capital appreciation (13.6%), tax benefit (13.6%), inflation resistant (13.6%) and concealability (13.6%).

As per the security of principal is concerned, the investors prefer gold (32.3%) as first rank and equity (14.6%) as the last rank. The other investment products range between 32.3% and 14.6%. As per the security of principal is concerned, the experts prefer real estate (15.9%) as first rank and mutual fund (12.3%) as the last rank. The other investment products range between 15.9% and 12.3%.

As per the liquidity is concerned, the investors prefer gold (32.3%) as first rank and post office (25.5%) as the last rank. The other investment products range between 32.3% and 25.5%. As per the liquidity is concerned, the experts prefer gold (32.3%) as first rank and post office (25.5%) as the last rank. The other investment products range between 32.3% and 25.5%.

As per the stability of return is concerned, the investors prefer bank deposit (18.2%) as first rank and gold (32.3%) as the last rank. The other investment products range between 18.2% and 32.3%. As per the stability of return is concerned, the experts prefer post office (25.5%) as first rank and gold (32.3%) as the last rank. The other investment products range between 25.5% and 32.3%.
As per the Capital appreciation is concerned, the investors prefer Real Estate (15.9%) as first rank and Post office (25.5%) as the last rank. The other investment products range between 15.9% and 25.5%. As per the Capital appreciation is concerned, the experts prefer Gold (32.3%) as first rank and Bank Deposit (18.2%) as the last rank. The other investment products range between 32.3% and 18.2%.

As per the Tax Benefit is concerned, the investors prefer post office (25.5%) or bank deposit (18.2%) as first rank and real estate (15.9%) or gold (32.3%) or mutual fund (12.3%) as the last rank. The shares as an investment product range between 32.3% and 12.3%. As per the Tax Benefit is concerned, the experts prefer post office (25.5%) as first rank and real estate (15.9%) as the last rank. The other investment products range between 25.5% and 15.9%.

As per the Inflation resistant is concerned, the investors prefer Real Estate (15.9%) as first rank and Gold (32.3%) as the last rank. The other investment products range between 15.9% and 32.3%. As per the inflation resistant is concerned, the experts prefer Real estate (15.9%) as first rank and Gold (32.3%) as the last rank. The other investment products range between 15.9% and 32.3%.

As per the Conceal ability is concerned, the investors prefer Real Estate (15.9%) as first rank and Post office (25.5%) as the last rank. The other investment products range between 15.9% and 25.5%. As per the inflation resistant is concerned, the experts prefer Gold (32.3%) as first rank and Equity (14.6%) as the last rank. The other investment products range between 32.3% and 14.6%. 
This chapter studied the various personal factors that play important role in the investment decision of an individual. The ranking of financial product has been done both by the investor and the financial experts using fuzzy mathematical technique. Apart from the ranking of financial product, each financial product is ranked according to the each key criterions as preferred by the investor and the financial experts. The next chapter deals with the major findings from the study.