

## *Chapter VII*

## CHAPTER VII

### APPLICATION OF FUZZY SOFT SETS TO INVESTMENT DECISION MAKING PROBLEM

Investment refers to activity involving commitment of funds, usually surplus funds, with an intention to earn return at an expected rate. An investor has various alternative avenues of investment for his savings to flow in accordance with his preference. A wise investor knows that money is losing its value by passage of time due to rise in prices or inflation. So he prefers to invest his funds in select avenues that fetch return, atleast sufficient enough to compensate such inflationary effects. The author of this thesis attempted to apply fuzzy soft sets to investment decision making problem based on the data collected from female employees working in both government and private sector undertakings located in Coimbatore city, Tamil Nadu, India.

In order to apply the concept of Fuzzy Soft Sets to Investment Decision Making problem, data were collected using convenient sampling technique from hundred female employees working in both government and private sector undertakings located in Coimbatore, Tamil Nadu, India.

Based on the response from the sample respondents the author identified the following factors that influence their investment decision and also the various avenues of investment they prefer.

#### **Factors Influencing Investment Decision**

**P<sub>1</sub>** – Safety of funds:

It is certainty of return on capital and the assurance of protection to the funds invested under changing conditions.

**P<sub>2</sub> – Liquidity of funds:**

It refers to the easy conversion of investment into liquid cash to meet any financial requirements of the investor without loss of time.

**P<sub>3</sub> – High returns:**

It is the basic objective of an investor. He aims higher return that facilitates rapid growth of funds invested.

**P<sub>4</sub> – Maximum profit in minimum period:**

The choice of investment is influenced by the relation between period of investment and rate of return. Investors choose investment avenues in which higher return is possible in shorter period of time.

**P<sub>5</sub> – Stable return:**

It refers to the consistent return from investment. If the return from investment is volatile in nature, the choice of investor may prove to be wrong when he could realize only a low rate of return.

**P<sub>6</sub> – Easy accessibility:**

It refers to the physical location of the institutions offering investment avenues and also the simplicity of procedures and formalities involved in the process of investment.

**P<sub>7</sub> – Tax concession:**

Certain investments and returns from investments are eligible for deduction under income tax. An investor who is particular to avail tax concession prefers such eligible investments.

**P<sub>8</sub> – Minimum risk of possession:**

It refers to the risk due to theft or dispute in title.

## Investment Avenues

Following are the investment avenues which are mostly preferred by the sample respondents

$I_1$  – Bank Deposit

$I_2$  – Insurance

$I_3$  – Postal Savings

$I_4$  – Shares and Stocks

$I_5$  – Mutual Fund

$I_6$  – Gold

$I_7$  – Real Estate

To apply Fuzzy Soft Sets to this investment decision problem, consider the various investment avenues as the universal set  $U = \{ I_1, I_2, I_3, I_4, I_5, I_6, I_7 \}$  and the factors influencing investment decision as the set of parameters  $E$  (i.e)  $E = \{ P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8 \}$ .

Based on the opinion of the respondents, the Fuzzy Soft Sets  $(F_i, P_i)$ ,  $i = 1$  to 8 were framed by considering the membership value  $\mu_{F_i(P_i)}(I_j)$  as the ratio between the number of respondents who opined the presence of the factor  $P_i$  on the investment avenue  $I_j$  and the total number of respondents.

$$\begin{aligned}(F_1, P_1) &= F_1(\text{Safety of funds}) \\ &= \{I_1/1, I_2/0.9, I_3/1, I_4/0.2, I_5/0.3, I_6/0.8, I_7/0.4\}\end{aligned}$$

$$\begin{aligned}(F_2, P_2) &= F_2(\text{Liquidity of funds}) \\ &= \{I_1/0.5, I_2/0.5, I_3/0.5, I_4/0.7, I_5/0.6, I_6/0.8, I_7/0.9\}\end{aligned}$$

$$(F_3, P_3) = F_3 \text{ (High Returns)}$$

$$= \{I_1/1, I_2/0.5, I_3/0.7, I_4/0.9, I_5/0.8, I_6/1, I_7/0.5\}$$

$$(F_4, P_4) = F_4 \text{ (Maximum profit in minimum period)}$$

$$= \{I_1/0.7, I_2/0.9, I_3/0.9, I_4/0.3, I_5/0, I_6/0, I_7/0\}$$

$$(F_5, P_5) = F_5 \text{ (Stable Return)}$$

$$= \{I_1/0.4, I_2/0.2, I_3/0.4, I_4/0.8, I_5/0.6, I_6/0.7, I_7/0.7\}$$

$$(F_6, P_6) = F_6 \text{ (Easy accessibility)}$$

$$= \{I_1/1, I_2/0.9, I_3/1, I_4/0.7, I_5/0.7, I_6/1, I_7/0.6\}$$

$$(F_7, P_7) = F_7 \text{ (Tax concession)}$$

$$= \{I_1/1, I_2/1, I_3/1, I_4/0.1, I_5/0.1, I_6/0.3, I_7/0.2\}$$

$$(F_8, P_8) = F_8 \text{ (Minimum risk of possession)}$$

$$= \{I_1/1, I_2/1, I_3/1, I_4/0.9, I_5/0.9, I_6/0, I_7/0.1\}$$

The author developed a decision making model using fuzzy soft relations by considering a set of factors preferred by an investor to identify the investment avenue that suits best requirements of the said investor.

### **Case 1: Preference of Investment Factors by the investor X -**

#### **Safety of Funds (P<sub>1</sub>) and High Returns (P<sub>3</sub>).**

The problem can be solved by virtue of the definition 4, a fuzzy soft relation (R,C) among the fuzzy soft sets (F<sub>1</sub> , P<sub>1</sub>)and (F<sub>3</sub> , P<sub>3</sub>) of the investment avenues which ensures Safety of funds and High returns is formed.

$$(R, C) = R \text{ (Safety of Funds, High Returns)}$$

$$= \{I_1/0.5, I_2/0.45, I_3/0.5, I_4/0.14, I_5/0.18, I_6/0.64, I_7/0.36\}$$

Therefore, the investment avenue which best satisfies the requirement of investor X is the investment avenue which has the largest membership value in the above relation. Here  $I_6$  has the largest membership value (0.64). Hence Gold best suits the requirement of investor X.

In the same manner the choice of Investment Avenue of any investor can be arrived at depending on any set of factors preferred by such investor. Some of such are given below:

**Case 2: Preference of Investment Factors by the investor Y -**

**Liquidity of Funds ( $P_2$ ), Maximum profit in minimum period ( $P_4$ ) and Minimum risk of possession( $P_8$ ).**

(R, C) = R (Liquidity of Funds, Maximum profit in minimum period, Minimum risk of possession)

$$= \{I_1/0.4, I_2/0.10, I_3/0.28, I_4/0.648, I_5/0.432, I_6/0, I_7/0.035\}$$

Here  $I_4$  has the largest membership value (0.648). Hence Shares and Stocks best suits the requirement of investor Y.

**Case 3: Preference of Investment Factors by the investor Z -**

**Liquidity of Funds ( $P_2$ ), Stable Return ( $P_5$ ), Easy accessibility ( $P_6$ ) and Tax concession ( $P_7$ ).**

(R, C) = R (Liquidity of Funds, Stable Return, Easy accessibility, Tax concession)

$$= \{I_1/0.7, I_2/0.405, I_3/0.63, I_4/0.036, I_5/0, I_6/0, I_7/0\}$$

Here  $I_1$  has the largest membership value (0.7). Hence Bank Deposit best suits the requirement of investor Z.