

Fuzzy Topsis Approach for Evaluating Job Satisfaction in India

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Abstract:- Current study is an attempt to prioritize the significant factors for better utilization of available human resource potential in order to increase or develop job satisfaction in companies especially IT sector in India. In this regard, a study is done on the basis of most important factors that impact the effective utilization of human power and ranking is done of these factors accordingly. Six factors are found to be the most influential parameters and this study is performed under the consideration of these six parameters. The corresponding ranking of different factors is done by TOPSIS. It is found that the recent employees want changes in work schedules. Flexible Timing is found to be the most dominant factor both men and women in Job Satisfaction. These type of studies are capable to make a paradigm shift in human resource utilization and government policy formulation and employers to think differently and optimum job satisfaction obtained by the employee.

Keywords:- Prioritization, Fuzzy Logic, MADM, TOPSIS.

I. INTRODUCTION

Poor work-life balance usually becomes a reason for dissatisfaction with job to the employees. This state of affairs is whopping with an increasing rate. The job paradigm of satisfaction has changed from salary hike to career optimisation with a proper work life balance. As per the survey the level of dissatisfaction has increased year-on-year. In 2015, 78% employees in spite of them being happy with their current job were still open to other job opportunities [1]. The report further stated that of the unsatisfied employees, 80% belong to the junior level, 60% are from the middle level and 40% respondents are from the senior level. Sadly, a lot of Indian companies are still focusing on salary increment to increase employee satisfaction in their jobs. 50% count poor work-life balance, 30% state meaningless work and 20% say poor salary as the reason for their dissatisfaction in jobs among the respondents who claimed to be unsatisfied. of the employees who are satisfied, 45% express their work-life balance as their major reason for their job satisfaction and WLB. 35% a good salary and 20% stated a good work profile as the reason for their satisfaction and contentment. According to this study, 60% employees dissatisfied with their job, 80% looking for a switch to another job. In the past there were the days when employees only looked for only high salaries in an over demanding and tough office environment. Even highly paid employees agree that after a certain point of time in any job money package does not matter; it is job satisfaction and work culture that ultimately makes a difference. There are many kind of companies, some who keep an hawk eye over its employees,

they even ban the use of mobile phones in office, and there are others which demand silence and formalities in the office.

But at the same time there are perks and facilities to the employees, which allow employees to work from home, part time and believe in a schedule which is more result-oriented than following a strict discipline. These companies reach out to its employees in the time of crisis, supporting them financially at that time and even taking care of the medical expenses of the ailing members in their family.

To a great extent especially in the IT sector, the employee has to be engaged on the job 24*7i.eeverytime, which results into increasing reports of stress and work imbalance among the employees [2]. The constant requirement and need to perform at optimum level which further takes its sacrifice in the form of job dissatisfaction, employee switching over, efficiency reduction, unhealthy work environment and even deaths in some cases. Stressed workplace leads to problems like absent employees, alcoholic staff, bad or poor decisions, indifference among them and unavailability of motivation or creativity. So the difference between work-life and family-life has vanished. The extended or joint families, even in India, is slowly decreasing [3]. Small families have come to stay, where both the spouses are working. On top of that due to increase in divorces due to dissatisfaction, there is an increasing number of single parent [4]. But this problem is not as serious in Delhi as in the West, especially in IT Sector but it could become a serious problem in the future. Despite more working women, there is a slight shift in patterns of responsibilities in household [5]. Women usually take the domestic responsibility, and child upbringing. It has been seen that the gender duty at work as women seek no major benefits, such as flexible hours [6] due to family responsibilities. Often the work interfere with the family and social life, on the other hand sometimes family pressure disturbs the work performance. Present study comes with such an approach in order to prioritize factors which hinders the Job-Satisfaction. This study aims to 1) Determine various criteria that affects the Work-Life Balance in India; 2) Predict weight age and hierarchy among these parameters; 3) Calculate rank of factors.

II. METHODOLOGY AND DATABASE

Multiple Attribute Decision Making (MADM) approach is quite effective in such type of problems [7]. These include methods like Modified Digital Logic (MDL), Analytic Hierarchy Process (AHP) [8], graph theory and matrix approach (GTMA) [9], TOPSIS [10], VIKOR [11] and many others. These methods can be applicable to many areas like Alternate selection materials selection, supply chain management (SCM), decisions of scientists and engineering

problems. Present study utilizes fuzzy TOPSIS in combination with weight age assignment to different parameters which affects the most the job satisfaction in India especially in Delhi region.

