

Information processing model to measure important determinants on job satisfaction

YB Shin

Francis Marion University, Florence, USA

SH Koh

Mississippi State University, Starkville, USA

CS Shim

King University, Bristol, USA

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Abstract

This study identifies possible sources that generate dissonance and finds important variables that may improve information systems (IS) professionals' level of satisfaction in each source. A logit model is used to identify significant variables that affect the formulation of higher job satisfaction. Results show that the effective management of variables related to the output side variables such as pay level, career progress opportunities, chance to learn new skills, etc, directly impact on the formulation of turnover intention among IS professionals.

1. Introduction

The current revolution in information technology has served to provide valuable information efficiently and effectively, but it has also increased the complexity of information systems (IS). The scarcity of new qualified professionals and the difficulty in training new professionals call attention to the effective management of IS professionals. The retention of qualified and motivated IS people is critical to the success of IS departments and the organization as a whole.

The lack of clarity regarding the reasons for turnover (Campion, 1991) and the inaccuracy of organizational data for turnover reasons encourage the use of turnover intention. Fishbein and Ajzen (1975) contended that "the best single predictor of an individual's behavior be a measure of his intention to perform that behavior." Since then, a substantial stream of research (Moore, 2000, Igbaria & Greenhaus, 1992; Baroudi, 1985) has come out to support their statement.

Although considerable efforts have been exerted toward research on employee turnover, no one theory has been found to explain the behavior of employee turnover. The survey performed by Mobley et al. (1979) reported that less than 20% of the variance in turnover could be explained. Consequently the major problem addressed by this research was that prior research has employed isolated subject groupings, and disregarded individual information processing in a turnover decision.

2. Information processing

According to Ofstad (1969), decision making is a process of choosing a course of action among several alternatives for the purpose of attaining a goal or goals. A decision consists of several alternatives, comparisons among these alternatives, and the evaluation of their outcomes. Turnover decisions take place when IS professionals revise their previous choice --

the present job. The present job can be regarded as the best among the alternatives which were available when the choice was made. Therefore, it is very important to understand why IS professionals revise their previous choices.

When the changes produce a state of imbalance called disequilibrium, IS professionals try to revise their previous choices. Disequilibrium, a concept adapted from the work of psychology research, can be used as the key concept in understanding the process of a turnover decision. Many different types of disequilibrium have been described in the literature: dissonance (Festinger, 1957), discrepancy (Higgins, 1987) and disequilibrium (Piaget, 1980).

When applied to a turnover decision, a discrepancy calls for a turnover decision which revises the previous choice of the current job. If an employee experiences a high level of discrepancy, he/she will try to reduce the imbalanced situation. Because of the high level of discrepancy, an adjustment process will be undertaken to remove the uncomfortable situation. Changing the current job can be one alternative to avoid the dissonance.

The model of human problem solving proposed by Newell and Simon (1972) explains this processes clearly. They developed the model based on the belief that problem solving can be understood as information processing. The model consists of the following important subsystems: a perception subsystem, a cognitive subsystem, and a motor subsystem.

The input for the human information processing system is external stimuli. In the process of the turnover decision, changes in available alternatives, organizational situations, and demographic characteristics can be regarded as external stimuli. The perception subsystem consists of sensors that interpret incoming information. In turnover analysis, the perception subsystem evaluates the effects of changes and may produce discrepancies. The cognitive subsystem selects and processes appropriate information transferred from the perception system and/or external sources to make a decision. In the process of turnover decision, the cognitive subsystem selects the best among possible alternatives. The output for the human information processing is some observable activity. In turnover analysis, turnover intention or actual turnover can be considered as output.

3. Sources of discrepancy

Since the understanding of the turnover decision process is far from complete, the mental process to explain turnover decisions focuses on the role of discrepancies. Doran et al. (1991) summarized Festinger's theory of cognitive dissonance as follows: Dissonance exists when an individual holds a cognition that is inconsistent with his or her other cognition in the same domain. One way in which the individual can reduce dissonance is by altering the discrepant cognition to bring it in line with his or her other cognition. A primary purpose of discrepancy theory in turnover analysis is to determine what sources create a discrepancy. The following are two important sources of discrepancy for this study.

