

Design of a Fuzzy Job Satisfaction Matrix with Dynamic Performance Criteria

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Abstract

Here, we propose a fuzzy rule-based algorithm to evaluate the job satisfaction in an organization. First, we collect the effective factors of job satisfaction by interviews. After analyzing the interview results, we propose questionnaires with respect to categories obtained from interviews. Due to qualitative aspect of satisfaction, we use linguistic choices in the questionnaires. While it is hard to disseminate questionnaires to all being interviewed, sampling is performed based on STRATA technique. The results are used to compose fuzzy rules. After defuzzification of the rules and computing the distance from ideal status, the gaps are determined. The gaps are fulfilled using improvement strategies.

Keywords

Job satisfaction matrix; STRATA technique; Fuzzy rules

1. Introduction

Job satisfaction is a complicated multi-dimensional concept. Job satisfaction in general, being an emotional reaction and behavioral expression, is established as a result of individual assessment of work performance, work environment and work life. Job satisfaction is defined to be an affective reaction to a job that results from the comparison of perceived outcomes with those that are desired [1-3]. According to Adams and Bond [4], the common point of job satisfaction definitions was the degree of positive approach related to work or to the elements of work.

The factors influencing job satisfaction could be professional status, pay, administrative style, work requirement and policies, and individual characteristics. Some studies suggest exploring the factors affecting job satisfaction such as age, marital status, gender, organization or institution, level of responsibility, employment type, work duration, payments [5-10].

Job satisfaction not only depends on the quality of the employment, but also on the employee's expectations with respect to the job. The key to job satisfaction is, in fact, in the fit between the objective conditions of the job and the worker's expectations. The better the fit between expectations and job reality, the greater is the satisfaction. This is how it is perceived by the main theories of social psychologists on job satisfaction (the classic theories are those of [11,12]).

Previous studies (e.g., [13-15]) reported that managerial factors affected employees' attitudes, job satisfaction, organizational commitment, and motivation to perform well, and these factors, in turn, influenced organizational outcomes.

Organizational outcomes include, for example, patient satisfaction and employees' intention to quit. Study of Bjorvell and Brodin's [16] found that half of the nursing staff wanted to quit their jobs. Those nurses, who had intention to quit, perceived themselves as less satisfied with several aspects (job dimensions of cooperation, job

complexity, help received from superiors, and sufficient time for nursing care delivery), than those who did not have any intention to quit. Results also showed that the head nurse seemed to have an important supportive function, and suggested that a supportive institution might reduce personnel turnover in hospitals.

Job satisfaction has been examined as an antecedent to intention to leave [17] and organizational commitment [18]. Job satisfaction has also been predicted by emotional exhaustion [19]. While job satisfaction is examined as both an antecedent and an outcome, the majority of academic research examines job satisfaction as a global, single-facet construct.

According to Churchill et al. [20], the use of a global measure of job satisfaction fails to provide an accurate and full assessment of satisfaction and provides little information for management requirements concerning specific aspects of the work environment that salespeople find satisfying. In addition, studies examining job satisfaction with multi-dimensional scales, have reported differential effects on employees' job-related attitudes and behaviors (e.g., [21-23]).

Organizations need to understand factors affecting and affected by different dimensions of job satisfaction. Specially, how does emotional exhaustion impact each of the dimensions of job satisfaction and what are the differential effects of dimensions of job satisfaction on critical organizational outcomes like commitment and turnover? The main objective of our study here is to provide a job satisfaction matrix for further clarification of the interrelationships between individual emotional exhaustion, job properties and organizational factors of job satisfaction. This matrix is trackable at any time interval for identifying the dissatisfaction factors.

2. Job Satisfaction Factors

Different kinds of job related stress exist. Burnout is one such job related stress identified by research that significantly impacts various job related outcomes [24,25]. Burnout is a psychological syndrome or condition that manifests in reactions to chronic stress experienced by people who provide services [26]. Burnout is composed of three dimensions (emotional exhaustion, depersonalization and personal accomplishment).

According to Singh et al. [25], emotional exhaustion reflects feelings of depleted energy and being drained of sensation, what people often associate with being "burned-out". Diminished personal accomplishment deals with inefficacy, reduced motivation and low self-esteem. Depersonalization, deals with the tendency to de-individuate and dehumanize others.

