



## Analysing Job Satisfaction of Engineering College Teachers at Puducherry Using Fuzzy Logic

### KEYWORDS

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**ABSTRACT** *This research paper discusses the job satisfaction of teachers in Engineering Colleges at Puducherry using Fuzzy Logic. Today, there is generally a widespread of engineering education has deteriorated because of mushroom growth of Engineering Colleges in India. A vast network of mediocre and substandard institutions has sprung up due to unplanned and uncontrolled proliferation of ill equipped; ill provided and inadequately staffed colleges with less salary without concern for quality. At present, in spite of various plans and programmes to improve the conditions of teachers, serious attempts have not been made to identify the factors affecting the Job Satisfaction of teachers in Engineering Colleges for they have great impact on the youth to maximize the profession of Engineering. It becomes necessary to judge the Job Satisfaction of the Engineering College teachers, so as to develop the budding Engineers of the present scenario. To achieve the objectives of the present study, the normative survey method was used. In this study, "Job Satisfaction" is alone taken as the independent variable and sex, age and marital status are taken as three dependent variables. Job Satisfaction is analyzed in terms of the present satisfactory conditions of the Engineering College Teachers at Puducherry.*

### INTRODUCTION

Job satisfaction is pleasant and positive attitude possessed by an employee towards his job-life. Job satisfaction has been characterized as the feeling of effective responses of a person towards his job. Job satisfaction is the result of various attitudes possessed by the teachers. The teacher has a powerful and abiding influence in the formation of the character of every future citizen. He acts as a pivot for the transmission of intellectual and technical skills and cultural tradition from one generation to the other. The responsibility of the teacher is very important and great. If the plans of the nation are to be fulfilled, it is the teacher who can make the most substantial contribution towards the achievement of the desired goals. Over the years, beginning in the early 1930's, psychologists have endeavored to determine the components of job satisfaction. Though many studies were conducted on Job Satisfaction of teachers, yet these appear to be precious little that has been unequivocally established. The reasons for the difference in findings may be due to the fact that job satisfaction has many different points of variables.

Under the general studies, there were many research findings on Job Satisfaction. These research findings stressed on the pleasant physical surroundings at work, organizational climate, and relationship with colleagues, teaching experience, mental health, teacher's attitude towards students, job expectations and performance, morale, sense of community, job security, commitment towards organization and they have significant relationship with Job Satisfaction. Level of job involvement, administrative effectiveness, teaching competency and job satisfaction did not have any effect on Job Satisfaction. In general, college teachers are more satisfied with their jobs.

Regarding sex as a factor in Job Satisfaction, there were seven research findings on Job Satisfaction. Two findings revealed that women teachers have better Job Satisfaction than male teachers. Another two findings revealed that men teachers have better Job Satisfaction than female teachers. Three findings revealed no significant difference between men and women teachers regarding their job. A study on "Teachers job satisfaction in schools of different levels" and found out that there was no difference in job satisfaction between men and women teachers in respect of their jobs [1]. A study on "School teachers and job satisfaction" reveals

that women teachers have better job satisfaction than men teachers [2]. A study on job satisfaction of selected parochial high school teachers in Kansas and found out that there was no significant difference between men and women teachers in their job satisfaction [3]. A study on "Job satisfaction and burn out among Minnesota Teachers" reveals that women teachers have better job satisfaction than men teachers [4]. A study on "A study of job satisfaction among school teachers" reveals that women teachers have better job satisfaction than men teachers [5]. A study on "Job satisfaction of primary school teachers" reveals that considering overall (job satisfaction), women teachers were more satisfied with their job than men teachers [6]. A study on "Job satisfaction of the Harijan welfare school teachers in Tamil Nadu" reveal that women teachers have better job satisfaction than men teachers [7]. To analyze the job satisfaction of teachers in respect of their sex, length of service, age, marital status, type of institution, [8] made a study on "School organizational climate with job satisfaction of teachers". It reveals that female teachers have better satisfaction than their counter parts. A study of organization commitment, attitude towards work and job satisfaction of postgraduate teachers of Goa [9] reveal that there were differences with respect to gender. A study on "Job satisfaction of secondary school teachers in relation to sex, experience, professional training & salary" found that 70.41% of male teachers and 86.44% of female teachers were satisfied with their job satisfaction [10]. A study on "Attitude towards teaching profession and job satisfaction of women teachers in Coimbatore" and found that job satisfaction is an act of satisfying, fulfillment or gratification. It may be the state of being satisfied; contentment or the cause or means of being satisfied or may be confident acceptance of something as satisfactory, dependable or true [11].