Source 1: Preference Changes

Preference changes resulting from changes in values can be one important source of discrepancy. Steers and Mowday (1981) argued that each employee would have a somewhat different set of expectations depending upon his or her own values and needs at any given time. With new knowledge and experience, the value systems of an employee may change over time.

Consequently, different employees have different preferences (or utilities) toward job characteristics which are considered for the selection of a job. Even if an employee's preferences are different, he/she will choose a job that is close to his/her ideal job. The changes in values result in the changes in preferences toward job features. These changes may cause a discrepancy. Therefore, the current job no longer provides the best choice on the basis of the changed decision criteria.

Source 2: Expectation Gaps

Another source of discrepancy is the gap between yesterday's understanding and today's reality. It is possible for an employee to choose a wrong alternative even if he/she evaluates possible alternatives carefully before selecting a job. In addition, the ability to evaluate the collected information is bounded, and some valuable information is hidden from a prospective employee. The evaluation of a job as a prospective employee may be different from that after employment. The gap between expectations and realities may generate regret about the past decision.

Katzell (1964) tried to measure the level of this discrepancy with formula. He asserted that the more a person expects, the higher the level of discrepancy, and that excess over expectations could produce a discrepancy which is called 'positive discrepancy.' Locke (1969), however, emphasized perceived discrepancy, not actual discrepancy. Perceived discrepancy is the difference between what an employee expects and what he/she perceives as an offering. The gap can be measured by examining the perceived level of expectation met. The perceived gaps proposed by Locke are examined in this study.

4. Variables Related to a Job

Because turnover intention is formulated while an employee is working on the current job, the analysis of job characteristics is important to understand turnover. Locke (1976) defined a job as a complex interrelationship of tasks, roles, responsibilities, interactions, incentives, and rewards. Vroom's expectancy-valence model can be used to clarify interaction between characteristics.

According to Vroom's theory, the choices mentioned above are a function of two variables: (1) the valence -- perceived value of outcomes, and (2) the expectancy -- the perceived probability of attaining the outcomes. In other words, the behavior of a choice (including turnover decision) can be explained by the attractiveness of outcomes and the possibility of attaining the outcomes on given conditions. Attractiveness is a utility function of perceived outputs. The possibility of attaining outcomes can be replaced with the amount of input to get the outcomes. Therefore, choices about a job are based on the interaction between input and output job characteristics.

General system theory is also useful to consider the interaction between input and output job characteristics. To apply the system theory, decision variables should be divided into two categories: input and output. Table 1 presents important job characteristics which are classified on the basis of the system theory. Input characteristics can be divided into two subcategories: amount/difficulty and managerial style. Output characteristics can be divided into two subcategories: monetary and non-monetary rewards.

Input	Amount & Difficulty	Work Load Difficult Job Stress
	Managerial Style	Job variety Freedom Working conditions
Output	Monetary	Current pay level Benefits Incentive
	Non-monetary	Career progress opportunities Job security Chance to learn

Table 1: Four Categories of Decision Variables

Sources: Mobley et al. (1979), Locke (1976), and Hom and Griffeth(1991)

5. Research Framework and Hypotheses

This study proposes a framework of decision variables which influence the formulation of turnover intention. The model is adapted from the theory of disequilibrium provided by Piaget (1980); that is, turnover intention will be created when an employee tries to remove dissonance, or discrepancies. This study is designed to find the factors that create the dissonance in the formulation of turnover intention. The following objectives are derived: 1) To identify possible sources that generate dissonance, 2) To measure the discriminant power of each source, and 3) To find important variables that may reduce IS professionals' turnover in each source. The framework is shown in Figure 1.

The first objective examines what makes employees feel that they do not fit the current job and organization. Many possible sources can cause discrepancy. The sources (Wanous, 1980; Rice et. al., 1990) can be divided into the following two categories: (1) changes in decision criteria to measure employees' preference changes, (2) unmet expectations to measure the gaps between yesterday's understanding and today's reality.

