

A PREDICTIVE MODEL FOR DETERMINING COGNITIVE VOLUNTARY TURNOVER BEFORE PHYSICAL DEPARTURE

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Abstract

This research focuses on the detection and identification of personnel who have mentally departed from their jobs before they physically leave. This process is defined as cognitive turnover (CT). A methodology for identifying and monitoring CT is presented as the Statistical Evaluation of Cognitive Turnover Control System. (SECtCS). SECtCS identifies personnel affected by CT, identifies causes, and provides relevant solutions. By using SECtCS, organizations can identify and predict disturbed workers that may sabotage both the company and themselves, so that some type of intervention can take place.

KEYWORDS

Turnover, Burnout, Statistical Process Control Charts, Modeling, Management

1.1 Introduction

In our society today there is a common group think that one should give themselves a raise and cut back the hours you work at your job and spend more time on some other side business or hobby that brings you more satisfaction. This may contradict some of the older Taylor philosophies of a fair day work for a fair days pay. Organizations should expect some form of commitment to productivity by their workers. There should be no expectation of blind company loyalty as was expected in the past, but they should expect good work from their personnel while they are on the job. We believe this good work can only come from focused effort and concentration from knowledge workers, engineering professionals and managers.

It has been previously assumed that this non-commitment type of behavior stemmed from employee stress and burnout created by management or organizational abuse. The pressures that exist in companies today are placing enormous stress on managers and employees and are triggering abusive behavior in managers (Smith 1988). Mental health experts estimated that up to 15 percent of executives and managers were suffering from depression or critical levels of stress that would eventually affect job performance. The most recent estimate is that stress-related problems and mental illness is costing business \$ 150 billion annually in health insurance and disability claims, lost productivity, and other expenses. [1].

Costs can lumped in 3 groups, direct costs, indirect costs, and opportunity costs. Direct costs include disability claims, worker's compensation claims, increased medical costs, and lawsuits, including wrongful discharge. Next, indirect costs are poor quality, high turnover, absenteeism, poor customer relationships, or even sabotage. Lastly, opportunity costs are lowered employee commitment, lack of discretionary effort, commitments outside of the job, time spent talking about problems instead of working, and loss of creativity. Further, subtle acts like absenteeism which a person labeled with Cognitive Turnover (CT) would perform cost organizations a lot of money. In the United States, for example, it is estimated that employee absenteeism costs organizations approximately 40 billion per year [2].

In order to achieve this concentrated focus personnel must be in a positive mental state. One can not expect that every hour of every day that personnel will be excited and positive about the work, but that overall they will have a

mindset that will not cause mental dissonance or excessive preoccupation with other non-productive work behavior. This research can be used in identifying the non-productive states of work in which the behavior of mentally quitting the job has occurred and potentially harming the organization because of lack of production and as far as sabotage is important to identify.

2. Literature Search

In the business community it has become critical that companies know how productive their workers are. They must ask the question, "How do you know that a person has already quit but is just showing up and picking up a check?" Engineering professionals often face challenges that cause them to mentally depart from their jobs before they actually physically leave. This researcher has trademarked this condition as, "cognitive turnover". It is important that this condition be identified and corrected. A methodology to identify and analyze this condition is SECTCS. SECTCS, or Statistical Evaluation of Cognitive Conditioning System, is a methodology utilizing a valid and reliable test instrument for respondents in which the analysis techniques are grounded with SPC (Statistical Process Control). Hopefully, SECCS will be considered a robust instrument that will identify and predict disturbed workers that may sabotage both the company and themselves, so that some type of intervention can take place.

Cognitive Turnover (CT) is a combination of turnover thought process and the results of burnout. Turnover is defined as voluntary cessation of membership in an organization by an individual who receives monetary compensation for participating in that organization [3]. Turnover has cognitive indicators that indicate eventual departure. The conditions indicated prior to cessation, can be utilized to describe an aspect of cognitive turnover. This definition emphasizes voluntary behavior because prevailing turnover models primarily seek to explain what motivates employees to withdraw from the workplace. This notation excludes individuals who work without payment, such as volunteers, students, and members of unions or fraternities.