Lewin and Sager [27] suggest that, because of the unique characteristics of the sales profession the core construct, emotional exhaustion, is predicted by both depersonalization and diminished personal accomplishments. In their study, they examined their proposed model against competing models. Findings suggest that both depersonalization and diminished personal accomplishments predicted emotional exhaustion.

Within sales research, emotional exhaustion is the most commonly examined dimension of burnout. For example, [19,24,28] have all examined the relationship between emotional exhaustion and job satisfaction. Boles et al. [24] failed to find a significant relationship between these two constructs. However, Babakus et al. [28] found a significant and negative relationship between emotional exhaustion and job satisfaction in an international service organization. These results were reinforced by Jaramillo et al. [19] in their examination of Ecuadorian financial institutions.

Using the proposed link structure, we can classify the job satisfaction factors in an organization under three headings, individual, job properties and organizational factors. After an interview made in an organization, the classified job satisfaction factors are identified.

3. The Proposed Approach

Here, we describe our proposed flowchart for the design of a job satisfaction matrix. As stated before, we first conduct interviews concerning aspects such as financial, social, work load, incentives and relationship with colleagues. After analyzing the interviews, we classify the organization into some categories based on the overlapping interview elements. Then, we propose questionnaires with respect to categories obtained from interviews. Due to the qualitative aspect of satisfaction, we use linguistic choices in the questionnaires. While it is hard to disseminate questionnaires to all being interviewed, sampling is performed based on STRATA technique. Then, the colleagues fill the questionnaires. The results are used to compose fuzzy rules. After defuzzifying the rules and computing the distance from ideal status, the gaps are determined. These gaps are fulfilled using strategies. Since the level of satisfaction differs with time, this process is repeated for different time periods and the gaps are analyzed to be lessened. This way, we can justify the dynamism of organizations from satisfaction viewpoint. Fuzzy logic is capable of treating this dynamic performance criterion in the uncertain and qualitative environment. The flowchart of our proposed methodology is shown in Figure 1.

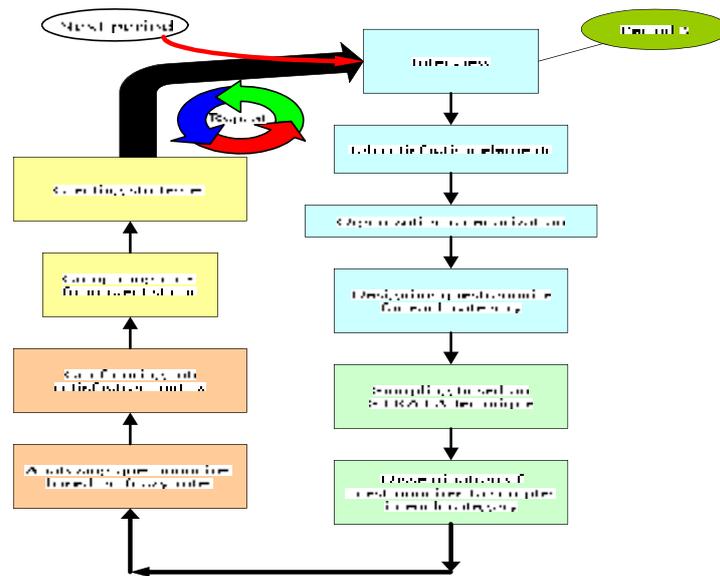


Figure 1: Proposed flowchart for job satisfaction

Next, we give a brief description of STRATA sampling technique and fuzzy logic.

3.1 STRATA sampling

Where the population embraces a number of distinct categories, the frame can be organized by these categories into separate "strata." Each stratum is then sampled as an independent sub-population, out of which individual elements can be randomly selected. There are several potential benefits to stratified sampling. A stratified sampling approach is most effective when three conditions are met:

1. Variability within strata are minimized.
2. Variability between strata are maximized.
3. The variables upon which the population is stratified are strongly correlated with the desired dependent variable.

Below, we present the parameters of STRATA technique:

n_h	the sample size for stratum h
N_h	the population size for stratum h
N	total population size
n	total sample size.

