Journal of Internet Banking and Commerce

An open access Internet journal (http://www.arraydev.com/commerce/jibc/)

Journal of Internet Banking and Commerce, August 2012, vol. 17, no.2
(*http://www.arraydev.com/commerce/jibc/*)

Where Are You Going? A Comparative Analysis of Job and Career Change Intentions among USA IT Workers

Jordan Shropshire
Assistant Professor, College of Information Technology, Georgia Southern University, Statesboro, Georgia, United States
Postal Address: **P O Box 8150, Statesboro, GA 30460**
Email: ***jshropshire@georgiasouthern.edu***

Dr. Jordan Shropshire is an Assistant Professor of Information Technology at Georgia Southern University. He has published articles and/or served as reviewer for journals such as MIS Quarterly, Decision Support Systems, European Journal of Information Systems and Journal of Business Research. Dr. Shropshire studied business at the University of Florida and Mississippi State University, where he received his undergraduate and graduate degrees (respectively). His areas of interest are systems administration, IT disaster recovery, information security, and the management of technical personnel.

Christopher Kadlec
Associate Professor, College of Information Technology, Georgia Southern University, Statesboro, Georgia, United States
Postal Address: **P O Box 8150, Statesboro, GA 30460**
Email: ***ckadlec@georgiasouthern.edu***

Dr. Christopher Kadlec is an Associate Professor of Information Technology at Georgia Southern University. He received a Doctorate in Information Systems from the Terry College of Business, University of Georgia. Dr. Kadlec conducts research on behavioral issues in computing. His interests include IT worker turnover, personnel training and development, IT innovation, and the development of technical expertise. Prior to his career in academia, Dr. Kadlec worked in industry as an IT professional for over 11 years.

Abstract

Unhappy IT workers will eventually leave their company. Some employees seek new positions with different firms. Others will choose to leave the IT field altogether. These mutually exclusive options have different outcomes for IT workers, organizations, and the computing professions. This research investigates the causes and consequences of each. A content analysis is first performed in order to identify possible determinants. Next, a canonical correlation analysis is conducted to determine which constructs load with job change intention and which associate with career change intentions among IT workers in the United States. The analysis was conducted using data from a survey of IT professionals. The results indicate that quantitative demands, cognitive demands, work pace, stress, work family conflict, and predictability lead to job change intention, while meaning of work, job satisfaction, recognition, role conflicts, role clarity, job insecurity, burnout, and perceived supervisor support lead IT workers to consider changing careers. Implications for theory and practice are provided.

Keywords: **turnover; career change; job change; IT workers; canonical analysis**

INTRODUCTION

Worldwide demand for IT professionals is on the rise. As businesses continue to recover from the recent economic downturn, more organizations are working to fill vacant IT positions. Some sources estimate that hiring demand for IT professionals is up 34% this year, on par with levels not seen since 2007 (Carey 2011; Guynn 2011; Simon 2011). The competition to attract the most talented candidates to fill IT positions is brisk, with firms often bidding for the brightest minds. The good news extends to recent college graduates who are currently seeing steady growth in career opportunities. The United States Bureau of Labor Statistics recently reported that the number of 20 – 24 year old college graduates who found jobs increased by 2.4% in the first quarter of 2011. Mid-career IT professionals are currently the most desired segment of the workforce, many are offered bonuses to accept new jobs. Their combination of skills and experience are in high demand throughout the IT field.

Despite all this good news, relatively few students are choosing to study in the computing fields. In colleges throughout the United States, departments of information systems, computer science, and information technology report low enrollment levels (Akbulut-Bailey 2009). Many upper-division courses still have empty seats. Recent studies indicate that students in the United States continue to question the long-term viability of careers in information technology (Koch and Kayworth 2009). The implication is that fewer people are entering the IT workforce (Granger et al. 2007). At the same time, a large segment of the IT workforce is entering retirement age (Lam and Chung 2010; Rowe 2010). Given the fact that the baby boom generation currently supplies as much as a quarter of the current labor pool, this is not surprising (Flynn 2010; Goodman 2009). The net result of decreased student interest and increased retirement rates is fewer personnel.

