Teaching Faculty Hassle Factors Analysis in Private Educational Institution in India Using Fuzzy Analytical Hierarchy Process


Abstract: In early decades in India, teaching profession is the one of the peaceful and stress free profession among all others. Now a days, the trends are changing day by day based on the so many factors affected their stress free work environment. Teachers are the vital role to create the next generation for the bright country. Due to several changes in the teaching environment, stress factors are increasing rapidly. It will affect the growth of the young generation. To overcome the above issues, in this work identified the few important stress factors and finding their determination of the ranks based on the factors. For the determination of the ranks Fuzzy analytical Hierarchy Process methodology used.

Index Terms: Stress factor, Analatical hierarchy process, Faculty, Educational Institute

I. INTRODUCTION

In the year 1965 Zadeh introduce the fuzzy sets in that he define approximately the fuzzy set and its operation. Fuzzy set generally define as the augmentation of classical set theory. Using the member ship feature the crisp units are transformed into fuzzy number or fuzzy set. It allow the steady evaluation of the participation of variables in relations to a rigid, the capacity esteemed inside the genuine in [0,1]. The club characteristic maps crisp factors inside the universe of discourse to factors’ degree of membership with a positive program language period, that's typically [0,1]. Then, each value crisp value converted into fuzzy value using the membership function and also the fuzzy value lies between 0 to 1. A fuzzy variety is a unique fuzzy set where are values on the real line, R: and is a continuous mapping from R to the closed interval in [0,1]. A fuzzy set, triangular fuzzy number can used using the following formula.

Revised Manuscript Received on April 10, 2019

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A. Multi Criterion Decision-Making (MCDM)

The Multi Criterion Decision-Making (MCDM) are picking up significance as potential devices for dissecting propelled main problems because of their intrinsic capacity to measure entirely unexpected options (Choice, procedure, arrangement, circumstance can even be utilized synchronously) on different criteria for feasible decision of the best/appropriate extraordinary. These options are likewise more investigated top to bottom for his or her last execution.

B. Analytical Hierarchy Process

In 1980 satty proposed the AHP that’s a powerful device in applying Multi criteria selection evaluation was delivered [4]. The Analytic Hierarchy system is a dominant and bendy selection building approach to assist with the selection for each qualitative and quantitative factor. On this approach, locating the weights or need vector of the options or the standards is necessary. In this motive pair sensible contrast matrix formed. The table 1 shows the linguistic scale and explanation about the numeric values used in AHP.

TABLE I. AHP COMPARISON LINGUISTIC SCALE (SATY)

<table>
<thead>
<tr>
<th>Number</th>
<th>Scale of Linguistic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equal significance of both elements</td>
<td>Two factors make a contribution equally</td>
</tr>
<tr>
<td>3</td>
<td>Direct significance of one thing over another</td>
<td>Knowledge and decision want one factor over another</td>
</tr>
<tr>
<td>5</td>
<td>More significance of one issue over another</td>
<td>An component is very powerfully governing</td>
</tr>
<tr>
<td>7</td>
<td>Robust significance of one component over another</td>
<td>A component is supported by utilizing no less than a request of greatness</td>
</tr>
<tr>
<td>9</td>
<td>Extreme significance of one component over another</td>
<td>An component is favored via at least greater than an order of magnitude</td>
</tr>
</tbody>
</table>
II. LITERATURE REVIEW