Regarding age as a factor in Job Satisfaction, there were two findings. One revealed that there was upward progression in Job Satisfaction with increasing age and the other over 55 years of age and less than 25 years were the most satisfied in their job. A study of job satisfaction of selected parochial high school teachers in Kansas and observed that there was upward progression in job satisfaction with increasing age [3]. A study on "Job satisfaction and burn out among Minnesota Teachers" and found out those teachers over 55 years of age and less than 25 years were the most satisfied [4]. A study on "Job Satisfaction Status of Primary School Teach-

ers in Ota, Nigeria" and reveals that no significant difference existed on gender basis while there were significant differences on educational qualification and age groups. Consequent upon these findings it is imperative for proprietors of schools to ensure that teachers are not dissatisfied with their job through their inability to consistently provide enabling environment [12]. A study on "Socio – Personnel correlates of Job satisfaction" and concluded that age was positively correlated with job satisfaction. Also they found out that age is more effective correlates of job satisfaction [13]. A study on "Personality correlates of job satisfaction of higher secondary school teachers" and concluded that age appeared to exert an adverse impact on job satisfaction [14]. A study on "Correlates of job satisfaction among different professionals" and concluded that age was positively correlated with job satisfaction [15]. A study on job satisfaction of graduate teachers in Coimbatore and concluded that the younger teachers were more satisfied with their jobs than their elders [16]. A study on "Job satisfaction of primary school teachers" and found that teachers younger in age had higher level of job satisfaction [6]. A study on "Job satisfaction of the Harijan welfare school teachers in Tamil Nadu" had reported that teachers who are above 40 years of age have better Job Satisfaction [7]. A study on "Job satisfaction of teaching assistants of the M.S. University of Baroda" showed that most of the teaching assistants were satisfied with their job responsibility and the social conditions within the department. They did not differ in their level of job satisfaction in terms of age group [17]. A study of organization commitment, attitude towards work and job satisfaction of postgraduate teachers of Goa [9] reveals that there were differences with respect to age. A study on "Occupational Stress and Job Satisfaction among Managers" and found that compared to the middle age that are more or less settled in their personals as well as work like young adults found their jobs much more satisfied [17]. A study on "Job satisfaction of faculty members of veterinary sciences: an analysis" and found that the younger faculty members are more satisfied as compared to those with a longer service period [18].

Regarding the marital status as a factor in Job Satisfaction, there was only one finding, which revealed that married teachers seem to be more satisfied with their teaching positions than unmarried teachers. A study on "Teachers voluntary absenteeism and perception of the professional environment, job satisfaction, and impact of collective bargaining" and revealed that married teachers seem to be more satisfied with their teaching positions than unmarried teachers [2]. A study on "A study of job satisfaction among school teachers" and noted that young unmarried teachers were more satisfied than married teachers [5]. A study on "Socio – Personnel correlates of Job satisfaction" has found that marital status is more effectively correlated to job satisfaction [13]. A study on "Personality correlates of job satisfaction of higher secondary school teachers" and concluded that the female unmarried teachers were more satisfied than the married teachers of both sexes [14]. To analyze the job satisfaction of teachers in respect of their sex, length of service, age, marital status, type of institution, A study on "School organizational climate with job satisfaction of teachers". It reveals that with reference to the marital status of teachers, the marital status has no influence on job satisfaction [8].