The second objective aims at finding the relationship between the levels of discrepancies and turnover intention. By examining the contribution of each source in the formulation of turnover intention, relevant strategies can be specified to retain qualified IS professionals. Finally, the third objective converges on examining the roles of job features in determining the level of discrepancy in each source.

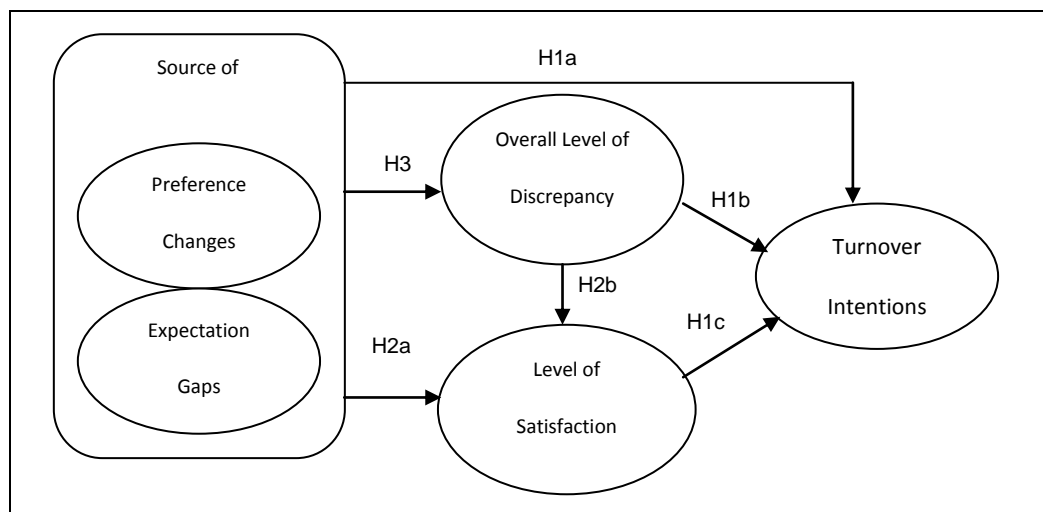


Figure 1: Research Framework and Hypotheses

Three major sets of hypotheses are addressed in this study. The first set of hypotheses concerns the role of the following variables in formulating turnover intention among IS professionals: 1) levels of discrepancies resulting from different sources, 2) the level of fitness, and 3) the level of satisfaction. The purpose of these hypotheses tests is to find important reasons that generate turnover intention. Therefore, the discriminant power of each variable will also be examined.

The first possible source of discrepancy is 'preference changes.' Preference changes may alter the choice pattern. Romme (1990) argued that preference changes might partly explain employee turnover. Preference changes are one important explanation for the increase in the female labor supply. Schkade and Johnson (1989) reported that changes in consumer preferences

due to the new knowledge of the health risk of cholesterol might increase the consumption of white meat in place of red meat. Preference changes may cause IS professionals to revise the previous choice.

The second possible source of discrepancy is 'the level of met expectation.' Wortruba and Tyagi (1991) examined the impact of met expectations on voluntary turnover. Their analysis showed that met expectations correspond to turnover behavior. IS professionals who think they do not fit their current jobs may consider quitting their current jobs to resolve the state of discrepancy. The level of fitness as a consequence of multiple discrepancies from several sources can affect the formulation of turnover intention.

Thirdly, the role of the level of satisfaction in generating turnover intention was examined by some previous studies (Baroudi, 1985). The studies indicated a negative relationship between job satisfaction and turnover intention. However, a low amount of variance is explained in both studies.

H1a: IS professionals whose levels of discrepancies are high display a higher chance of generating turnover intention.

H1b: IS professionals whose level of fitness to the current job is low display a higher chance of generating turnover intention.

H1c: IS professionals who are dissatisfied with the current job display a higher chance of generating turnover intention.

The second set of hypotheses concerns the role of the following variables in determining the level of satisfaction: 1) levels of discrepancies resulting from different sources and 2) the level of fitness. The purpose of these hypotheses tests is to find important antecedents of job satisfaction. These tests are based on the assumption that job satisfaction plays an important role in generating turnover intention. Rice et al. (1990) examined the association of multiple discrepancies with the satisfaction level. Their results indicate that the hypothesis related to the strong association was generally well supported.