Burnout is the mental dissonance from organizational pressure. It occurs when caring or obsessed people, attempting to cope with complex situations that burgeon more rapidly than do the skill and attitudes that permit successful coping. Litanies of such antecedents only require brief pump-priming before they gush forth. In this research, we are associating burnout and low productivity. To take the easiest hypothetical case, high degrees of burnout among major proportions of a group suggest low productivity. That is, high burnout implies little slack in a person's coping capacities, and perhaps deficits in them. So high measures of burnout have strong indicators of this phenomena, but the inverse low burnout does not necessarily indicate high productivity. We naturally focus our attention on the high measures of burnout in conjunction with movement towards turnover indicators and label our taxonomy. This taxonomy "Cognitive Turnover" is strongly influenced by burnout. We will review the two conditions in more detail. [4].

2.1 Definitions

2.1.1 Turnover

Voluntary turnover is defined by the US Bureau of Labor Statistics (1966) [5] as individual movement across membership boundaries of a social system initiated by the individual. "Quits" and "resignations" are used interchangeably to frequently label voluntary turnover. Involuntary turnovers are movements not initiated by the individuals such as dismissals, layoffs, retirements, and deaths. For the most part turnover refers to individuals who voluntarily leave organizations [6].

The departure of good performers is construed as dysfunctional turnover--representing a loss to the organization--for their replacements are likely to be lower in caliber. The departure of poor performers is viewed as functional turnover--because they are apt to be replaced by better performers. These two phenomena are prime examples of what our research labels "Cognitive Turnover." A pre-emptive intervention will allow companies to re-motivate the good performers to stay and motivate the marginal performers to leave. Obviously the advantage for the company is the reduction of the dysfunctional turnover.

2.1.2 Cost To The Organization: Turnover

Human resource accounting experts define exit expenses as having three main components: (1) cost of separation, (2) replacement, and (3) training [7]. Separation costs are produced directly by a quitting (i.e., costs of exit interviews).

Replacement costs include expenses incurred to replace leavers (such as expenses for advertising job vacancies). Training costs consist of the company's expenditures to orient and train replacements and opportunity costs caused by inefficient production. Whenever there is turnover, companies have an increased administrative burden. Organizations may expand their administrative staffing to handle the extra recruiting and training created by excessive attrition, research reviews have observed this practice [6].

Turnover may erode the morale and stability of those who remain employed. Their morale suffers because they lose friends and may interpret motives for quitting as social criticisms about the job [8]. Awareness that a leaver has a better job elsewhere may change employees' perceptions of jobs. As a result, the stayers may denigrate their present position in light of superior alternatives and begin contemplating other employment. In small groups, personnel instability weakens the cohesion for the group.

2.1.3 Burnout

Burnout though it has previously been categorized as something fairly subjective, it is a significant factor in the business world. Some see burnout as "a syndrome of inappropriate attitudes toward clients and toward self, often associated with uncomfortable physical and emotional symptoms." Maslach observed [9] that, along with reductions in the quality of care of service, burnout "appears to be a factor of job turnover, absenteeism, and low morale [and] various self-reported indices of personal distress, including physical exhaustion, insomnia, increased use of alcohol and drugs, and marital and family problems." Others present even longer lists of significant signs and symptoms [10].

Most importantly, fewer and fewer areas of life will tolerate "half-baked" commitment on the part of anyone. Half-baked commitment suffices far less frequently, nowadays. In today's jobs, work often requires higher levels of skill and better self-starting abilities, particularly from "knowledge workers." And trends like co-production also add to the burdens of what used to be the consumer's role—we now pump our own gas, and carry ourselves long distance to airport gates so that the airlines can lower their costs while still providing long-distance mass transportation. We now provide self-help or voluntary aid in myriad of public and private contexts, and will probably engage in far more of it in the future.

