A MACROERGONOMIC APPROACH TO THE EVALUATION OF TURNOVER AMONG IT WORKERS

Jen Schwarz*+
Pascale Carayon*+
Peter Hoonakker+

* Department of Industrial Engineering
+ Center for Quality and Productivity Improvement
University of Wisconsin-Madison
610 Walnut Street  575 WARF
Madison, WI  53726
Tel: +608-263-2520
Fax: +608-263-1425
E-mail: jschwarz@cae.wisc.edu, carayon@engr.wisc.edu, hoonak@ie.engr.wisc.edu

In this study, we examine turnover intention in Information Technology (IT) workers, in particular among women and minorities. An initial set of intention to turnover questions from the Michigan Organizational Assessment Scale (Seashore, Lawler, Mirvis, & Cammann, 1982) was used. Phone interviews were conducted with 13 people from three IT companies to refine these turnover intention questions. A new set of three questions was then developed to capture the causes and consequences of turnover intention. Data from 125 IT workers using this new set of questions is also reported.

INTRODUCTION
There is substantial evidence for a critical shortage of skilled IT workers in the United States (Freeman & Aspray, 1999; ITAA, 1998; Office of Technology Policy, 1997), and a large subset of this problem is the underrepresentation of women and minorities in the IT workforce. The untapped resources of women and minorities as potential talent for the IT workforce may, if represented in the IT workforce in proportion with their representation in the general population, significantly reduce the IT worker shortage, or perhaps, completely resolve the problem (CAWMSSET, 2000; Freeman & Aspray, 1999). According to statistics from the U.S. Department of Commerce and the Census Bureau, women represent 46% of the total workforce, but only 30% of the IT workforce (National Science Foundation, 2000). Similarly, African-Americans make up 12% of the U.S. population, yet hold only 5% of IT workforce jobs (National Science Foundation, 2000). Hispanics make up almost 12% of the U.S. population, but hold less than 5% of IT workforce jobs (National Science Foundation, 2000). Unfortunately, similar data is not available for American Indians or Alaskan Natives, but it has been shown that both groups are underrepresented in all science and engineering fields (ITAA, 2000).

Compared to women in other fields, female scientists and engineers are more likely to leave their jobs and the workforce altogether. Attrition data shows that female scientists and engineers have exit rates almost double those of men (25% versus 12%), and exit rates for women in the technical fields are much higher than those of women in other fields (CAWMSSET, 2000). Minority groups may also be prone to leave when they are underrepresented in work groups (Griffeth, Hom, & Gaertner, 2000). There has been some initial work examining the key barriers to the entrance and retention of women and underrepresented minorities in the IT workforce (CAWMSSET, 2000; ITAA, 2000). While there are some differences speculated between the groups, women and underrepresented minorities do tend to share the same types of barriers. These shared barriers include stereotyping and discrimination, lack of role models and mentors, unequal pay scales, inadequate work/family balance, and exclusion from informal networks (CAWMSSET, 2000; ITAA, 2000).

Our research relies on a macroergonomic model of the impact of various work characteristics on IT workers (Carayon, Haims, & Kraemer, 2001; Carayon & Smith, 2000). We examine a how a range of job and organizational factors can affect IT workers (i.e. job satisfaction, organizational commitment, job strain, turnover intention). Our macroergonomic approach to work design emphasizes the variety and interactions of job characteristics that can influence multiple outcomes, including positive outcomes (e.g., job satisfaction) and negative outcomes (e.g., job strain). In this research, we are also interested in the specific role of two individual characteristics, i.e. gender and minority status [NOTE: In this research, minority is defined as American Indian, Alaskan native, black, Hispanic (NSF, 1999)].

TURNOVER AND RETENTION MODELS
Numerous studies have looked at intention to turnover as an outcome of poor job satisfaction and organizational commitment. Igbaria and Greenhaus (1992) used questionnaires to test a model of turnover intentions among 464 management information systems (MIS) employees. Turnover intention was strongly influenced by job satisfaction and organizational commitment. The impact of other variables, such as demographics, role stressors and career experiences, on turnover intention was mediated by job satisfaction and organizational commitment. Moore and Burke (2002) discuss the evolution of the turnover culture within the IT workforce as a factor contributing to intention to turnover. They state that turnover attitudes at the occupational
group level are learned from others (both at work and outside of work) through formal and informal communication channels as normal occurrences. They contend that looking at intention to turnover within the IT workforce as turnover culture can help to understand how turnover breeds more turnover. Furthermore, they argue that high turnover in the IT workforce allows for incorrect situations (those that are not aligned with corporate goals) to go uncorrected since it is easier and more expedient for IT workers to leave the situation than voice objections, feelings, and ideas in the hope of improving the work environment (Moore & Burke, 2002). The notion of a turnover culture is further substantiated by Griffeth (2000), who notes that the turnover rate of women is similar to that of men (Griffeth et al., 2000).