Also, formula for the sample size of a stratum is:

$$n_h = \frac{N_h}{N} \times n$$

The questionnaires are given to the obtained sample size n_h .

3.2 Fuzzy logic

Fuzzy Logic (FL) is a problem-solving control system methodology that lends itself to implementation in systems ranging from simple, small, embedded micro-controllers to large, networked, multi-channel PC or workstation-based data acquisition and control systems. It can be implemented in hardware, software, or a combination of both.

FL provides a simple way to arrive at a definite conclusion based upon vague, ambiguous, imprecise, noisy, or missing input information. FL's approach to control problems mimics how a person would make decisions, only much faster.

FL incorporates a simple, rule-based IF X AND Y THEN Z approach to solving a control problem rather than attempting to model a system mathematically. The FL model is empirically-based, relying on an operator's experience rather than their technical understanding of the system.

FL requires some numerical parameters in order to operate such as what is considered significant error and significant rate-of-change-of-error, but exact values of these numbers are usually not critical unless very responsive performance is required in which case empirical tuning would determine them.

4. Job Satisfaction Matrix

Here, using fuzzy logic we compose rules helping to determine the current status of job satisfaction factors in an organization. Fuzzy approach helps us to consider qualitative aspects of employees' opinions. The indices and parameters are as follows:

Indices:

- i index for category; $i=1, \dots, M$.
- j index for factor; $j=1, \dots, N$.

Parameters:

- F_j^0 j th factor in period 0
- F_{ij}^0 j th factor in i th category in period 0
- Q_j^0 linguistic variable for j th factor in period 0
- Q_{ij}^0 linguistic variable for j th factor in i th category in period 0
- C_j^0 numerical value of j th factor in period 0
- A_C^0 value vertices of factors in job satisfaction matrix in period 0
- I_j^0 ideal value of j th factor in period 0
- A_I^0 ideal value vertices for each factor in period 0
- G_{I-C}^0 gap vertices between ideal and matrix values in period 0.

Note that we apply triangular fuzzy linguistic variable, and thus Q_j^0 and $Q_{ij}^0 \in \{\text{low, fair, high}\}$.

Here, we compose the fuzzy rules for job satisfaction evaluations. The structure of fuzzy rules is as follows:

- If $F_{11}^0 = Q_{11}^0$ and $F_{21}^0 = Q_{21}^0$ and ... and $F_{M1}^0 = Q_{M1}^0$ then $F_1^0 = Q_1^0$.
- If $F_{12}^0 = Q_{12}^0$ and $F_{22}^0 = Q_{22}^0$ and ... and $F_{M2}^0 = Q_{M2}^0$ then $F_2^0 = Q_2^0$.
-
- If $F_{1N}^0 = Q_{1N}^0$ and $F_{2N}^0 = Q_{2N}^0$ and ... and $F_{MN}^0 = Q_{MN}^0$ then $F_n^0 = Q_n^0$.

After defuzzifying each set of the above fuzzy rules, we obtain the defuzzified value for each factor (C_j^0). Having the ideal status, we can compute the gaps between current and ideal statuses. Thus, the job satisfaction matrix is configured as Table 1.

Table 1: Job satisfaction matrix

Factor	F_1^0	F_2^0	...	F_N^0
Status				
A_C^0	C_1^0	C_2^0	...	C_N^0
A_I^0	I_1^0	I_2^0	...	I_N^0
G_{I-C}^0	$G_{I_1-C_1}^0$	$G_{I_2-C_2}^0$...	$G_{I_N-C_N}^0$

After determining the gaps, improvement strategies are proposed to eliminate or reduce the gaps.

5. Conclusions

We proposed a fuzzy rule-based algorithm to evaluate job satisfaction in an organization. Conducting interviews, we collected the effective factors of job satisfaction. Then, analyzing the interviews, we proposed questionnaires with respect to a link structure among substantial satisfaction elements in an organization. Due to the qualitative aspect of satisfaction, we used linguistic choices in the questionnaires. While it is hard to disseminate questionnaires to all being interviewed, sampling was performed based on STRATA technique. The results were applied in composing fuzzy rules. After defuzzifying the rules and computing the distance from ideal status, the gaps were determined and improvement strategies were suggested.

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