# Factors Influencing Candidates to Prefer Jobs in 'IT SECTOR' – A Mathematical Model using Interval Valued Fuzzy Soft Sets

**R. Jayashree [1], [Dr]. A. Kalaichelvi [2]** [1]*Department of Mathematics*
*Avinashilingam Institute for Home Science and Higher Education for Women*
*Coimbatore – 641 043. Tamilnadu, India*
[2]*Associate Professor,*
*Department of Mathematics,*
*Avinashilingam Institute for Home Science and Higher Education for Women*
*Coimbatore – 641 043. Tamilnadu, India*

***ABSTRACT***

**Soft Set Theory and Interval Mathematics are the mathematical tools for dealing with uncertainties. Both have rich potential for application in solving real life problems. In this article, the authors attempted to analyze the various factors that influence candidates to prefer jobs in IT sector using Interval Valued Fuzzy Soft Sets**.

***KEY WORDS***

**Soft set, Fuzzy soft set, Interval-valued fuzzy set, Interval-valued fuzzy soft set.**

## I. INTRODUCTION

The information technology (IT) services in India have become highly visible nodes of the global economy, attracting substantial attention from international media and business interests as a prime destination for outsourcing and off shoring. The success of this industry, as well as the recent anti outsourcing backlash in U.S. has produced a new global image of India as arising economic power. Moreover, for many political and business leaders in India, IT has come to be regarded as a source for India's future economic growth and development, based on the policies of liberalization and globalization.

It has become the career option for many young educated Indians, for whom it offers salaries unknown in other sectors as well as the opportunity to live and work outside of India. Software engineers, BPO workers

and others employed in IT-related occupations can be said to constitute a new kind of workforce, they are highly educated, well paid, mobile, and closely linked to the global service economy, whether working in India or abroad.

The rise of IT industries has caused changes in lifestyles, forms in sociality, family structure and self-identity, which are linked to the rapid upward socio-economic mobility experienced by employees in the industry.

Here the researcher intended to develop a mathematical model, using interval valued fuzzy soft sets, to identify the most important factor that influences a candidate to prefer job in IT sector.

## II. BASIC DEFINITIONS

**Definition: 1**

Let U be a nonempty finite set of objects called universe and let E be a nonempty set of parameters. An ordered pair (F, E) is said to be a **Soft set** over U, where F is a mapping from E into the set of all subsets of U. That is, F: E → P(U). It has been interpreted that a soft set indeed is a parameterized family of subsets of U.

**Example: 2**

Let U = $\{c_1, c_2, c_3\}$ be the set of three cars and E = {costly($e_1$), metallic colour($e_2$), cheap($e_3$)} be the set of parameters and A = $\{e_1, e_2\} \subset$ E. then (F, A)= $\{F(e_1)=\{c_1, c_2, c_3\}, F(e_2)=\{c_1, c_3\}\}$ is the crisp soft set over U which describes the "attractiveness of the cars " which Mr. S(say) is going to buy.

**Definition: 3**

Let U be a universe. A fuzzy set X over U is a set defined by a function $\mu_x$ representing a mapping $\mu_x$ : U → [0,1]. Here $\mu_x$ called **Membership function** of X, and the value $\mu_x(u)$ is called the G**rade of membership** of u ∈ U. The value represents the degree of belonging to the fuzzy set X. Thus, a fuzzy set X over U can be represented as follows:

$$X = \{(u / (\mu_x(u)): u \in U, \mu_x(u) \in [0,1]\}$$

The set of all the fuzzy sets over U will be denoted by F(U).

**Definition: 4**

Let U be a universal set, E a set of parameters and A ⊂ E. Let F(U) denotes the set of all fuzzy subsets of U. Then a pair (F, A) is called **Fuzzy Soft Set** over U, where F is mapping from A to F(U).

**Example: 5**

Let U = {$c_1$, $c_2$, $c_3$} be the set of three cars and E = {costly($e_1$), metallic color($e_2$), getup($e_3$)} be the set of parameters and A = {$e_1$, $e_2$}⊂ E. Then (G, A) = {G($e_1$) = {$c_1$/0.6, $c_2$/0.4, $c_3$/0.3}, G($e_2$) = {$c_1$/0.5, $c_2$/0.7, $c_3$/0.8}} is the fuzzy soft set over U describes the "attractiveness of the cars" which Mr. S(say) is going to buy.

**Definition: 6**

An interval Fuzzy Number is defined as $\widehat{A} = [a_L, a_R] = \{a: a_L \leq a \leq a_R\}$ where $a_L, a_r \in [0,1]$. A matrix of order n × n is said to be an **Interval Fuzzy Number**.