Rouse (2001) has looked at intention to turnover among IT professionals in terms of rational and instinctual models. Rational models are linear: one follows a rational sequence of steps or thought processes to arrive at the decision to stay with or leave a job. Instinctual models, however, may be triggered by an event (at work or outside of work) where very little cognitive effort is used at the start of the model and gradually one works towards a rational decision at the end of the model. In this model, each step from the beginning to the end is progressively more rational. Rouse argues that linear (rational) models of turnover do not hold true for the IT workforce and that instinctual models give a better understanding of voluntary turnover. Instinctual models assume that IT professionals may leave their job even if they are satisfied (Griffeth et al., 2000; Rouse, 2001). Rouse summarizes Lee and Mitchell’s (1994) Unfolding Model of Voluntary Turnover by stating that a precipitating event (positive, negative, or neutral), referred to as shock, occurs which forces a person to evaluate his/her beliefs and values. This process can take four different paths: 1) after a shock is experienced, the person evaluates previous experiences that match the shock and then acts on instinct to stay or leave current job; 2) after a shock is experienced, if previous experiences do not match the shock and the shock matches personal values, the current job is kept; 3) after a shock is experienced, if previous experiences do not match the shock and the shock does not fit with personal values, alternative jobs are sought after and a decision to stay or leave the current job is made; and 4) no shock is experienced, but the person assesses the job periodically and uses job satisfaction when deciding to stay or leave current job. Rouse further states that the first three paths are based on instinct and previous experiences that gradually lead one through an increasingly rational decision process. Overall, Rouse argues that IT professionals may choose to leave their jobs in the absence of job dissatisfaction.

In the management and organizational design literature, turnover has traditionally been thought of as coming from a perceived ease of movement (extent to which one can find alternative jobs) and a perceived desirability of movement (related to job satisfaction). Empirical studies have demonstrated a relationship between job satisfaction and turnover. Levy (2003) cites Hom and Griffeth’s (1991) Modified Model of Turnover as an example of a model that uses job satisfaction as a key element in the decision-making process of staying with or leaving a job. Levy also points out that individual circumstances may impact one’s decision to leave a job, such as relocating because of a spouse or to be near a sick relative. However, in most turnover models the concept of what happens after one leaves a job is missing.

Previous studies on intention to turnover, in particular in the IT workforce, leave gaps in our understanding of turnover intention. We argue that we need to look at turnover and its causes and effects in order to better understand the reasons for the underrepresentation of women and minorities in the IT workforce. Specifically, the question we see left unanswered is “What is the relationship of gender and minority status to the negative and positive causes and consequences of intention to turnover?” By looking for individual factors that cause one to consider leaving her/his current job, we hope to discover the factors that are similar or different for men and women and minorities and majorities within the IT workforce. By discovering whether similarities exist, we will better understand how gender and minority status play a role in the relationships between intention to turnover and the decision to leave a job, leave a company, leave the IT workforce, or leave the workforce all together. In the future, this relationship, combined with job/organizational factors and quality of working life factors, may help to better understand the IT workforce, with a special emphasis on the underrepresented population. This research will serve as the basis for the development of a set of “best practices.”