A study on "Job Satisfaction of Technology and Design Education Teachers in Turkey (Ankara Case)", and found that such variables as gender, age, educational level, experience do not affect all dimensions of satisfaction but they are influential in some aspects of job satisfaction [20]. A study on "Comparative Study of Job Satisfaction among Teachers in Public and Private Engineering Institutions" and found that the overall satisfaction which measured mean scores concluded that job satisfaction of the teachers of public Engineering Institutions is more than that of the teachers of private sector [21]. A study on "Role of Demographic Characteristics on Job Satisfaction" and found that age and job satisfaction was not

positively correlated with each other's. The academic staffs from private sector universities were comparatively more satisfied with overall job satisfaction than that of public sector universities [22]. A study on "Design of Fuzzy Job Satisfaction Matrix with Dynamic Performance Criteria" and found that after defuzzifying the rules and computing the distance from ideal status, the gaps were determined and improvement strategies were suggested [23]. A study on "Hierarchical Fuzzy Competition algorithm for Complex Job Shops Scheduling Problem" and revealed that products with fuzzy logic monitor user defined settings and then automatically set the equipment to function at the user's preferred level for a given task [24]. A study on "Utilization of Artificial Intelligence Approach for Assessment of Job Satisfaction" and found that by determining the shifts that have more operators with fewer score and find the weakness each shift, we can begin to correct these shifts in order to achieve higher efficiency [25]. A study on "Application of Expert System with Fuzzy Logic in Teachers' Performance Evaluation" and found that The proposed model produced significant bases for performance assessment and adequate support in decision making, so the research on the issue can be continued. The qualitative variables are mapped into numeric results by implementing the fuzzy expert system's model through various input examples and provided a basis to use the system ranking for further decision making. Thus, the uncertain and qualitative knowledge of the problem domain have been handled absolutely through integration of expert system technology with fuzzy logic concept [26]. A study on "Job Satisfaction Status of Primary School Teachers in Ota, Nigeria" and reveals that no significant difference existed on gender basis while there were significant differences on educational qualification and age groups [27]. Consequent upon these findings it is imperative for proprietors of schools to ensure that teachers are not dissatisfied with their job through their inability to consistently provide enabling environment.

#### STATEMENT OF THE PROBLEM

Today there exists a general feeling that the professionals do not have satisfaction in their respective job at various levels of education. Hence there is a fall of standards in education as a whole. In order to identify, which factor favors the satisfaction in the Job and which components of Job Satisfaction influence the working environment are to be analyzed for the betterment of standards of education and simultaneously improve the working conditions. Hence the problem is identified as Job Satisfaction of Teachers in various educational Institutions. Particularly, Engineering Colleges have great impact on the youth to maximize the profession of Engineering. It becomes necessary to judge the Job Satisfaction of Engineering College Teachers, so as to develop the budding Engineers of the present scenario. Hence the problem is identified as "Job Satisfaction of Teachers in Engineering Colleges".

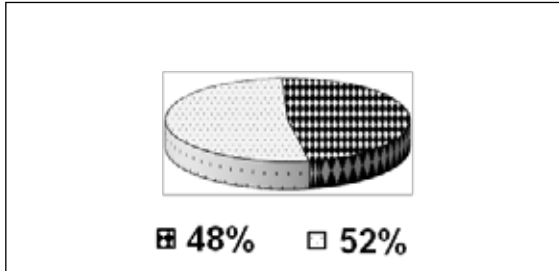
#### SAMPLING PROCEDURE

The population of the study is the Engineering College Teachers at Pondicherry. The population consists of nearly 250 teachers from Engineering College managed by Central Government and Colleges managed by the private bodies at Pondicherry. The stratified random sampling technique was used, to select the sample of Engineering College Teachers. Two strata, namely, Engineering College Teachers from Central Government College (Pondicherry Engineering College (PEC)) and Managed by private bodies (Sri Manakula Vinayagar Engineering College (SMVEC) & Rajiv Gandhi College of Engineering & Technology (RGCT)). From the population, 150 Engineering College Teachers from three different Engineering Colleges were selected. The sample selected is also diagrammed and is shown in Fig. 1. Table 1 shows the complete data collected for the present study. Table 2 shows the distribution of sub samples. It is easy to infer that the sample selected for the present study is almost stratified. The selected sample comprises nearly 60% of the population. Also the sample selected is further distributed on the sub sample

based on Sex, Age, and Marital status.