The implications of a decreased IT workforce are complex and far-reaching. Organizations will have to spend more money to hire replacements. Businesses may be forced to raise prices to make up for the associated expenses. Current employees will be expected to make up the shortfall by working longer hours and taking on additional duties. Some firms may even choose to outsource IT functions to countries where labor costs are lower. Such events often create negative attention in the media and decrease the perceived stability of the IT field. In the end, the individual, the firm, and the IT profession suffer from extensive shortfalls in skilled labor.

Unfortunately, there are no simple fixes to the impending labor problem. Reducing the rate of worker retirements may prove to be an expensive and difficult solution to structure. Organizations would have to consider changing their compensation, benefits, and pension structures. Regrettably, this approach has been explored within the contexts of other professions and found to be cost-prohibitive (Meredith and Salter 2008). At the same time, encouraging growth in the computing majors in the United States has not been easy (Bender et al. 2010). Significant work has already been invested in building enrollment growth, mostly to no avail (Benamti et al. 2010). Aside from increased student recruitment and decreased worker retirements, the only other option involves reducing the number of workers who voluntarily leave the IT field in order to find work in other professions. This option is attractive because it also involves retaining IT worker knowledge.

In order to reduce the rate at which IT workers leave the profession, it is first necessary to identify the factors which contribute to IT career exodus. Therefore, the purpose of this research is two-fold. First, it seeks to differentiate between IT workers who leave their current positions for new jobs in IT from those who leave the IT field altogether. Although these behaviors have previously been generalized within the concept of turnover, they are actually mutually exclusive actions with different implications for research and practice. Second, this research identifies and distinguishes among the factors which contribute to each outcome. By separating the determinants of job change and career change intentions, it will be possible to provide more specific recommendations for reducing the number of IT workers who leave the field.

This research begins by exploring the practical and conceptual differences between job and career changes. Next, the study focuses on identifying their determinants. A content analysis of practitioner-oriented literature is conducted in order to identify the reasons why IT workers make employment changes. This process ensures content validity and results in a more complete elicitation of potential determinants. To ensure theoretical soundness, the results of the content analysis are paired with pre-existing constructs from social psychology. Specifically, the constructs are derived from a comprehensive psycho-social measure of the work environment called the Copenhagen Psychosocial Questionnaire (COPSOQ). Some 16 elements from the inventory were selected based on the extant literature. They are: stress, possibilities for development, meaning of work, predictability, influence, burnout, role conflicts, role clarity, recognition, work pace, job insecurity, supervisor support, cognitive demands, qualitative demands, work-family conflict, and job satisfaction. Canonical correlation analysis was then performed in order to determine which of the sixteen predictors determine job change intention and which impact career change. The results have implications for theory and practice and can be interpreted for guidance on future research.

The remainder of the article is organized as follows. The following section reviews the background literature covering the findings of previous studies in IT worker turnover. The background literature also compares the concept of career change intention with intention to find new position within the IT field. Next, a content analysis is conducted in order to identify potential determinants of job and career change. The methods section describes the empirical procedure used to align predictors with the dependent variables. Next, the results section conveys the outcome of the analysis and provides implications for theory and practice are covered in the discussion. Finally, the limitations are addressed and the conclusions are stated.

BACKGROUND

Turnover is costly. There is an economic expense associated with recruiting and hiring new talent. When IT workers leave their respective organizations there is loss of organizational knowledge and experience (Ghapanchi and Aurum 2011; Joseph et al. 2007). Substantial risk is involved, as the new candidate may not perform to standards or may even have a detrimental effect on organizational performance. Over the years, an abundance of turnover studies have been conducted within the IT space. This research stream tended to frame turnover in general terms while focusing on the determinants of behavioral intention. It provides value in that it comprehensively reviews potential turnover antecedents.

The present study seeks to build on the existing knowledge base by focusing on the specifics the dependent variable.