Even though TOPSIS is more reliable and compatible with the tangible attributes and in dealing with number of alternatives, it needs weight age criteria of each parameter.

➤ *TOPSIS Method*

Technique for order performance by similarity to ideal solution (TOPSIS) is one of the known classical MCDM method, which was first developed by Hwang and Yoon in 1981 [12]. TOPSIS takes the MADM problem with m alternatives as a geometrical system with m points in the n-dimensional space. The chosen parameter must have the shortest distance from the positive ideal solution and the longest distance from the negative ideal solution which is the basis of this method. TOPSIS introduces with an index called similarity to the positive ideal solution and the maximum distance from the negative ideal solution. Thereafter, this method depicts an alternative/parameter with the maximum similarity to the positive ideal solution (Wang and Chang, 2007). This study is particularly suitable for solving the group decision-making problem in a fuzzy environment which consists of lingual variables.

III. METHODOLOGY USED

The present study aims to provide a ranking for evaluation of the parameters (under techno-socio-economic constraints) considering the job satisfaction in IT sector in India. Once the evaluation criteria and the parameters are decided the analysis requires a methodology that is capable to convert the verbal qualitative reasoning (obtained from understanding developed discussion, brain storming sessions and available literature) to the quantitative numbers which are calculated to results. In this present study fuzzy-TOPSIS is incorporated with weight age to these parameters. This approach is used to calculate the ranking and thus prioritizing of the factors affecting the present scenario of work life balance.

Mathematically, the employed methodology is comprised of the following steps:

Step 1: Characterize linguistic variables, fuzzy numbers and their membership function.

A set of fuzzy rates is required in order to compare all the alternatives for each criterion. These fuzzy terms are assigned by the decision makers and responsible for intra criterion comparisons of the alternatives.

Step 2: Construction of decision matrix

Let m be the parameters and n be the alternate parametrs for k number of decision makers in the proposed model of a problem. The fuzzy rating for C_j criterion is shown as x_{ijk} = {x_{ijk1}, x_{ijk2}, x_{ijk3}, x_{ijk4}}. For i = 1,2,...,p; j = 1,2,...,q and k = 1,2,...,k, x_{ijk}

$$\begin{cases} x_{ij1} = \min_k \{b_{ijk1}\} \\ x_{ij2} = \frac{1}{k} \sum b_{ijk2} \\ x_{ij3} = \frac{1}{k} \sum b_{ijk3} \\ x_{ij4} = \max_k \{b_{ijk4}\} \end{cases}$$

Thus the obtained decision matrix (M) is shown as:

$$M = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1p} \\ x_{21} & x_{22} & \dots & x_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ x_{q1} & x_{q2} & \dots & x_{qp} \end{bmatrix}$$

Step 4: Normalize the matrix as given below:

$$r_{ij} = \frac{f_{ij}}{\sqrt{\sum_{i=1}^m (f_{ij})^2}}; \forall j$$

Step 5: Calculate the weighted normalized decision matrix as given:

$$V_{ij} = [r_{ij}]_{m \times n} \times [W_j]_{n \times m}^{diagonal}$$

Step 6: Calculate the positive ideal and negative ideal solution:

The positive ideal solution V_j⁺ and negative ideal solution V_j⁻

$$V_j^+ = \{(\max V_{ij}, j \in J_1), (\min V_{ij}, j \in J_2), i=1,2,3,\dots,m\}; \forall j$$

$$V_j^- = \{(\min V_{ij}, j \in J_1), (\max V_{ij}, j \in J_2), i=1,2,3,\dots,m\}; \forall j$$

Where, J1 and J2 represents higher best and lower best criteria respectively.