H2a: The levels of discrepancies are significantly related to the level of satisfaction.

H2b: The level of fitness to the current job is significantly related to the level of satisfaction.

Hypothesis 3 concerns the association of the levels of discrepancies resulting from different sources with the level of fitness. Hypothesis 3 was developed on the basis of the fact that IS professionals who think they do not fit their current jobs can be vulnerable to dissatisfaction and/or turnover intention. Therefore, it may be important to identify the determinants of the level of fitness.

H3: The levels of discrepancies are significantly related to the level of fitness.

6. Data Analysis

Questionnaires were sent to 153 IS professionals who were proportionally selected from each type of non-government business in the southeast region of United States. A total of 97 responses are collected. And based on list-wise deletion, 91 usable questionnaires are obtained. Table 2 exhibits the descriptive statistics for the level of met expectations and the results of a comparison of the current job with alternatives in other organizations. Mean values ranged from 2.603 to 3.237. IS professionals perceive that the following job characteristics are better than their expectations: chance to learn, amount of freedom to do my job, job variety, and coworkers. For preference changes in decision criteria, respondents are asked to indicate the level of consideration that they gave to each item when making the decision to select their current job. The biggest change takes place in benefits and incentives from 3.76 to 4.26 (difference=0.50).

Items	Met Expectations		Comparison	
	Mean	Std. Dev.	Mean	Std. Dev.
Pay	2.97	0.94	3.13*	0.93
Benefits and incentives	2.97	0.87	3.12*	0.83
Career progress opportunities	2.45*	0.88	3.40*	0.81
Chance to learn	3.10*	1.02	3.24*	0.87
Job security	2.81*	1.00	2.83*	0.86
Work loads	2.71*	0.83	2.97	0.71
Working conditions	2.92*	0.87	3.13*	0.77
Job stress	2.60*	0.88	2.96	0.78
Amount of freedom to do my job	3.24*	1.01	2.94	0.82
Job variety	3.14*	1.04	2.96	0.82
Coworkers	3.15*	0.93	3.04	0.67

Table 2: Descriptive Statistics for Met Expectations and Attractiveness of Alternatives in Other Organizations (The five-point scale from 'much worse (1)' to 'much better (5).'
 * indicates the mean of each item is significantly different from its mid-point value.)

Items	Past		Future		Differences	
	Mean	SD	Mean	SD	Mean	SD
Pay	3.80	0.90	4.20	0.74	0.40*	0.90
Benefits and incentives	3.76	0.86	4.26	0.73	0.50*	0.86
Career progress opportunities	3.78	0.88	3.99	0.93	0.21*	0.91
Chance to learn	4.10	0.76	4.18	0.79	0.08	0.79
Job security	3.78	0.91	4.00	0.92	0.23*	0.85
Work loads	3.06	0.88	3.35	0.88	0.29*	0.82
Working conditions	3.38	0.86	3.70	0.81	0.31*	0.85
Job stress	3.26	0.89	4.06	0.83	0.39*	0.82
Amount of freedom to do my job	3.75	0.94	3.64	0.94	0.31*	0.83
Job variety	3.68	0.90	3.91	0.85	0.23*	0.88
Coworkers	3.23	0.95	3.61	0.92	0.33*	0.89

Table 3: Descriptive Statistics for Preference Changes in Decision Criteria
 (The five-point scale is used from 'very unimportant (1)' to 'very important (5).'
 * indicates items whose changes in decision criteria are significant.)

The p-values for both tests (Wilks' lambda and Hotelling T²) are large enough to reject the null hypothesis that there is no difference in the mean vectors between the early and late respondents. The reliability and validity of the collected data are examined to ensure adequacy for further analysis. Cronbach's coefficient alpha for the 22 items measuring the level of discrepancy was 0.845. Cronbach's coefficient alpha for the 3 items measuring the level of satisfaction was 0.890. In conclusion, the measurement of the level of discrepancy and the level of satisfaction can be assumed to be reliable.