2.1.4 Costs To The Organization: Burnout

Burnout seems of both practical and theoretical significance, as judged from its associations with a broad range of variables relating to health, well-being and productivity. The traditional model of motivation is best characterized by the writings of Frederick W. Taylor (1911) and his associates in the scientific management school. The opposite of exploitation of the worker, in contrast they viewed scientific management as an economic boon to the worker as well as to the management. In theory Scientific Management represented a win-win venture for both management and the worker because of the mutual benefit to both. [8]

Employee abuse can have major bottom-line consequences. Although a hidden problem because of its unacknowledged status, various forms of employee abuse cost any large company millions of dollars in increased expenses and lost profits. The pressures that exist in companies today, and have increased significantly in recent years, are placing enormous stress on managers and employees and are triggering abusive behavior in managers who were suffering depression of critical levels of stress that would eventually affect job performance.

The most recent estimate is that stress-related problems and mental illness (including depression) is costing business \$ 150 billion annually in health insurance and disability claims, lost productivity, and other expenses. The costs associated with employee abuse can be grouped into three categories for discussion. The first category is the direct cost due to stress and disability claims, worker's compensation claims, increased medical costs, and lawsuits, including wrongful discharge. The second category includes more indirect costs, such as poor quality, high turnover, absenteeism, poor customer relationships, or even sabotage. Finally, there are the even more indirect "opportunity" costs of lowered employee commitment, such as lack of discretionary effort, commitments outside the job, time spent talking about the problem rather than working, and loss of creativity [1].

3. Problem Statement

The main objective of this study was to develop models that can be used as indicators for predicting mentally quitting a job or what is defined as “cognitive turnover”. This entire process is labeled Statistical Evaluation of Cognitive Turnover Control System, or SECTCS. These models were developed so they can be used by organizations in identifying possible low productivity unit. When used correctly, it identifies cognitive turnover so that organization can take appropriate actions and increase productivity of their personnel.

Traditional models of burnout and aspects of pre-turnovers have been constructed, for the most part, on personnel after the events have happen. (i.e., personnel has quit or personnel has attacked management) Our goal was to identify this behavior in a more proactive fashion which allows organizations to create interventions prior to a negative event happening.

4. Methodology

The steps to having SECTCS, (utilizing the SECTCS methodology) is for participants to take the SECTCS questionnaire. The questionnaire is designed to measure “Cognitive Turnover” (CT) and to identify the level of CT, which a respondent is experiencing. The next step for SECTCS is to take the respondents scores and place them into a predictive scoring model, labeled the “SECTCS Analyzer”. Last, the model score will be placed into the SECTCS SPCT which will allow us to analyze whether an organization CT is out of control.

4.1 SECTCS Questionnaire

The summated rated scale methodology was utilized to create the SECTCS questionnaire. The summated rating scale is one of the most frequently used tools in the social sciences. Its invention is attributed to Rensis Likert (1932), who described this technique for the assessment of attitudes. The questionnaire was previously tested for reliability using Cronbach's alpha, and then validated.

4.2 Multiple Linear Regression

Multiple linear regression was performed using the stepwise method for each of the different independent variables. As in the case of one independent variable, we treated the problem where the regression equation is linear, where for any given set of values $\chi_1, \chi_2, \dots, \chi_r$, for the r independent variables, the mean of the distribution of Y

is given by, $Y = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \dots + \beta_r\chi_r$, Where β_0 is the population intercept ;

$\beta_{\chi_1}, \beta_{\chi_2}, \dots, \beta_{\chi_r}$ are the population slopes for each $\chi_1, \chi_2, \dots, \chi_r$ independent variables (Johnson, p. 356). The coefficient of determination, R square, is commonly used in research to measure the goodness of fit for linear models. It can also be used as the proportion of variation in the dependent variables “explained” by the model. Thus, it can be used as a measure.