Step 7: Calculate the distance d_i⁺ and d_i⁻ from the positive ideal solution and negative ideal solution respectively as follows:

$$d_i^+ = \left[\sum_{j=1}^n (V_{ij} - V_j^+)^2 \right]^{0.5}, i = 1,2,3,\dots,m$$

$$d_i^- = \left[\sum_{j=1}^n (V_{ij} - V_j^-)^2 \right]^{0.5}, i = 1,2,3,\dots,m$$

Step 8: Calculation of TOPSIS rank index:

$$C_i^+ = \frac{d_i^-}{d_i^- + d_i^+}$$

Factor which has the highest rank index C_i^+ are preferred to be the most dominant and influential.

This step is done in order to acquire the closeness coefficient (C_i) and rank the order of alternatives. According to the C_i , we can depict the ranking order of all parameters and we select the best one from a set of feasible alternate parameters. TOPSIS defines a similarity to the positive ideal solution and the remoteness from the negative ideal solution. after that the approach chooses an alternative with the maximum similarity and closeness to the positive ideal solution (Wang and Chang, 2007).

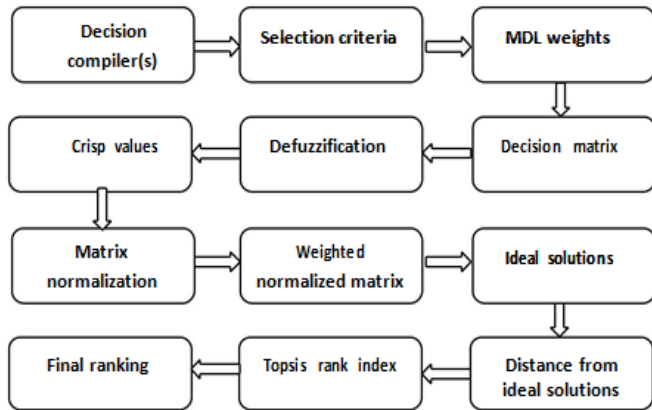


Fig 1:- Flow Chart for Proposed Methodology

IV. PARAMETERS FOR EVALUATION

The respondents belong to Delhi and NCR which are considered in this study. Questionnaire Variables were taken based on the studies published by Hyman et al [12, 13]. The questionnaire was taken at different work places and the responses of employees at various work places were collected. The mode of taking questionnaires were also sent via e-mail. Data sampling is classified into various categories such as gender, marital status, age-group and academic-professional categories with maximum attained qualifications and different size of the IT Company.

Six factors which contribute to WLB are taken into consideration. Whereas three of which are work related, two are family related factors which are taken. Work based factors are, flexible time, option to work part time and freedom to work from home.

Whereas the family related factors which are being taken in this study are, availability of child care facility, flexibility to take care of emergencies at home, Work Environment and Spill-over of work into family life. Three factors i.e. health, sleep, exhaustion, Decreased quality of Family life, Reduced time with the family, No clear leisure time, Recurring thoughts of work were identified and analysed in order to understand the adverse impact of work. Four factors (Reduced time with the family, No clear leisure time, Recurring thoughts of work, decreased quality of family life) were identified and analysed to understand the spill-overof work into family life.

Variable	Number	Percentage
Age		
Less than 25 years	45	30
26-35 years	77	51
Above 36 years	28	19
Total	150	100
Gender		
Male	98	65
Female	52	35
Total	150	100
Marital status		
Married	87	58
Unmarried	63	42
Total	150	100
Parent		
Yes	66	44
No	84	56
Total	150	100

Table 1. Demographic Profile of the Respondents

The detailed explanation of these parameters is as follows:

A. Flexible Timing (P₁):

Offering the employees flexibility is a great way to show your team members that the company trust them. Gift of time is one of the most acknowledged workplace perks which a company has to offer to its employees. Whereas a smart employee works best when they can choose their own timings and schedule. Growth of engagement and productivity can be ensured perhaps when Flexible hours are tolerated by a company on the other hand they may decrease collaboration. Search of a balance will depend on the aim of your team. Flexibility in timings and targets depends on company to company however this parameter is very significant in order to check the work culture of a company.

B. Option to work from Home (P₂):

The study has taken into consideration many other variables that may influence the impact of work as follows:

The proportion of their work per week that workers telecommute: working from home even for one day a week may have a different impact than working from home full-time. Various studies have found that job satisfaction is maximum among workers who telecommute a sometimes.

The organizational culture in general: Job satisfaction among telecommuting workers may be determined by the certain factors that influence job satisfaction in the office, acts like feedback and relationships with colleagues and supervisors. Flexibility and self decisions have also been attached with job satisfaction among remote workers.