**Table 1: Sample selected for the present study**

Sl No.	Strata	Name of the College	Sample selected	Total	Percentage of Sample
1	Central Government College	PEC	78	78	52%
2	Managed private bodies	SMVEC RGCET	37 35	72	48%
Total				150	100



**Fig.1: Pie diagram showing the stratification of the sample**

**Table 2: Distribution of Sub Samples**

Sl.No.	Category	Type	Total
1	Sex	Male	95
		Female	55
2	Age	Below 31	80
		Above 31	70
3	Marital Status	Married	106
		Unmarried	44

**TOOLS USED**

The tool used for the present study is Job Satisfaction Inventory. It is for finding the Job Satisfaction of Teachers. The investigator adopted Job Satisfaction inventory (JSI) developed by Jayalakshmi Indiresan (1973) of IIT, New Delhi. Also the investigator uses the 'Personnel data sheet' for finding out the effect of background variables Sex, Age and Marital status.

**TECHNIQUES USED**

The statistical design adopted in the present study comprises the following techniques.

- (i) Descriptive analysis
- (ii) Differential analysis
- (iii) Fuzzy Logic Method

**DESCRIPTIVE ANALYSIS**

The scores of "Job Satisfaction" (Present Satisfactory Conditions) are found to form a normal distribution with a mean of 66.73 and a standard deviation of 13.73. The median and mode of distribution are formed to be 66.00 and 59.00 respectively. The complete analysis is tabulated in Table 3.

**DIFFERENTIAL ANALYSIS**

Differential Analysis for the Present Satisfactory Conditions on Job Satisfaction is shown in Table 4.

**Table 3: Descriptive Analysis for Present Satisfactory Conditions on Job Satisfaction**

Sl. No.	Statistical Meaning	Present Satisfactory Conditions
1	Mean	66.73
2	Median	66.00
3	Mode	59.00
4	SD	13.73
5	QD	8.88
6	SE <sub>M</sub>	1.12

7	SE <sub>σ</sub>	0.79
8	Skewness	0.12
9	Kurtosis	0.28
10	Fiduciary limits of Mean	63.84 & 69.62
11	Fiduciary limits of SD	11.69 & 15.77

**Table 4: Differential Analysis of the Present Satisfactory Conditions of Job Satisfaction**

Sl. No.	Variable	Sub sample	N	Mean	SD	MD	df	TS	Level of significance
1	Sex	Male	95	66.71	13.61	0.49	148	0.2081	NS
		Female	55	66.22	14.06				
2	Age	Below 31	80	66.90	14.53	0.80	148	0.3578	NS
		Above 31	70	66.10	12.85				
3	Marital Status	Married	106	66.58	12.83	0.17	148	0.630	NS
		Unmarried	44	66.41	15.85				

**FUZZY LOGIC METHOD**

Fuzzy logic is a mathematical theory, which encompasses the idea of vagueness when defining a concept or a meaning. For example, they're in uncertainty of fuzziness in expressions like large or small, since these expressions are imprecise and relative. Variables considered are termed 'Fuzzy' as opposed to 'crisp'. Fuzziness is simply one means of describing uncertainty. Such ideas are readily applicable to the job satisfaction problem.

In the formulation, the fuzzy variables associated with the Job Satisfaction problem are:

- Sex (S)
- Age (A)
- Marital Status (MS)

**A) Fuzzy Sets associated with Job Satisfaction**

After identifying the fuzzy variables associated with job satisfaction, the fuzzy sets defining those variables are selected and normalized between 0 & 1. This normalized value can be multiplied by a selected scale factor to accommodate any desired variable. The sets are defined as follows:

The mean (M) is stated by following sets:

$$M = \{Low, Medium, High\}$$

The standard deviation (SD) is stated by following sets:

$$SD = \{Very Low, Low, Medium, High, Very High\}$$

The total score (TS) is chosen as the objective function, are given by:

$$TS = \{Very Low, Low, Medium, High, Very High\}$$

Based on the aforementioned fuzzy sets, the membership functions are chosen for each fuzzy input and output variables. For convenience, a triangular shape is used to illustrate the membership functions considered here. Once these sets are established, the input variables are then related to the output variables by If – Then rules as described below.