PILOT STUDY

In this paper, we report data on the pilot study aimed at refining and revising an initial set of questions on turnover intention and data collected from one company using our new set of questions on turnover intention (Carayon, Haims, Brunette, & Hoonakker, 2002). We used the three-item scale from the Michigan Organizational Assessment Scale (MOAQ) to initially measure intention to turnover (Seashore et al., 1982). The items are: 1) How likely is it that you will actively leave a company, leave the IT workforce, or leave the workforce all together? 2) I often think of quitting. and 3) I will probably look for a new job in the next year. Once the initial questionnaire was constructed, a pilot study with phone interviews was conducted to amend the questionnaire. The sample for the pilot study interviews included 13 women and minorities across three participating companies: 5 female non-minorities, 3 female minorities, and 5 male minorities. In the semi-structured phone interviews, participants were asked to comment on the questionnaire itself and offer suggestions regarding how to better capture data related to the main study variables. Interview length varied from 45 minutes to 1 hour and 15 minutes. The interviews were conducted between mid-January and mid-February 2002. The goal of the pilot study was to gain an understanding of what specifically IT professionals consider when thinking of leaving a job and what their intentions are after they leave and thereby refining the initial questions and/or developing a new set of questions on intention to turnover (Carayon, Brunette, Haims, & Hoonakker, 2002).
All of the interviews were transcribed over a two-week period, were formatted for entry into the NVivo® qualitative data analysis software, and then imported into the software. The initial coding structure used in NVivo® was developed in three steps: 1) handwritten notes, containing key points from each of the interviews, were typed up; 2) the researchers reviewed all of the key comments and notes for each topic area separately; and 3) from that initial reading of the handwritten notes, the researchers developed an initial node structure with three levels of subnodes (additions, changes/edits, and interviewee positive comments) under the major node of intention to turnover. The coding structure was fine-tuned several times. After each revision of the coding structure, the interview data was recoded.

The results of coding within NVivo® were itemized lists of additions, deletions, and changes of questions. Criteria for filtering of the itemized lists for consideration as actual recommendations for the survey included a combination of relevance and feasibility. One major feasibility issue was survey length; another included not losing important issues. Five researchers read through the codes and independently listed recommendations. Three researchers then met and discussed all recommendations. From the discussion, final decisions for edits in the questions on turnover intention were made.

Our pilot study allowed us to understand how to evaluate the causes and effects of retention and intention to turnover within the IT workforce, in particular for women and minorities. The data allowed us to construct a new measure of retention and intention to turnover using a new set of three questions (see Appendix). The first general question is the same as Seashore and colleagues (1982): “How likely is it that you will actively look for a new job in the next year?” The second question captures the causes of intention to turnover. This question contains a mix of both positive and negative reasons that may contribute to intention to turnover. The positive reasons fall under the categories of ambition, social camaraderie, career advancement, development, challenge and other circumstances. The negative reasons fall under the categories of general dissatisfaction, organizational policies and practices, workload and stress, everyday versus serious thoughts of leaving, and discrimination. The final list of causes includes 20 causes and one additional open-ended space for other reasons to be written in (see Appendix).

The third question captures the effects, or consequences, of intention to turnover, i.e. the individual’s intention for what happens after one decides to leave a job. The list contains 5 consequences and one additional open-ended space for other consequences to be written in. The consequences are:

1. To look for a different type of job in the same company.
2. To stay in a similar type of job- but move to a different company.
3. To take a different IT job in a different company.
4. To no longer work in the IT field.
5. To not look for another job at all.

SURVEY: PRELIMINARY DATA

A questionnaire survey was conducted with a Midwest IT consulting company. The sample size was 125 information technology employees: 26 were women and 99 were men (response rate: 67%). There were not enough minorities within the sample to use for analysis, so that aspect of our research will be examined in the data collections with other companies in the future. Employees were asked via e-mail notices to complete a web-based questionnaire. Company support of the project was conveyed to the employees via e-mail. Data was analyzed using SPSS®, a statistical software application, and Microsoft Excel®.

Figure 1 shows data on turnover intentions for women and men. Respondents could check any of the 6 response categories. Percentages of women and men checking any of the 6 response categories are shown on Figure 1. Staying in a similar job but in a different company was the most frequently checked intention for both women (58%) and men (51%). Three other intentions were checked by about 20-30% of women and men: looking for a different job in the same company, looking for a different job in a different company, and leaving the IT workforce.

Figure 2 shows data on the negative reasons on turnover intentions for women and men. Respondents could check any of the 13 response categories. Percentages of women and men checking any of the 13 response categories are shown in Figure 2. The most frequently checked response categories by women and men were inadequate rewards (women 54%; men 51%) and poor career and development opportunities (women 50%; men 33%). Women and men answered with approximately the same frequency for many of the other job and organizational factors: 1) high job demands, 2) long working hours, 3) lack of challenge, 4) work/family conflict, 5) ineffective management, and 6) training. The most obvious differences in responses between women and men deal with discrimination and feelings of not fitting in. Women (23%) felt more discriminated against than men (2%). Women (19%) also had more feelings of not fitting in than men (8%).