Teamwork: In a study, workers with a high level of dependency on others to do their indicates less productive as remote workers. Teamwork is one of the skill which should be there in every employee.

Innovation: Face-to-face confrontations have been associated with a creative and innovative work. Researchers who worked in close physical proximity produced more impactful work.

C. Availability of child care facility (P₃):

Although child care was not in relation with supervisor and team leaders’ views of performance or absenteeism, employees receive more favourable appraisals if absenteeism was low. Child care is always been a greatest impact on females and employees without a family. Child care greatly influenced users’ attitudes toward managing work and simultaneously child care responsibilities, and views on the attractiveness and administration of benefits to the employees. The greater use of care across all dependents, the more favourable the behaviour of the employee and work culture in an organisation. A “frustration effect” involves in a job in the absence of child care. The study suggests that child care benefits greatly affect employee attitudes and membership behaviours’ such as recruitment and retention than performance or absenteeism [14].

Variable	Men	Women
Health	Yes 53	23
	No 45	29
Sleep	Yes 32	23
	No 66	29
Exhaustion	Yes 51	17
	No 47	35

Table 2. Perceived Improvement in WLB

D. Flexibility to meet emergencies at home (P₄):

Flexibility to meet emergencies at home in the workplace is called as “the opportunity of workers to make choices influencing when, where, and for how long they engage in work-related tasks” (Bal & De Lange, 2014). Recently in the availability of flexible working arrangements (FWAs), there is an increase in flexibility in the workplace. FWAs include a kinds of arrangements, which allow workers to work flexibly both in terms of when and where they work. Organisations are often tend to implement FWAs because they are afraid that this will result in reduced productivity for both individuals and teams and thus to the company. However, our interviews shows a number of ways in which flexible working increased both personal and team effectiveness [15].

E. Work Environment (P₅):

Recently, organizations are facing various challenges because of the dynamic nature of the working environment in organisations, the business must satisfy the needs of its employees by providing good working conditions. One of the various challenges for a business is to satisfy IT employees in order to cope up with the changing and fast evolving environment and to achieve success and remain in competition in the market. Job satisfaction is related to different factors, like: Age, Gender, Incentives, working environment, education, duration of work etc, in order to increase efficiency, productivity and job commitment of employees. Work environment and job stress are major barriers of job satisfaction.[16]

Variable		Men	Women
Flexible time	Yes	96	48
	No	2	4
Option to work part Time	Yes	81	49
	No	17	3
Option to work from Home	Yes	85	44
	No	13	8
Availability of child Care facility	Yes	74	48
	No	24	4
Flexibility to meet emergencies at home	Yes	73	46
	No	25	6

Table 3. Perceived Adverse Impact of Work

F. Spill-over of work into family life (P₆):

Around 73% men and 52% women accepts that they are unable to spend enough time with their families due to work and extended work hours and work related activities(Table 5). Around 54% men and 47% women admit that they have no clear leisure and quality time since work overlaps into this period of time. Moreover, also 38% men and 50% women have recurring and simultaneous thoughts of work, even after they leave their place of work as if they are still in office. Amazingly, 55% men and around 50% women feel that work pressures have affected and dominated over their quality of family life [17].

Variable	Men	Women
Reduced time with the family	Yes 72	28
	No 26	24
No clear leisure time	Yes 53	24
	No 45	28
Recurring thoughts of work	Yes 37	26
	No 61	26
Decreased quality of Family life	Yes 54	26
	No 44	26