Okay. Kwong Rating of consumer requirement using fuzzy analytical manner proposed [3]. The selection of appropriate Database systems for software program using AHP [5]. With F.AHP over selection of the aesthetic constrains of profile of the vehicles and their relative importance with the aid of H.C. Yadav et. al[4], AHP and Bayesian community over the threat control device in Australia and Newzealand proposed by A.Ahmen et.al.[9] in the year 2005. Satty [7] solved a few smaller trouble the usage of AHP in distinctive actual time programs. Zeki Aya [10] proposed Fuzzy AHP over a actual existence manufacturing system and examined by simulation to supply a new product improvement surroundings. Systematic technique towards the generation choice using the fuzzy Delphi technique to supply essential elements studied with the aid of Cheng-Haw et.al. [6], inside the year of 2005 Feng Kong et.al. [8] proposed how the key elements have an effect on the success in E-commerce business using the fuzzy AHP and additionally to discover the drawbacks and opportunities, inside the 12 months of 2010 Yu-Lung Hsu et.al. [11] proposed fuzzy Delphi technique and fuzzy AHP over the regenerative technology to determine crucial elements and additionally discover the degree of all criterion because the measurable shows of regenerative technologies. In 2011, Li Guo[12] proposed AHP over the net consumer purchasing behaviours to determine the maximum influencing elements. In 2012, choice of economic cocoon traits development in silkworm breeding using the fuzzy analytical hierarchy manner studied by means of Shaverdi et.al. [13]. In 2012, Berkir et.al. [14] turned into proposed Analytical hierarchy manner and rough set over dealer based on the numerous standards. In 2012, Dan Wang et.al. [15] proposed for predicting highest temperature and decrease temperature in unusual climate conditions the usage of the fuzzy analytical hierarchy system and tough sets. In 2012, Chen et.al [16] proposed analytical hierarchy technique and fuzzy analytical Hierarchy technique over the lodge surroundings to decide the important thing factors. Using fuzzy AHP seller selection troubles over the deliver chain management in a tough situation proposed by using Saroj Koul et.al.[17] in 2012. In 2013 Alessio Ishizaka et.al.[18] proposed, selection of financial institution account for college students the use of the bushy set concept.

In 2013, Seongkun Lee et.al.[19] proposed a hybrid version for efficiently of power the use of the bushy analytical hierarchy method and statistics envelopment analysis. In 2012 Ajay verma et.al. [20] proposed to decide the adopting and application of green deliver chain control in Indian pharmaceutical organizations the usage of fuzzy analytical hierarchy manner to check the consistency procedures. In 2013, hybrid fuzzy analytical hierarchy process model became proposed by means of chang et.al. [21] to resolve the vicinity choice in global distribution centre. In 2013 Fuzzy analytical hierarchy system and DEMATEL to locate the ERP essential.

Achivement factor inside the industries proposed by using Saeed Rouhani et.al.. [22]. In 2013, Aggarwal et.al.[23] proposed to advance the excellent of Ranking of an worker’s performance using the FAHP. In 2012 in the pharmaceutical industry prioritizing the standards concerned in choice of international provider the use of the FAHP through Aysegul Tas et.al [24]. Use of the fuzzy analytical hierarchy system over interpretive structural modelling to decide the risks mitigation in the improvement of mangos teen resource chain in Indonesia become studied by means of Rentno et.al. [25] in 2013. In the year 2013 Rajaprakash et.al.[26] proposed student expectation in private organization in Tamilnadu, in his work the author identified many attributes and ranked them using the FAHP. How the student will affected by stress and what are all the attributes impact the student stress in Indian school was studied by S.Rajaprakash et.al.[27] in the year 2018.

III. FACTORS DESCRIPTION

A. Salary or CTC

The primary stress among the teaching employees of the engineering colleges in India is salary or package of their work. If colleges wants to retain their teaching employee’s long time within their organization, they have to provide the competitive salary for them. Salary will be the important factor of their family livelihood as well as the support of their family. The satisfaction of the teaching job may together or autonomously forecast the teaching faculty performance based on the salary paid by the colleges. [28]

B. Management

The employee and the organization relationship are the important factor for the stress of teachers in engineering colleges in India. The fellow feeling between the teachers and the organization in engineering colleges are as follows, (a) any one of the entity should provide the needs of both the teacher and the colleges; (b) both of the basic characteristics should be the similar. Teaching faculty will be involved to select their work place established on the availability of the in elevation level of similarity of the basic characteristics. [29]

C. Locality

The distance between the educational institution and the residence of the faculty is important factor of the stress. Because, the travelling time and the spending money for the travel is important. The travelling is important, because if the travel time increase for any faculty, they will get very tired. Also money spending for travelling is important factor for them concerned about the money.