**B) Fuzzy If – Then Rules**

In a fuzzy logic based approach, decisions are made by forming a series of rules that relate the input variables to the output variable using If – Then statements. The If (condition) is an antecedent to the Then (consequence) of each rule. Each rule in general can be represented in the following manner:

If (antecedent) Then (consequence)

Mean, standard deviation is considered as input variables and total score is treated as output variables. This relation between the input and output variables are given as:

Total Score = {Mean} and

{Standard Deviation}

In fuzzy set notation this is written as:

$$TS = M \wedge SD$$

Hence, the membership function of the production cost ( $\mu$ PRC) is computed as follows:

$$\mu_{TS} = \mu_{\min} \{ \mu_M, \mu_{SD} \}$$

Where,  $\mu_M$  and  $\mu_{SD}$  are membership of mean and standard deviation respectively. For example, rule 1 can be written as follows:

If            Mean is low and  
               Standard Deviation is low  
Then         Total Score is low

After relating the input variables to the output variables, the fuzzy result must be defuzzified through what is called a defuzzification process, to achieve crisp numerical values. The analysis using Fuzzy Logic method is shown in Table 5.

### C) Defuzzification Process

One of the most commonly used methods of defuzzification is the cancroids or center of gravity method. Using this method, production cost is as follows:

$$TotalScore(\mathcal{S}) = \frac{\sum_{i=1}^n \mu_{\mathcal{S}} \cdot \mathcal{S}_i}{\sum_{i=1}^n \mu_{\mathcal{S}}}$$

**Table 5: Fuzzy Logic Method of the Present Satisfactory Conditions of Job Satisfaction**

Sl. No.	Variable	Sub sample	N	Mean	SD	MD	df	TS	Level of significance
1	Sex	Male	95	67	13	0.49	148	0.2	NS
		Female	55	66.2	13				
2	Age	Below 31	80	67	13	0.80	148	0.3	NS
		Above 31	70	66.1	13				
3	Marital Status	Married	106	66.4	14	0.17	148	0.569	NS
		Unmarried	44	66.6	14				

### CONCLUSIONS

This research paper discussed the job satisfaction of teachers in Engineering Colleges at Puducherry using Fuzzy Logic. The scores of Job Satisfaction (present satisfactory conditions) form a positively skewed platykurtic distribution. It is concluded that there is no significant difference between the male and the female teachers in Job Satisfaction (present satisfactory conditions). It is concluded that there is no significant difference between the teachers at the age of 31 and below, and teachers at the age above 31 in Job Satisfaction (present satisfactory conditions). It is concluded that there is no significant difference between the married and unmarried teachers in Job Satisfaction (present satisfactory conditions). Based on the analysis using descriptive, differential and fuzzy logic method, it is seen that the present role of Job Satisfaction forms a positively skewed platykurtic distribution, which indicates that there is a greater satisfaction in the present job among the Teachers in Engineering Colleges.