Table 4. SPILL-OVER of work into Family Life

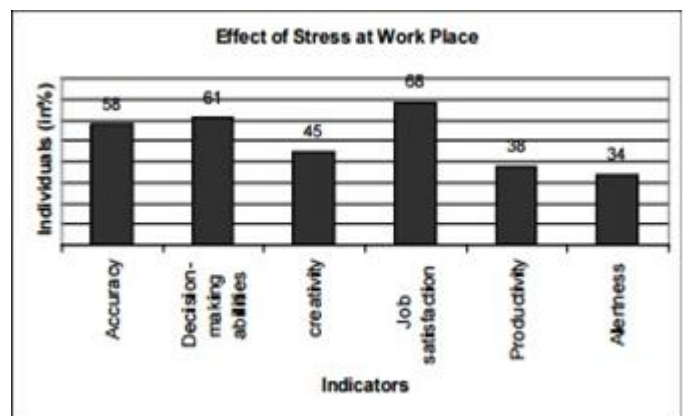


Fig 2:- Effects of Work-place Stress

V. RESULTS AND DISCUSSION

Present study determines the dominant parameters influencing the job satisfaction to the employees and their significance to the employers. In this context, shortlisted important factors are ranked based on how crucially that influences the homogeneity of a company. Afterwards, a comparison is done for both the men and women existing in

our corporate jobs especially IT sector. Ranking helps to determine the factors with high potential and dominant factors responsible for dissatisfaction of the working class. Once the most significant parameters are identified the next question is to prioritize these parameters and to be ranked. In this regard, fuzzy technique is implemented as it works really good for the problems and where discussion is in the form of verbal reasoning and logic with the ‘decision makers’ which later need to be converted into subjective values. Table 5 accommodates the linguistic variables and their corresponding fuzzy ratings. The best range is termed very high (EH) while the worst is termed very low (EL). Table 5 shows the crisp values of the linguistic variables that are being used in previous table. Then there is Table 6 shows the Decision Matrix which is filled with ‘decision compilers’ on the bases of discussion with various ‘decision makers’.

Variables	Parameters					
	P ₁	P ₂	P ₃	P ₄	P ₅	P ₆
Men(S ₁)	L	L	VL	H	H	H
Women (S ₂)	VH	H	H	A	H	A

Table 5. Linguistic Decision Matrix for all Evaluation parameters.

- 1 – VERY LOW (VL) 7 - HIGH (H)
- 3- LOW (L) 9 - VERY HIGH(VH)
- 5- AVERAGE (A)

Consequently, a single decision matrix is formed rather than having a separate decision matrix for each decision maker

Table 8 shows the normalized decision matrix in which all the values are normalized and these values are then multiplied with the weight age which is further shown in Table 9 which accommodates the weighted normalized Decision Matrix. Afterwards, the linguistic variables and their corresponding fuzzy values are defuzzified.

Variables	Parameters					
	P ₁	P ₂	P ₃	P ₄	P ₅	P ₆
Men(S ₁)	3	3	3	7	5	7
Women (S ₂)	9	7	9	5	7	7
Total	12	10	12	12	12	14
Weightage	0.16	0.14	0.16	0.16	0.16	0.19

Table 6. Crisp Values of Linguistic Variables

The Crisp Values are written in the form of the linguistic variable. These values are considered according to the parameter given. These crisp values are then arranged to form the decision matrix which needed for the process of prioritization which is further solved and calculated.

State	P ₁ (%AGE)	P ₂ (%AGE)	P ₃ (%AGE)	P ₄ (%AG E)	P ₅ (%AG E)	P ₆ (%AG E)
Men (S ₁)	97.9	82.6	75.5	74.4	46	55.1
Women(S ₂)	92.3	84.6	92.3	88.4	40	50

Table 7. %age of people affected with these Parameters (Decision Matrix)

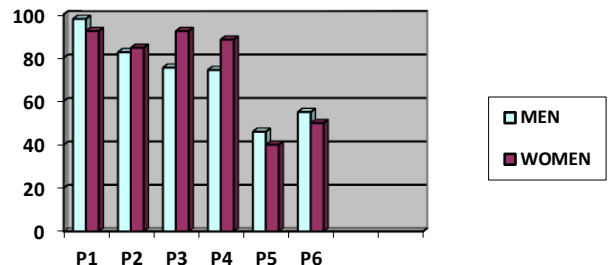


Fig 3:- % age Contribution of various parameters towards men and women

MEN	97.9	82.6	75.5	74.4	46	55.1
WOMEN	92.3	84.6	92.3	88.4	40	50

Table 5 Shows calculated crisp values obtained after normalization of the aggregated fuzzy ratings. The crisp values thus obtained are utilized to calculate the priority and TOPSIS index of distinct factors in contrast to the evaluation of parameters.