Turnover

Turnover occurs when an employee voluntarily leaves an organization. In a recent meta-analysis of turnover intention of technology professionals using thirty-three studies, forty-three antecedents were identified and then grouped into environmental-level, firm-level, and individual-level (Joseph et al. 2007). This study covered the theory and possible future research opportunities. It was limited to quantitative studies on turnover intention. They are: desire to move, ease of movement, job search, demographics, human capital, motivation, job-related factors, and organizational perceptions. The first category, desire to move, includes the three dimensions of commitment and career and job satisfaction (Mathieu and Zajac 1990; Tett and Meyer 1993). The second category consists of perceived job alternatives (March and Simon 1958). The demographics group includes age, gender, and marital status. The human capital group includes factors such as education and job and career tenure. The fourth group, motivation, is based on factors which govern career aspirations. This includes constructs such as growth need strength and career orientations (Igbaria and Greenhaus 1992; Lee 2000). Another category includes job-related constructs such as autonomy, ambiguity, and role conflict (Cook et al. 1981; Hackman and Oldham 1975). Finally, organizational perceptions such as social support have been identified within the IT context (Lee 2002).

More recently, in a systematic literature review, seventy distinct antecedents to turnover intention were identified (Ghapanchi and Aurum 2011). These antecedents were then categorized as individual attributes, job-related factors, psychological factors, environmental factors, and organizational factors. The review covered seventy-two

studies from 1980 – 2008. While the number of studies covered was greater than other reviews and was opened to qualitative studies, the results confirmed an earlier meta-analysis (Joseph et al. 2007). In sum, these studies provide significant value by laying the groundwork for the present research.

Changing Jobs vs. Changing Careers

Earlier studies of turnover tended to focus on the identification of behavioral predictors while glancing over the dependent variable. In most studies, turnover is simply defined as the act of leaving the organization. From the standpoint of some business, this is sufficient. Regardless of why the individual leaves, the organization must find another individual to refill the position. Rehiring is both risky and costly in terms of time and money. Further, a new hire may not perform as well as the previous worker, or he or she may cause trouble. The worker who leaves the firm departs with organizational knowledge, specific skills, and potentially sensitive information. There is much potential downside for the enterprise. However, the current framing of turnover is neither rich nor specific. There is no mention of where the individual is going next, and this does not provide any insight regarding the purpose of the change. More information is not only valuable to the organization but it has important implications for the business environment.

In this research, we distinguish between IT workers who leave their current position for a new job within IT and those who seek a new position outside the information technology field.

Instead of generalizing both groups of workers into turnover, the first category of employees should be considered job changers – those who intend to find a new job within the same discipline. The second category of workers is the career changers, individuals who seek a new career outside IT. The two categories of behavior have separate implications for managers and scientists (Blau 2007; De Croon et al. 2004). Those who intend to leave the field might be motivated by factors which differ from those who want a new position in the same discipline. Armed with this more specific information, organizations may be able head off resignations by finding potential career-changers new positions within the firm but outside the IT function. This would preserve organizational knowledge. It would also mean that any potentially-sensitive information that the employee may have stays within the company. Firms could also accommodate those who want to change jobs by varying work conditions, assignments, or financial incentives. To sum, the distinctions between the different types of turnover appear to have profound implications, but little is yet known.

DETERMINANTS OF CHANGE

The current study is one of the earliest to provide a greater understanding of turnover by decoupling intention to change jobs from intention to change careers. It cannot be assumed that existing literature provides an exhaustive coverage of the antecedents of these separate actions. To avoid the omission of potentially relevant factors, this research began with a content analysis of articles and essays from practitioner-related publications. The purpose of the content analysis is to codify the reasons why IT workers make employment changes.

Content analysis is a research method used in the social sciences to draw inferences

from text [102]. In this case, the text includes articles which concern IT career abandonment. Each reference to an aspect of IT career exit was categorized according to an a-priori coding scheme. The results of the coding operation were iteratively refined into clusters which formed the basis of the construct dimensions and conceptual definition. This qualitative methodology is often used by information systems researchers to define concepts and frameworks in cases in which little research currently exists (Byrd and Turner 2000; Lewis et al. 2005).

A search for relevant articles was conducted in the Pro-Quest Direct and Business Source Complete databases using keywords such as "IT" and "career change." Keywords were combined using Boolean search terms in order to achieve more specific results sets. Some 43 articles were initially found. After an initial inspection, 11 were culled because the content in the articles was not in any way related to this study. An additional 6 articles did not contain any useable recommendations. Thus, 26 articles were ultimately included in the sample. It should be noted that the majority of the articles were published in trade publications, industry-specific magazines, and IT practitioner–oriented journals.