D. Policies

The policies of the teaching faculty in educational institution is important in terms of the stress free work environment. There is different type of the policies salary policy, leave policy, vacation policy and etc. The policies for the faculty in educational institution should
be motivated for them career wise as well as personally. The policies is the another remarkable stress factor for the teaching faculty in educational institution.

E. Non-Academic Work

Now days, non-academic work is another stress for the teaching faculty in the educational institution in India. In the institution, the administration work, documentation and the admission related work are the few works done by the teaching faculty related to the non-academic work. In this scenario, faculty will get very less time to concentrate the academic work as well as upgrading their subject knowledge.

F. Students Status

The factor which is directly related to the stress for the teaching faculty in India is the student’s status. Status is defined here is the IQ of the students among the class. Most of the private institutions students are not the equal level of the IQ’s among the students. In this situation, acquiring the knowledge for students from the faculty teaching will be varied among the students. At the same time outcome of the students from the particulars institution will different from other institution. This scenario is the important anxiety of the faculty to making the entire student in equal manner.

G. Age & Health Factor

Job satisfaction is directly associated with the teaching faculty’s health or sickness. [30], as of the proverb, “Health is Wealth” the teaching faculty’s health is important to focus on the students care and the fulfilment of the roles and responsibilities. Health illness will give the stress for both the physical as well as the mental stress for the teaching faculty.

H. Roles and Responsibilities

Roles and responsibilities of the teaching faculty is important factor for their career growth. From the roles and responsibilities, faculty can get experience knowledge for their career. Also they will get improvisation for their profile. Changing the role also will give the confident to the faculty. So that they can think about their ability to do the entire task available in the institution. But, increasing roles and responsibility for the single person will impact their quality work.

I. New Technologies

Technologies are growing more and more now days in all fields. This will be the one of the most considerable stress factor in the faculty working in private educational institution. Experienced as well as the senior faculty will feel that, the adaptation of the new technologies is complex.

IV. METHODOLOGY

FAHP proposed by Pedrycz and Laarhoven (1983) which is an application of the mixture of Fuzzy Theory and AHP. In FHAP changes the thoughts of authorities from previous final values to fuzzy numbers and membership functions. The table 2 given the explanation about the linguistic scale and the triangular fuzzy numbers with their intensity of the importance. The intensity of the importance is the severity of the stress factors for the Teaching Faculty Hassle Factors.

Analysis in Private Educational Institution.

<table>
<thead>
<tr>
<th>Linguistic Scale</th>
<th>Triangular Fuzzy scale</th>
<th>Fuzzy Num.</th>
<th>Intensity of rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal Favorite</td>
<td>(1,1,1)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Discretely more</td>
<td>(1,3,5)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>More Favorite</td>
<td>(3,5,7)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Very powerfully</td>
<td>(5,7,9)</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Exceptionally</td>
<td>(7,9,11)</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

FAHP demonstrates that numerous standards progressively have fuzziness. So the feelings of leaders are changed from past correct qualities zero to 1 fuzzy numbers in the FAHP [5].

The accompanying advance is engaged with FAHP method

1. From the questionnaires gathered opinions from the professional with the aid of using the linguistic variable in questionnaires.
2. The fuzzy triangular quantity is deliberate from the component specified by means of experts. Using the geometric suggest proposed via Klier and Yuan (1985) two locate out the magnitude triangular fuzzy number of the substitute thing is observed.
3. Building the comparison with the fuzzy matrix by using a fuzzy triangular number via pairwise comparison, the fuzzy decision matrix is constructed as given below

\[ \hat{A} = [a_{ij}] \]

\[ \hat{A} = \begin{bmatrix}
1 & \tilde{a}_{12} & \tilde{a}_{13} & \ldots & \tilde{a}_{1(n-1)} & \tilde{a}_{1n} \\
\vdots & 1 & \tilde{a}_{23} & \ldots & \tilde{a}_{2(n-1)} & \tilde{a}_{2n} \\
\vdots & \vdots & \ddots & \ldots & \vdots & \vdots \\
\tilde{a}_{(n-1)1} & \tilde{a}_{(n-1)2} & \tilde{a}_{(n-1)3} & \ldots & 1 & \tilde{a}_{(n-1)n} \\
\tilde{a}_{n1} & \tilde{a}_{n2} & \tilde{a}_{n3} & \ldots & \tilde{a}_{nn} & 1
\end{bmatrix} \]