State	P ₁ (%AGE)	P ₂ (%AGE)	P ₃ (%AGE)	P ₄ (%AGE)	P ₅ (%AGE)	P ₆ (%AGE)
weightage	0.16	0.14	0.16	0.16	0.16	0.19
Men (S ₁)	0.541	0.456	0.417	0.411	0.254	0.304
Women(S ₂)	0.486	0.445	0.486	0.465	0.210	0.263

Table 8. Formation of Normalized Decision Matrix

State	P ₁ (%AGE)	P ₂ (%AGE)	P ₃ (%AGE)	P ₄ (%AGE)	P ₅ (%AGE)	P ₆ (%AGE)
Men (S ₁)	0.086	0.064	0.067	0.065	<u>0.041</u>	0.057
Women(S ₂)	0.077	0.062	0.077	0.074	<u>0.034</u>	0.049

Table 9. Weighted Normalized Matrix

Parameters	Si ⁺		Si ⁻	
	Men	Women	Men	Women
Flexible Timing (P ₁)	0	0	0.045	0.043
Option to work from Home (P ₂)	0.022	0.015	0.023	0.028
Availability of child care facility (P ₃):	0.019	0	0.026	0.043
Flexibility to meet emergencies at home (P ₄):	0.021	0.003	0.024	0.04
Work Environment (P ₅)	0.045	0.043	0	0
Spill-over of work into family life (P ₆):	0.029	0.028	0.016	0.015

Table 10. Distance Si⁺ and Si⁻ from the positive ideal solution and negative ideal solution respectively

C_i is defined to determine the ranking order of all alternatives once and of each alternative C_i^+ and C_i^- have been calculated. S_i^+ shows the positive and S_i^- shows the negative distance from the ideal solution. Table 10 shows the closeness coefficient of distinct parameters from the ideal solution and their corresponding TOPSIS Rankings.

In this study of alternative selection, Factor which has the highest rank index C_i^+ are preferred. This step is done to obtain the closeness coefficient (C_i) and rank the alternatives.

Parameters	C_i^*		TOPSIS Ranking	
	Men	Women	Men	Women
Flexible Timing (P_1)	1	1	1	1
Option to work from Home (P_2)	0.511	0.65	4	3
Availability of child care facility (P_3):	0.577	1	2	1
Flexibility to meet emergencies at home (P_4):	0.533	0.93	3	2
Work Environment (P_5)	0	0	6	5
Spill-over of work into family life (P_6):	0.355	0.348	5	4

Table 11. Closeness coefficient (C_i) and TOPSIS rank of alternatives.

VI. CONCLUSION

This study is an application of MADM approach, In this study, the perspective of both men and women is studied under six most significant parameters. These parameters are analysed, weighted and it is found that Flexible Timing (P_1) is the most influential parameter for both men and women as far as Job Satisfaction in India is concerned. While Availability of child care facility (P_3) is also being the most influential among all the parameters for women under consideration. While for the women Flexibility to meet emergencies at home (P_5) found out to be the second most influential parameter for Women. Work Environment (P_5) is the least influential and dominant parameter for both men and women. This study brings out some of the problems related to Work Life Balance (WLB) in the context of Delhi and NCR. The study shows that WLB problems here are quite similar to those in the Western countries. While most developed countries in the world have put family friendly work environment and practices [18, 19] the same is yet to be seen in India. With the increase in the number of working couples, it is obvious that such practices must be implemented here also, as they would improve productivity and also quality of work and family life. Flexible time, home working, child care facilities and the option to work part time are facilities that need to be introduced in India also. Friendly and at the same time Supportive work environment is yet

another important step to be taken. The results of the study are affected by these responses and are subject to varying in a bigger or different sample of responses or area. Moreover, it must be understood by organizations these differences so that employee specific steps to improve WLB could be initiated. Social and political discussions, the problem of stress in the workplace requires concrete responses from employers and policy makers inside the organisation.

Of all these alternatives calculation of the distance to both the “positive-ideal solution” and the “negative-ideal solution” simultaneously is studied. Compared with existing fuzzy TOPSIS methods, the proposed method can deal with group decision-making problems in a more efficient manner. This approach is based on the concept that the ideal alternative has the best level for all attributes undertaken, whereas the negative-ideal is the one with all the worst attribute values. TOPSIS defines solutions as the points that are simultaneous in nature.

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