### REFERENCE

- Englehardt (1974). Teacher's Job Satisfaction in school of different levels. *Journal of Psychology in Enzichung & Untirricht*.
- Smith (1982). Teachers' voluntary absenteeism and perception of the professional environment, Job satisfaction and impact of collective bargaining. *DAI*, 43(1).
- Lee (1983). A study of Job Satisfaction of selected Parochial High School Teachers in Kansas. *DAI*, 44-49.
- Birmingham J.A (1985). Job Satisfaction and burnout among Minnesota Teachers. *DAI*, 45(8). 2318-A.
- Lavingia K.V. (1974). A study of Job Satisfaction among school teachers. *Research in Education*. Second survey (1972-78).
- Reddy Balakrishna.P (1989). Job Satisfaction of primary school teachers. M.Phil Dissertation. Sri Venkateswara University.
- Sundararajan and Ashrafullah (1990). Job Satisfaction of the Harijan Welfare School Teachers in Tamil Nadu. *Experiment in Education*. XVIII (5).
- Natarajan, R. (2001). A study on School Organizational climate and Job Satisfaction of Teachers. *Journal of Educational Research and Extension*, 38-4.
- Shared Kumar and Sabita P. Patnaik (2002). A Study of organizational Commitment, attitude towards work and Job Satisfaction of post graduate teachers of Goa. *Journal of Educational Research and Extension*, 39.1.
- Thakira Khaton (2000). Job Satisfaction of Secondary School Teachers in relation to their personnel variables: Sex, Experience, Professional Training, Salary and Religion. *Journal of Indian Educational Review*, 36(1).
- Pushpam A.M.L. (2003). "Attitude towards teaching profession and job satisfaction of women teachers in Coimbatore", *Journal of Educational Research and Extension*, 40(2), 49-58.
- Abiodun M. Gesinde and Gbadebo O. Adejumo (2012). "Job Satisfaction Status of Primary School Teachers in Ota, Nigeria", *European Journal of Educational Studies*, 4(1), 11-18.
- Neeraja Dwivedi and Pestonjee (1975). Socio personnel correlate of Job Satisfaction. *Journal of Psychological Studies*, 20(2). 30-49.
- Porwal (1980). A study on personality correlates of Job Satisfaction of higher secondary school teachers. Doctoral Thesis. Agra University.
- Amar Singh (1985). Correlates of Job Satisfaction among different professionals. Doctoral Thesis. Punjab University.
- Sekar.G and Renganathan.S (1988). Job Satisfaction of graduate teachers in Coimbatore. *Journal of Indian Educational Review*, 23(3), 126-36.
- Naik.G.C. (1990). Job Satisfaction of teaching assistants of the M.S.University of Baroda. M.Phil Dissertation. The Maharaja Sayajirao University of Baroda.
- K. Chandraiah S.C. Agrawal, P. Marimuthu and N. Manoharan (2003). Occupational Stress and Job Satisfaction among Managers. *Indian Journal of Occupational and Environmental Medicine*, 7(2).
- M. Gautam, K. Mandal and R S Dalal (2006). Job satisfaction of faculty members of veterinary sciences: an analysis, *Livestock Research for Rural Development* 18 (7).
- Zeki Kaya, H.Güclü Yavuzcan, Mahmut Izciler and Serap Tufekci (2011). "Job Satisfaction of Technology and Design Education Teachers in Turkey (Ankara Case)", *International Journal on New Trends in Education and Their Implications*, 2(4), 112-114.
- Ankur Bansal, Himanshu Aggarwal and Madanlal (2011). "Comparative Study of Job Satisfaction among Teachers in Public and Private Engineering Institutions", 2(6), 82-92.
- Muhamamd Mudasar Ghafoor (2012). "Role of Demographic Characteristics on Job Satisfaction", *Far East Journal of Psychology and Business*, 6(1), 30-45.
- Iraj Mahdavi, Hamed Fazlollahtabar, Nezam Mahdavi-Amiri, Mohsen Arabmaghsudi and Norouz Kolbadinejad (2011). "Design of Fuzzy Job Satisfaction Matrix with Dynamic Performance Criteria", *Proceedings of the 2011 International Conference on Industrial Engineering and Operations Management*, Kula Lumpur, Malaysia.
24. Uning B., Liong T.H., Abednego B.S.P. and Nazaruddin Y.Y. (2006). "Hierarchical Fuzzy Competition algorithm for Complex Job Shops Scheduling Problem", *Proceedings of the International Conference on Engineering and Intelligent Systems*.
25. Azadeh A., Rouzbahman M. and Saberi M. (2009). "Utilization of Artificial Intelligence Approach for Assessment of Job Satisfaction" *International Journal of Intelligent Information Technology Application*, 2(6), 250-255.
26. Abdur Rashid Khan, Hafeez Ullah Amin and Zia Ur Rehman (2011). "Application of Expert System with Fuzzy Logic in Teachers Performance Evaluation", *International Journal of Advanced Computer Science and Applications*, 2(2), 51-57.
27. Abiodun M. Gesinde and Gbadebo O. Adejumo (2012). "Job Satisfaction Status of Primary School Teachers in Ota, Nigeria", *European Journal of Educational Studies*, 4(1), 11-18.