**Definition: 7**

An **Interval-Valued Fuzzy Set** $\hat{X}$ on a universe U is a mapping such that $\widehat{X}: U \rightarrow \text{Int}([0, 1])$, where Int([0,1]) stand for the set of all closed subintervals of [0,1], the set of all interval-valued fuzzy sets on U is denoted by $\tilde{F}(U)$.

Suppose that $\hat{X} \in \tilde{F}(U), \ \forall x \in U, \ \mu_{\hat{X}}(x) = [\mu_{\hat{X}}^{-}(x), \mu_{\hat{X}}^{+}(x)]$ is called the degree of membership an element x to$\hat{X}$. $\mu_{\hat{X}}^{-}(x)$ and $\mu_{\hat{X}}^{+}(x)$ are referred to as the lower and upper degrees of membership x to $\hat{X}$ where $0 \leq \mu_{\hat{X}}^{-}(x) \leq \mu_{\hat{X}}^{+}(x) \leq 1$.

**Definition: 8**

Let U be an initial universe and E be a set of parameters, a pair (F, E) is called an **Interval-Valued Fuzzy Soft Set** over U, where F is a mapping given by $F: E \rightarrow \tilde{F}(U)$.

## III. APPLICATION OF INTERVAL VALUED FUZZY SOFT SETS

To identify the most important factor that influences a candidate to prefer job in IT sector, the researcher collected opinion from three groups regarding various factors influencing a candidate to prefer job in IT sector. The details are presented below:

The first group $G_1$ consists of fifty prospective candidates (Final year students of Engineering and Arts Colleges). The second group $G_2$ consists of fifty employees of IT sector. The third group $G_3$ consists of fifty college/university teachers.

Factors that influence candidates to prefer jobs in IT sector were identified and listed below:

$F_1$ - High salary
$F_2$ - High social status
$F_3$ - More opportunity to move abroad
$F_4$ - Talent based promotion
$F_5$ - Talent based reward
$F_6$ - Opportunity to develop skills
$F_7$ - Easy switch over to other jobs
$F_8$ - Comfortable work atmosphere

Each respondent was asked to give a score value ranging between 1 and 10 for each factor. Using the data, Mean (M) and Standard Deviation (S.D) were calculated for each group $G_1$, $G_2$, $G_3$. An interval fuzzy number matrix was framed by taking the eight factors $F_1$, $F_2$, $F_3$, $F_4$, $F_5$, $F_6$, $F_7$, $F_8$ as rows and the three groups $G_1$, $G_2$, $G_3$ as columns. Each entry in the matrix is an Interval Fuzzy Number which was framed by taking $\frac{M-S.D}{10}$ and $\frac{M+S.D}{10}$ as the left and right end points of the interval respectively.

$$A = \begin{array}{c} \\ F_1 \\ F_2 \\ F_3 \\ F_4 \\ F_5 \\ F_6 \\ F_7 \\ F_8 \end{array} \begin{array}{c} \begin{array}{ccc} G_1 & G_2 & G_3 \end{array} \\ \begin{bmatrix} [0.4,0.7] & [0.3,0.5] & [0.2,0.4] \\ [0.3,0.4] & [0.4,0.6] & [0.2,0.5] \\ [0.6,0.7] & [0.5,0.8] & [0.3,0.4] \\ [0.2,0.3] & [0.2,0.3] & [0.2,0.4] \\ [0.2,0.8] & [0.3,0.7] & [0.2,0.8] \\ [0.3,0.4] & [0.2,0.3] & [0.3,0.4] \\ [0.2,0.4] & [0.5,0.6] & [0.3,0.4] \\ [0.2,0.3] & [0.2,0.3] & [0.3,0.5] \end{bmatrix} \end{array}$$

The following is the algorithm for finding the solution to the problem using Interval Valued fuzzy Soft Sets:

**Step 1**

Construct the Interval Valued Fuzzy Soft Set (H, E) Where H is a mapping given by H : E$\rightarrow \tilde{F}(U)$. Let U = {$F_1$, $F_2$, $F_3$, $F_4$, $F_5$, $F_6$, $F_7$, $F_8$} and E = {$G_1$, $G_2$, $G_3$}.