Where

\[ a_{ij} = \begin{cases} 1 & \text{or } 1^{-1}, 3^{-1}, 5^{-1}, 7^{-1}, 9^{-1}, i = j, i = j \\ 3, 5, 7 & \text{or } 1^{-1}, 3^{-1}, 5^{-1}, 7^{-1}, 9^{-1}, i = j, i = j \end{cases} \]

Detecting the fuzzy Eigen values. A fuzzy Eigen value \( \hat{\lambda} \), is fuzzy number solution

\[ \hat{A} = \mu \hat{\lambda} \]

Where \( \hat{A} \) is the fuzzy matrix having fuzzy numbers \( \tilde{a}_{ij} \) and \( \hat{\lambda} \) is a non-zero mx1 fuzzy vector containing fuzzy number \( \hat{\lambda} \). In and additions (+) and fuzzy, multiplications (*) interval arithmetic and \( \alpha \) cut, Equation 1 is corresponding to

\[ [\tilde{a}_{ij}, \tilde{a}_{ij}'] \Theta [\tilde{a}_{ij}, \tilde{a}_{ij}'] = [\hat{\lambda} x_{ij}^l, \hat{\lambda} x_{ij}^r] \]

\[ \hat{A} = [a_{ij}] \]

\[ \hat{\lambda} = [\lambda^l, \lambda^r] \]

\[ \hat{\lambda} = [\lambda^l, \lambda^r] \]

Degree of gratification of the decision matrix \( \hat{A} \) is estimated by the index of hopefulness \( \mu \).
The bigger value of the index $\mu$ designates the higher degree of optimism. The index optimism is a linear convex combination defined as

$$\tilde{a}_{ij} = \mu a_{ij}^w + (1-\mu)a_{ij}^w \quad \forall \mu \in [0,1]$$

While $\mu$ is fixed, following crisp judgment matrix can be acquired after fixing the index of optimism $\mu$, in order to estimate the degree of satisfaction.

$$\tilde{A} = \begin{bmatrix}
1 & \tilde{a}_{12} & \ldots & \tilde{a}_{1n} \\
\tilde{a}_{21} & 1 & \ldots & \tilde{a}_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
\tilde{a}_{n1} & \tilde{a}_{n2} & \ldots & 1 \\
\end{bmatrix}$$

Based on the value of $\mu$ the eigenvector is measured and from the eigen values which is largest one that value taking into account. Based on the satty the weights of the attributes are calculated for each pair wise matrix. From the largest eigenvalue its corresponding eigen vectors are calculated.[6] The pairwise matrix is normalized and weight of the each attributes is calculated and consistency of the matrix is checked by the following formula.

Consistency index(CI) = $\frac{\lambda_{max} - n}{n-1}$

The consistency index is used to calculate the consistency of the matrix. Where RI value selected from the following Table 3, which is calculated by the rank of the matrix (satty).

<table>
<thead>
<tr>
<th>Rank Matrix</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>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI</td>
<td>0.0</td>
<td>0.580</td>
<td>0.900</td>
<td>1.120</td>
<td>1.240</td>
<td>1.350</td>
<td>1.410</td>
<td>1.450</td>
<td>1.490</td>
</tr>
</tbody>
</table>

$CI = CR * RI$

If CI<0.1 then the data are consistent else we should check the value in comparison matrix and the value should be revised by the author.

