

# A Fuzzy AHP Methodology to Analysis the Impact of Employee Motivation in Manufacturing Industry



Ekta Tiwari, Rajesh Singh

**Abstract:** In this competitive era where employee's performance and productivity decides his or her value, motivated employees stands on the top priority of every organization. This is because a motivated employee not only adds revenue to its organization but also helps in creating brand value as only a motivated employee can generate customer satisfaction leading to customer brand loyalty. In a developing country like ours Manufacturing sectors play a very important role in the economy of the country. Through its modern implements manufacturing sectors brought great changes in the traits of agriculture which helped the agricultural sector in modernizing itself by introducing various manufacturing tools. A motivated employee through his or her performance and productivity help the manufacturing sector lowering its cost of units produced which directly benefits the society as the product will be available to them in better quality and at cheaper rate. Thus, the performance of the employees in the manufacturing sector directly or indirectly influence the pricing policy of any product. Hence a motivated employee is way more necessary not only for the benefit of organization but for our economy and the society as whole.

**Keywords:** Employee motivation, productivity, manufacturing sector, customer satisfaction

## I. INTRODUCTION

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## II. FACTORS AFFECTING MOTIVATION OF THE EMPLOYEES



Fig 1.Factors affecting the motivation factors

### A. Relationship with co-workers

Co-workers means the other employee working in the same department or organization. Co-workers plays a major role in motivating an employee because in an organization they are the only ones with whom an employee spends most of his time.<sup>2</sup>

### B. Incentives or rewards

“Extra” is loved and enjoyed by everyone whether it be in monetary terms or appreciation. People love to be appreciated for their good work and same goes with the employees working in any organization. Every employee want that their efforts are being noticed and are appreciated by everyone especially where they work.<sup>3</sup>

### C. Workplace culture and working condition

Workplace culture is the environment which is created for an employee in an organization. Workplace culture or the working condition provided for the employees plays a vital role in determining the work satisfaction which not only affects the motivation level of the employees but also influences the retention level of the employees in an organization.

#### **D. Leadership style**

Leaders play a pivotal role in motivating their employees. Leaders must focus on the long term policies of the organization and should influence and persuade their employees to do their work with full enthusiasm.<sup>4</sup>

#### **E. Salary**

Salary is the powerful tool to attract and retain the best employees. The basic thing which every candidate looks before joining the organization is the salary package which he or she is going to get in return of the work performed. A good pay acts as a good motivator for the employees.

#### **F. Goals and objective**

Goals and objectives of an organization is linked to the performance of the employees. Goals and objectives give direction to the employees regarding the policies and needs of the organization. Thus a challenging goal can highly motivate the employees to perform their task in the stipulated time and with full energy.

#### **G. Competition**

Competition if taken in a positive way can motivate the employees to improve their learning and performance. Competition creates an urge among the employees perform better so that they can reduce their competition which gives them room to grow and enhance their skills and knowledge.

#### **H. Training program**

Conducting training program for the employees is becoming part and parcel of each and every organization today. Training programs are now being considered as an important function of the organization and is made sure that it is conducted and performed in a similar way as all others functions are performed.

#### **I. Positive feedback**

Positive and honest feedback is very essential for every employees working in the organization in order to groom themselves. Giving a positive feedback is also considered as the easiest way to motivate the employees. Feedback is not only used to give information to the employees and praise them but it also helps the employees to bring required improvement in their working pattern.

#### **J. Opportunities**

A future career growth and opportunities can highly motivate the employees to retain longer in the organization. Being stick to one position is never entertained and accepted by any employee and therefore the employees are always in a need of opportunities which may give them a new recognition and power.<sup>5</sup>

#### **K. Trade Unions**

Trade unions are the informal groups formed by the workers of the organization for the common interest of the members. Trade unions are seen to act as a powerful advocate of the employees against the organization if something wrong or injustice is done to the employees. In such situations trade unions motivates and strengthen them.

#### **L. Job security**

Job security is one of the most important motivational factor for the employees. Organization must make sure that the employees feel secure regarding their job in order to gain their loyalty towards the organization. Lack of job security generates a feeling of fear among the employees which directly or indirectly hampers their performance.

#### **M. Performance appraisal tool**

Performance appraisal tool act as a great source for employee development. Through Performance appraisal method the employees can easily recognize their strength and weakness and can work upon the factors in which they are lacking. Effective performance appraisal tool helps the employees in identifying the challenges in the job and gives them a chance to improve their performance.

#### **N. Self-determination**

Self- determination is a skill through which the person controls his life according to his own choice. Self-determination skills in an organization helps the employees to take better decisions towards the work in particular and the organization in general. Self-determination motivates the employees to perform the task within the stipulated time and with greater efficiency.

#### **O. Personal life**

Fortunately or unfortunately personal life plays a huge role in employee's motivation. It has both positive and negative impact on the motivation level of the employees. Major personal issues such as death of closed ones, end of relationship or a traumatic incident automatically drain the employee's motivation the other hand if the personal life is full of happiness it is automatically reflected in the work because the employee is both mentally and physically fit to fight the upcoming challenges in his profession.

### **III. FUZZY PAIR WISE COMPARISON**

Analytical Hierarchy Process (AHP) is a multipronged decision making mechanism which is widely applied in order to evaluate and rank the complex decision problems.