$$H(G_1) = \{< F_1[0.4, 0.7] >, < F_2[0.3, 0.4] >, < F_3[0.6, 0.7] >, < F_4[0.2, 0.3] >,$$

$$< F_5[0.2, 0.8] >, < F_6[0.3, 0.4] >, < F_7[0.2, 0.4] >, < F_8[0.2,0.3] >\}$$

$$H(G_2) = \{< F_1[0.3, 0.5] >, < F_2[0.4, 0.6] >, < F_3[0.5, 0.8] >, < F_4[0.2, 0.3] >,$$

$$< F_5[0.3, 0.7] >, < F_6[0.2, 0.3] >, < F_7[0.5, 0.6] >, < F_8[0.2,0.3] >\}$$

$$H(G_3) = \{< F_1[0.2, 0.4] >, < F_2[0.2, 0.5] >, < F_3[0.3, 0.4] >, < F_4[0.2, 0.4] >,$$

$$< F_5[0.2, 0.8] >, < F_6[0.3, 0.4] >, < F_7[0.3, 0.4] >, < F_8[0.3,0.5] >\}$$

**Step 2**

$\forall$ $F_i \in U$, compute the choice value $c_i$ for each features $F_i$ such that

$$c_i = [c_i^-, c_i^+] = \left[\sum_{G_{i\in E}} \mu^-_{H(G_i)}(F_i), \sum_{G_{i\in E}} \mu^+_{H(G_i)}(F_i)\right], \text{ where i = 1 to 8.}$$

$C_1 = [0.9, 1.7]$ $C_2 = [0.9, 1.5]$ $C_3 = [1.4, 1.9]$ $C_4 = [0.6, 1.0]$ $C_5 = [0.7, 2.3]$ $C_6 = [0.8, 1.1]$

$C_7 = [1.0, 1.4]$ $C_8 = [0.7, 1.1]$

**Step 3**

$\forall F_i \in U$, compute the score $r_i$ of $F_i$ such that

$$r_i = \sum_{F_j \in U}((c_i^- - c_i^+) + (c_i^- + c_i^+)) \text{ , where i, j = 1 to 8.}$$

Thus, we have

$r_1 = 4.1$ $r_2 = 0.3$ $r_3 = 3.6$ $r_4 = -5.8$ $r_5 = 1.5$ $r_6 = -2.7$ $r_7 = 1.7$ $r_8 = -2.6$

**Step 4**

The decision is any one of the elements in $S = \max_{h_i \in U}\{r_i\}$

In our problem, the factor "High salary ($F_1$)" is the most important factor that influences to prefer jobs in IT sector because $\max_{h_i \in U}\{r_i\} = \{r_1\}$.

## IV. CONCLUSION

In the present competitive world, it becomes imperative to identify the contributing factors and its order of significance for various issues relating to social and economic development, academic performance, entrepreneurship development, personnel management, marketing management and so on. Application of mathematical concepts facilitates the authorities concerned to analyze the issues scientifically and take the most reliable decision. The concepts of interval valued fuzzy number matrices and interval-valued fuzzy soft sets have rich potentials for developing such decision making models suitable for social, economic, commercial and managerial issues.

## REFERENCES

1. A. R. Roy and P. K. Maji, "*A Fuzzy Soft Set theoretic approach to decision making problems",* Journal of Computational and Applied Mathematics Vol 203, pp. 412-418, 2007.
2. B.Chetia and P.K.Das, "*An Application of Interval-Valued Fuzzy Soft Sets in Medical Diagnosis*" Int. J. Math. Sciences, Vol.5, No.38, 2010.
3. D. Molodtsov, "*Soft Set Theory-First Results",* Computers and Mathematics with Application Vol.37, pp. 19-31, 1999.
4. English Kuppusamy Ramamoorthy Nagarajan and Ganesamoorthi Meenambigai, "*An Application of*

*Soft Sets to Lattices*" Kragujevac Journal of Mathematics, Vol.35, No.1, pp.75-87, 2011.

5. A. Kalaichelvi, P. Haritha Malini and K. Janofer, "Application of Interval Fuzzy Number Matrices and Interval-Valued Fuzzy Soft Sets in the Analysis of the factors influencing High Scores in Higher Secondary Examinations " International Journal of Mathematical Sciences and Applications, Vol.2, No.2, May 2012, pp.777-780.

6. Madhumangal Pal, Gobinda Murmu and Anita Pal, "*Orthogonality of Imprecise Matrices"* The 2010 International Conference on E-Buisness Intelligence, pp. 560-565, 2010.

7. Naim Cagman, Filiz Citak and Serdar Enginoglu, "*Fuzzy Parameterized Fuzzy Soft Set theory and its application*" Turkish Journal of Fuzzy Systems Vol.1, No.1,pp.21-35, 2010.

8. X. Yang, T. Y. Lin, J. Yang, Y.Li and D. Yu, "*Combination of interval-valued fuzzy set and soft set*", Computers and Mathematics with Application Vol.58, pp. 521-527, 2009.