The component analysis method with varimax rotation is used to investigate the dimensionality of the underlying questionnaire data. Factor loading patterns are shown in Table 4. This study divides important job characteristics into two groups: input and output variables as mentioned earlier. Most decision variables grouped as predicted. Input variables load on factor 1 and factor 5. The variables loading on factor 1 are related to the amount of inputs (work

load, work stress, and working condition), and those loading on factor 5 are related to the managerial characteristics of input (freedom, and job variety). Output variables loaded on factor 3 and factor 4. Factor 3 includes the items related to the amount of monetary output (pay, incentive and benefits), while factor 4 includes those related the amount of non-monetary output (chance to learn, career progress opportunities, and self-esteem).

	FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6	FACTOR7
EX_PAY	0.12633	-0.07527	0.72892	0.12902	0.00478	0.06280	-0.06792
EX_BNFT	0.09244	0.01348	0.68723	0.14679	0.11526	-0.00418	-0.03276
EX_CAREER	0.01846	-0.00753	0.24719	0.72208	0.15733	0.02495	0.03717
EX_CHANCE	0.13701	-0.11676	0.02922	0.68930	0.30747	0.05887	-0.03804
EX_SECURE	0.15721	-0.11416	-0.01750	0.09956	-0.02000	0.11958	-0.06990
EX_LOAD	0.76701	-0.06655	0.04848	0.01259	0.07055	-0.04319	0.09438
EX_COND	0.69542	-0.13079	0.16414	0.20438	0.06800	0.27326	0.08165
EX_STRESS	0.72474	0.14709	-0.05936	-0.06293	0.20231	0.01138	0.04747
EX_FREE	0.27959	-0.16347	0.07448	0.18239	0.59758	0.11013	-0.08714
EX_VARY	0.24639	-0.17310	0.02364	0.31369	0.67216	0.18279	-0.01736
EX_COWORK	0.09276	-0.13844	-0.04013	0.12580	0.08091	0.14433	0.78348
PC_PAY	-0.05805	0.56675	0.25405	-0.06319	-0.06371	0.52594	0.01768
PC_BNFT	-0.08372	0.63167	0.26434	-0.02093	0.10215	0.61141	-0.05929
PC_CAREE	-0.01012	0.67347	-0.05796	-0.05045	0.06610	0.68527	0.45702
PC_CHANC	0.03735	0.67635	0.01524	0.06210	0.05037	0.39584	-0.01080
PC_SECUR	0.11621	0.56849	-0.22016	0.07662	-0.21133	0.50653	-0.02935
PC_LOAD	0.14842	0.23200	-0.05923	0.08092	-0.05300	0.27265	0.11278
PC_COND	0.22269	0.27058	-0.14552	0.04978	-0.02944	0.13872	-0.02203
PC_STRES	0.19791	0.38030	-0.12037	-0.10527	-0.08041	0.11175	-0.06600
PC_FREE	0.00682	0.33439	0.07498	0.07055	0.01279	0.09516	-0.03628
PC_VARY	-0.09539	0.27524	0.06273	-0.03765	-0.03994	0.18191	-0.05064
PC_COWOR	-0.05155	0.23079	-0.01690	-0.00924	-0.01542	0.25655	-0.02281

Table 4: Rotated Factor Pattern

Variables to measure changes in decision criteria are grouped into the two categories: changes in input decision criteria (factor 6) and changes in output decision criteria (factor 2). Most items in this source loaded as predicted, but PC_LOAD (work load variable in preference change input criteria) does not load on any factors.

Validating the multiple discrimination analysis (MDA) model examines differences in the mean vectors of all independent variables across the groups of the dependent variable. The dependent variable in the MDA model, turnover intention, has two groups: IS professionals with and without turnover intention. Multivariate statistics provided by MDA shows that significant differences exist in the important attributes emphasized by the two groups.

The univariate partial F-statistics is used as a proxy of standardized coefficients of the discriminant function. The level of satisfaction (S_LEVEL) has the largest F-value. That means that the level of satisfaction makes the greatest contribution in classifying the two groups. Factor 4 (the amount of non-monetary output) has the largest F-value among the factors used in the MDA model. The contribution of factor 4 is important in classifying the dependent variable of turnover intention. That is, discrepancy resulting from the amount of non-monetary output such as 'career progress opportunities' and 'chance to learn new skills' can be considered significantly important in the formulation of turnover intention among IS professionals. Factor 6 (changes in input decision criteria) has the smallest F-value, 3.0889, which could be considered unimportant in this classification at $\alpha=0.05$. All other factors, except for factor 6, make significant contributions in classifying the groups of the dependent variables.