The components of the paired of comparison matrix in decision making models based on the Fuzzy AHP (FAHP) are the fuzzy numbers. In fuzzy paired of comparison first the hierarchical structure is obtained proceeding to the comparison between the criteria of the same hierarchical level to the preceding one.<sup>6</sup>

Then the fuzzy linguistic terms are adopted to execute the pair wise comparison. This comparison is made on a 0-10 scale as expressed by the triangular fuzzy number in the table given below. The conventional function of fuzzy AHP is to select the top preference from a discrete set of choices.

Triangular fuzzy numbers with bottom value, much credible value & top most value are taken into consideration in order to reflect despondent, most acceptable and idealistic decision making environment.

#### IV. FUZZY SCALE OF PRECEDENCE

Semantic Variable	Crisp AHP Scale	TFN	Reciprocate of TFN
Immensely Acceptable	9	(8, 9, 9)	(1/9, 1/9, 1/8)
More Powerfully To Immensely Acceptable	8	(7, 8, 9)	(1/9, 1/8, 1/7)
More Powerfully Acceptable	7	(6, 7, 8)	(1/8, 1/7, 1/6)
Powerfully To More Powerfully Acceptable	6	(5, 6, 7)	(1/7, 1/6, 1/5)
Powerfully Acceptable	5	(4, 5, 6)	(1/6, 1/5, 1/4)
Moderately To Powerfully Acceptable	4	(3, 4, 5)	(1/5, 1/4, 1/3)
Moderately Acceptable	3	(2, 3, 4)	(1/4, 1/3, 1/2)
Equally To Moderately Acceptable	2	(1, 2, 3)	(1/3, 1/2, 1)
Equally Acceptable	1	(1, 1, 1)	(1, 1, 1)

#### V. EXPERIMENTATION

Pair wise comparison is done by each expert, once the hierarchy is developed. The main criteria weight from first expert is as shown below.

##### A. Main Criteria Weight by First Expert

Table 1 Main criteria weight by first expert

Main criteria	A	B	C
Reward motivation	0.4473	0.2470	0.2291
Organizational motivation	0.5527	0.2808	0.2474
Attitude motivation	0.0000	0.1777	0.1795
Fear motivation	0.0000	0.1058	0.1220
Competence motivation	0.0000	0.1132	0.1270

After repeating the same procedure for all expert's judgment, the equation (1) for the global weights of main criteria was developed.

$$W_i = (a_i) / \sum_{i=1}^n a_i \dots\dots\dots (1)$$

during research work, corresponding weights shown in the table below are generated from the feedback established from the experts for the three motivational category with respect to each sub criteria derived by using fuzzy linguistic scale.

##### B. Global Weights of motivational factors

In the succeeding step, the global weights of motivational factors are computed as explained.

Table 2 Global weights of motivational factors

Sub criteria	MF1			MF2			MF3		
	A	B	C	A	B	C	A	B	C
Incentives	0.051	0.025	0.024	0.028	0.017	0.017	0.028	0.062	0.024
Salary	0.002	0.016	0.009	0.002	0.024	0.021	0.015	0.002	0.015
Training program	0.032	0.027	0.021	0.019	0.02	0.019	0.02	0.028	0.022
Trade and Unions	0.049	0.021	0.03	0.008	0.011	0.012	0.022	0.012	0.014
Workplace culture	0.023	0.034	0.02	0.127	0.045	0.036	0.019	0.028	0.021
Leadership style	0.031	0.019	0.018	0.013	0.019	0.019	0.011	0.013	0.019
Goals and objectives	0.024	0.018	0.026	0.033	0.021	0.02	0.023	0	0.012
Relationship with co-workers	0.025	0.03	0.021	0.009	0.023	0.023	0.013	0.009	0.023
Performance appraisal tool	0.037	0.023	0.29	0	0.01	0.012	0.014	0	0.015
Competition	0.033	0.021	0.01	0.01	0.02	0.021	0.016	0.008	0.016
Opportunities	0.011	0.026	0.011	0.006	0.013	0.014	0.016	0.012	0.016
Job security	0.007	0.022	0.008	0.005	0.013	0.014	0.009	0.009	0.016
Positive feedback	0.014	0.01	0.022	0.002	0.006	0.007	0.006	0.003	0.01
Self determination	0.003	0.007	0.015	0.004	0.007	0.008	0.015	0.003	0.008
Personal life	0.001	0.022	0.012	0.002	0.012	0.014	0.007	0.006	0.016

#### VI. RESULT AND DISCUSSION

The results are computed as reported below

Table 3 De-fuzzified weight

	MF1			MF2			MF3		
Sum of weights	0.4	0.39	0.37	0.31	0.32	0.32	0.22	0.29	0.31
Defuzzified weight	0.387			0.315			0.279		

MF1 got the maximum score on overall criteria's. Hence MF1 is appropriate choice

## VII. CONCLUSION

The above multiple criterion approach has been employed to make the best decision regarding the motivational factor motivating the employees to its highest degree when considered in a manufacturing sector. The main criteria and the sub part of the main criteria displayed in the above research paper is a result of dynamic nature of environment as well as the changing perception. Experts of the respective fields have also played an important role in deciding the factors affecting motivation of the employees in the manufacturing firm. Each and every element influencing the motivation level of the employees has been examined and considered. The paradigm shift from other decision making tool to AHP has been found to be uncomplicated, less time consuming giving an advantage of less expenditure as well. AHP do not comprise of heavy and clumsy mathematical procedure making it overall an easy approach towards sophisticated decision making issues. It bears the competence to captivate the fuzziness in human belief thereby making it a viable technique.

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