4.3 SECTCS CT Chart Development Process

The typical SPC chart is designed to monitor a stable manufacturing or service process, where the measured parameter is expected to remain relatively constant. Conversely, the SECTC's control chart has some differences in comparison to a typical SPC chart.

4.4 Statistical Process Control

Statistical Process Control (SPC) is used to measure process and evaluate if they are under statistical control. The tool that is used to measure process statistical control is a SECTCS Control Tool (SECTCS CT, pronounced “Sex control tool”), which includes a battery of charts that measure technical performance-related parameters. SPC charts were originally developed by Dr. Walter Shewhart of Bell Telephone n 1924.

One of the most common types of SPC charts is the x-bar chart. This chart tracks the mean value of a small sample over a period of time. For the x bar chart, the central line is the x bar or the mean of sample means calculated from historical process performance. The UCL and LCL lines are usually plus or minus three standard deviations of the sample means from the central line. The zones are the regions formed by plus or minus one, two and three standard

deviations from the central line. Sample means are plotted, then patterns of the plots are analyzed. If the plots exhibit certain patterns, then the variations in the process are most likely the result of some special cause needing investigation.

4.5 Chart Component Calculations

Normalized questionnaire variable was utilized to calculate the central line, UCL, and LCL lines, and the zone boundaries. The central line was defined as the mean of the dependent variable measured. It was given by

$$\bar{x}_j = \frac{\sum_{i=1}^n x_{ij}}{n} \quad \text{Where } i = \text{participant 1, 2, 3, ... and } j = \text{time periods 1, 2, 3, ...}$$

The sample standard deviation for each time period is calculated by:

$$\sigma_j = \sqrt{\frac{\sum_{i=1}^n (x_{ij} - \bar{x}_j)^2}{n-1}} \quad \text{The UCL and LCL lines for the SPCT chart are computed from the "x-bar" target values,}$$

by adding plus or minus 3σ as follows: $UCL_j = \bar{x}_j + 3\sigma_j$ and

$LCL_j = \bar{x}_j - 3\sigma_j$ Where $j = \text{time periods 1, 2, 3, ..., n}$. The outer boundaries of the A zones are formed by the UCL and LCL lines. The outer boundaries of the C zones are the central lines plus or minus one standard deviation. Similarly, the outer boundaries of the B zones are formed by the central line plus or minus two standard deviations. The following equations can be used for the appropriate calculations.

$$\text{Upper C Zone Boundary}_j = \bar{x}_j + \sigma_j, \text{Lower C Zone Boundary}_j = \bar{x}_j - \sigma_j.$$

$$\text{Upper B Zone Boundary}_j = \bar{x}_j + 2\sigma_j, \text{Lower B Zone Boundary}_j = \bar{x}_j - 2\sigma_j,$$

Where $j = \text{time periods 1, 2, 3, ..., n}$.

4.6 Chart Run Rules

With typical SPC charts, six accepted patterns indicate that the process is out of statistical control.

SPC Rule 1 – One point beyond zone A

SPC Rule 2 – Nine points in a row in Zone C or beyond

SPC Rule 3 – Six points in a row steadily increasing or decreasing

SPC Rule 4 – Fourteen points in a row alternating up and down

SPC Rule 5 – Two out of three points in a row in Zone A or beyond

SPC Rule 6 – Four out of five points in a row in Zone B or beyond

If any of these patterns are observed, a typical response would be to investigate the process for potential problems. Once the source of variation is corrected, the process should return to under control. The implication of the out-of-control cognitive turnover would indicate that the company could have unmeasured productivity problems from their most important resource the knowledge workers and engineers.

5. Contribution To The Body Of Knowledge

The contribution to the body of knowledge for this research is the SECtCS methodology. The Statistical Evaluation of Cognitive Turnover methodology includes the usage of a valid and reliable questionnaire that can be scored and placed in a predictive model. The constructs of the model will then be charted on a Statistical Process Control Chart to identify if the group studies have an out of control level of cognitive turnover process.

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