### 4.1 Flow Diagram for Teaching Faculty Hassle Factors

1. Identify the Problem
2. Identify the Attributes
3. Optimize the Attributes into Hierarchy
4. Define the Triangular Membership Function
5. Make Pairwise Comparison
6. Construct the fuzzy comparison Matrix
7. Find the Eigen value and Vector
8. Normalized the Matrix
9. Using the Sensitivity Analysis Determine the source of Variance

#### Figure 1 Flow Diagram for Teaching Faculty Hassle Factors

![Flow Diagram for Teaching Faculty Hassle Factors](image)

### V. Sample Work

Keeping in mind the end goal to assess contrast educator push factors in instructive foundations, we built up a streamlined choice model. This improvement diminishes the intricacy of the choice. In this examination imperative pressure factor are recognized and classifications into nine characteristics from the specialists from the instructive foundation. The characteristics are

$$\mathbf{A} = \begin{bmatrix}
1 & 2 & 2 & 4 & 4 & 4 & 2 & 2 & 2 \\
1 & 1 & 2 & 2 & 1 & 1 & 1 & 1 & 1 \\
1 & 1 & 1 & 4 & 3 & 1 & 1 & 1 & 1 \\
1 & 1 & 1 & 1 & 3 & 3 & 3 & 1 & 1 \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{2} & \frac{1}{3} & \frac{1}{4} & \frac{1}{4} & \frac{1}{3} & \frac{1}{3} \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{3} & \frac{1}{4} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{3} & \frac{1}{4} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\
\frac{1}{2} & \frac{1}{2} & \frac{1}{1} & \frac{1}{1} & \frac{1}{3} & \frac{1}{3} & \frac{1}{1} & \frac{1}{1} & \frac{1}{1} \\
\frac{1}{3} & \frac{1}{3} & \frac{1}{1} & \frac{1}{1} & \frac{1}{3} & \frac{1}{3} & \frac{1}{1} & \frac{1}{1} & \frac{1}{1} \\
\end{bmatrix}$$
The most elevated estimation of the list $\mu$ gives the most noteworthy level of improvement. Also, the record of ideal is a straight arched characterized. The accompanying fresh choice grid can be acquired from the file of confidence esteem $\mu$. Here $\mu=0$. 5 is utilized to get fluffy correlation framework into a fresh examination network.

When $CCM (\mu=0.5$ and $\alpha=0.5)=D$. The Eigen value and Eigen vector can be found from the calculation $\left(A-\lambda I\right)=0$. The determined Eigen value is 10.5592 and the individual Eigen vector can be regularized. The reliability index is 0.14898.

### TABLE IV. STRESS FACTORS RANKING FOR ALL USED ATTRIBUTES

<table>
<thead>
<tr>
<th>No.</th>
<th>Attributes</th>
<th>weight</th>
<th>Preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salary/CTC</td>
<td>0.248964</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>New Technologies</td>
<td>0.829153</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Locality</td>
<td>0.138341</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Policies</td>
<td>0.109041</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Non-Academic Work</td>
<td>0.104977</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Management</td>
<td>0.103184</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Students Status</td>
<td>0.0865506</td>
<td>7</td>
</tr>
</tbody>
</table>

## VI. RESULT AND DISCUSSION

Based on the past works review with the Faculty Hassle Factors and fuzzy AHP, the faculty’s stress factors are ranked from the table 4 “Stress factors ranking for all used attributes”, the package or CTC is the primary stress which affect the faculty in educational institution. Because, most of the educational institution in India are not followed compared with the government educational institutions. All other rankings are listed in the table. But, the age and the health factors are least stress factor for the faculty in Indian educational institution.

## VII. CONCLUSION

In this work analysed the stress factors for teaching faculty in Private Educational Institution in India by using the triangular participation work in the examination with the Analytical Hierarchy Processes. There is nine variables are utilized here for the overview from the personnel in private instructive organization. The fluffy AHP is the valuable philosophy for change over the human’s emotions into the usable designs. According to the present scenario of the faculty’s working environment from the private educational institutions to be concentrated on make the stress free environment. With the help of the Fuzzy Analytical Hierarchy Process, can be analysed for human comparisons and can solve the problems with the help of it.

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