The validation of the estimated logit model is measured and supported by the maximum likelihood ratio test. The level of satisfaction, the level of fitness, factor 3 (amount of monetary output), and factor 4 (amount of non-monetary output) are statistically significant. The level of fitness and the level of satisfaction play an important role in the formulation of turnover intention. Discrepancies resulting from factor 3 (amount of monetary output) and factor 4 (amount of non-monetary output) make significant contributions to classifying the dependent variable of turnover intention.

According to the results of MDA and logit analysis, the level of fitness and the level of satisfaction are playing an important role in the formulation of turnover intention. Therefore, it is important to find significant antecedents of the two variables. Regression analysis is used to check the relationship between important factors identified and the level of satisfaction. The stepwise method to select the appropriate independent variables is used.

Regression analysis identifies the following three sources as the determinants of the level of satisfaction: 1) Factor 3 (amount of monetary output), 2) Factor 5 (managerial characteristics of input), and 3) the level of fitness. Regression analysis is repeated to check the relationship between important factors identified and the level of fitness. Regression analysis identifies Factor 4 as the determinant of the level of fitness. However, R-square is 0.12. It implies that the level of fitness is not explained well by the variables included in the model.

7. Findings and Conclusion

Multiple discriminant analysis (MDA) and logit analysis are employed as statistical techniques to identify important reasons which generate turnover intention. However, because two important assumptions (normality and homogeneity) are violated, logit analysis serves as the primary tool to identify the following four important factors that produced significant impacts on the formulation of turnover intention: 1) the level of satisfaction, 2) the level of fitness, 3) amount of monetary output (factor3), and 4) amount of non-monetary output (factor4).

Non-monetary output variables that reflect the growth needs of IS professionals can be considered as important determinants of turnover intention. The level of fitness and the level of satisfaction also play an important role in the formulation of turnover intention.

The following three factors are as the determinants of the level of satisfaction: 1) the level of fitness, 2) amount of monetary output (factor3), and 3) managerial characteristics of input (factor5). This finding indicates that variables related to the input side such as work load and job stress exert an influence on the formulation of turnover intention through the level of satisfaction. This means that the input variables are important antecedents of job satisfaction, but they are not important determinants of turnover intention. Job satisfaction can be considered as an intermediate variable which links input variables and turnover intention.

Regression analysis identifies the amount of non-monetary output (factor4) as the determinant of the level of fitness. The analysis of the level of fitness is based on the assumption that IS professionals who think they do not fit their current jobs might consider quitting the jobs to resolve the state of discrepancy. The assumption does not obtain strong support from the results of regression analysis although it was statistically significant. This means that the level of fitness can not be explained very well by the levels of discrepancies resulting from different sources. Table 5 shows hypothesis test results of this study.

The managerial side of the input variables (amount of freedom to do the current job and job variety) is closely related to the level of satisfaction. Based on this finding, it appears that dissatisfaction with input variables may not generate turnover intention directly, but that the dissatisfaction exerts some influence on turnover intentions through the level of job

satisfaction. The effective management of the variables related to output side is recommended to reduce turnover among IS professionals because those variables directly related to the formulation of turnover intention.

Test	Hypothesis	Result
H1a	IS professionals whose levels of discrepancies are high display a higher chance of generating turnover intention.	Supported
H1b	IS professionals whose level of fitness to the current job is low display a higher chance of generating turnover intention.	Strongly Supported
H1c	IS professionals who are dissatisfied with the current job display a higher chance of generating turnover intention.	Strongly Supported
H2a	The levels of discrepancies are significantly related to the level of satisfaction.	Supported
H2b	The level of fitness to the current job is significantly related to the level of satisfaction.	Supported
H3	The levels of discrepancies are significantly related to the level of fitness.	Weakly Supported

Table 5: Hypothesis Test Result

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