Figure 3 shows data on the positive reasons for turnover intentions for women and men. Respondents could check any of the 8 response categories. Percentages of women and men checking any of the 8 response categories are shown in Figure 3. More women (42%) wanted a better compensation plan than men (27%). In addition, more women (65%) wanted the opportunity to learn new things than men (37%). Other top positive reasons checked by both women and men are wanting a higher salary (women 50%; men 49%), wanting to obtain more of a different expertise (women 35%; men 32%), and wanting to advance one’s career (women 39%; men 39%).

DISCUSSION

Figure 1 data showed that both women (58%) and men (51%) have a high intention to look for a similar job but in a different company. This data may help to support Moore and Burke’s (2002) notion of a turnover culture, where turnover is learned from others and turnover breeds more turnover. Further, the
high intention for both women and men to look for similar jobs in different companies may be reinforced by Rouse’s (2001) instinctual models of voluntary turnover. Instinctual models of voluntary turnover assume that IT professionals may leave their job even if they are satisfied. Figure 3 shows some of the positive reasons to leave a job. The notion of the Instinctual model goes directly against the Modified Model of Turnover (Levy, 2003), which says that job satisfaction is a key element in the decision-making process of staying with or leaving a job. Figure 2 shows some of these negative reasons to leave a job that may contribute to job dissatisfaction. However, in these turnover models, the concept of what happens after one leaves a job is missing. The preliminary data in this study further emphasizes the need to examine what happens after an IT professional leaves a job in conjunction with the reasons as to why s/he leaves.

We know there is substantial evidence for a critical shortage of skilled IT workers in the United States (Freeman & Aspray, 1999; ITAA, 1998; Office of Technology Policy, 1997), and a large subset of this problem is the underrepresentation of women and minorities in the IT workforce. Thus it is imperative to understand the causes and consequences of intention to turnover among women and minorities in the IT workforce in order to start dealing with the IT worker shortage. Our new set of questions on turnover intention can help us better understand the causes and consequences of turnover intention among IT workers, and to examine the role of gender and minority status.

The next step of our research is to conduct a survey of a large sample of IT workers, including men and women and majorities and minorities, in order to understand the job and organizational factors that contribute to turnover intention. We need to expand our understanding of turnover intention by studying the macroergonomic work environment of IT workers. This data can help identify opportunities for improving their work environment in order to make their current job more attractive and reduce their intention to turnover.

ACKNOWLEDGMENTS

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REFERENCES


Figure 2: Negative Reasons to Leave Job

![Bar chart showing negative reasons to leave job.](image)

Women vs. Men

Figure 3: Positive Reasons to Leave Job

![Bar chart showing positive reasons to leave job.](image)

Women vs. Men

APPENDIX

<table>
<thead>
<tr>
<th>Questions on Turnover Intention</th>
<th>Not at all likely</th>
<th>Somewhat likely</th>
<th>Quite likely</th>
<th>Extremely likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How likely is it that you will actively look for a new job in the next year?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. If you’d consider leaving your current job, please check all the reasons that would apply.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ High job demands</td>
<td>□ Ineffective management</td>
<td>□ Lack of opportunities for career advancement</td>
<td>□ Want to obtain more or different expertise</td>
<td></td>
</tr>
<tr>
<td>□ Long working hours</td>
<td>□ Feeling discriminated against</td>
<td>□ Want a higher job status</td>
<td>□ Want the opportunity to learn new things</td>
<td></td>
</tr>
<tr>
<td>□ Lack of challenge or boredom</td>
<td>□ Feeling of not fitting in</td>
<td>□ Want to advance my career</td>
<td>□ Want a higher salary</td>
<td></td>
</tr>
<tr>
<td>□ Lack of social support</td>
<td>□ Lack of training</td>
<td>□ Want a better</td>
<td>□ Other</td>
<td></td>
</tr>
<tr>
<td>□ Inadequate flexible work practices / options</td>
<td>□ Lack of development opportunities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Conflicts between work and family</td>
<td>□ Inadequate rewards / reviews / raises</td>
<td></td>
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</table>

3. If you decide to leave your current job, what would be your intentions? Please check all that apply.

□ I would intend to look for a different type of job in my same company.
□ I would intend to be in a different IT job in a different company.
□ I would intend to no look for another job at all.
□ I would intend to stay in a similar type of job, but move to a different company.
□ I would intend to no longer work in the IT field.