Specific references to IT career turnover were identified in the articles. Each specific reference was considered a coding unit. Each specific unit was analyzed according to an a priori coding scheme based on the COPSOQ (Copenhagen Psychosocial Questionnaire) inventory. Two independent judges performed the coding manually. An additional judge acted to break ties when necessary. This yielded 32 unique "motivation" units which were then clustered into 17 holistic concepts (see Appendix A).
Two units were ultimately combined because their definitions overlapped. Ultimately, this resulted in 16 independent explanations for why employees change their jobs or leave the IT field.

To provide a sound theoretical basis, the potential causes of job change were interpreted in terms of pre-established and validated constructs from the field of social psychology. These constructs were derived from a comprehensive taxonomy of factors affecting the work environment. This structure is grounded in social psychology and is based on the COPSOQ (Copenhagen Psychosocial Questionnaire) inventory. COPSOQ was used because it provides a comprehensive yet parsimonious outline of factors which summarize employee workplace perceptions (Pejtersen et al. 2010). Some 16 variables were ultimately retained for further testing (Table 1). The selected variables were further organized into six groups based on their similarities. These groups included work requirements, autonomy, fulfillment, strain, role definition, and uncertainty. This procedure for identifying possible determinants of job change and career change provided increased content validity while remaining grounded in social psychology.

Table 1: Proposed Predictors

Group	Construct	Definition
Work Requirements	Quantitative Demands	Physical effort required to satisfy expectations.
	Cognitive	Intellectual effort required to satisfy expectations.

	Demands	
	Work Pace	Speed at which work is assigned and expected to be completed.
Autonomy	Influence	Control over work-related issues such as assignments, projects, and teams.
	Possibilities for Development	Opportunities to progress by developing new skills or acquiring advanced experience.
Fulfillment	Meaning of Work	Perceived importance and relevance of job functions.
	Job Satisfaction	General pleasure associated with the work.
	Recognition	Appreciation conveyed by peers and supervisors for work which meets or exceeds stated guidelines.
	Supervisor Support	Willingness of supervisors to hear concerns and address them in a fair way.
Strain	Stress	Ambiguity, conflict, or overload arising from the characteristics of the individual and the work environment.
	Work Family Conflict	Difficulty in meeting work requirements and balancing family obligations.
	Burnout	Constant or repeated emotional pressure associated with intense involvement with people over long periods of time.
Role Definition	Role Conflicts	Contradictory demands or inconsistent rules and conditions.
	Role Clarity	Clear delineation of work responsibilities.
Uncertainty	Predictability	Extent to which advance notice of changes is provided.
	Job Insecurity	Powerlessness to maintain desired continuity in a threatened work environment.

The first group, work requirements, consists of factors which govern the amount of effort required by the work. This group is comprised of three constructs: quantitative demands,

cognitive demands, and work pace. The first construct, quantitative demands, is defined as the degree of physical effort required to satisfy expectations. Research shows that increases in quantitative demands leads to decreases in employee happiness and subjective health (Mikkelsen et al. 2005). The second construct, cognitive demands, is the amount of intellectual effort required to satisfy expectations. Previous research indicates that increases in cognitive demands correspond with decreased work life perceptions among employees (Layer et al. 2009). The third construct is work pace. It is defined as the speed at which work is assigned and expected to be completed. Studies show that when forced to work at a higher pace employees are initially more efficient but also prone to make more mistakes. Further, they are more likely to exhibit increased fatigue, decreased work quality, and eventually organizational resentment (Bosch et al. 2011; Layer et al. 2009).

The second group, named autonomy, consists of factors which impact the degree of control an individual has over his or her current or future work. Autonomy relates to the individual's ability to select the tasks and projects he or she will be working on and to seek out opportunities for advancement. The constructs included in this group are influence and possibilities for development. Influence is defined as the degree of perceived control over work-related issues such as assignments, projects, and involvement on work teams. At least one previous study indicates that perceived influence increases organizational commitment and decreases turnover intention (Savaneviciene and Stankeviciute 2011). The second construct, possibilities for development, is conceptualized as opportunities to progress by developing new skills or acquiring advanced experience. Organizations which afford such opportunities have previously been found to have lower rates of turnover (Anafarta 2011).

The third group is comprised of four constructs which characterize employee satisfaction with the work experience. It is called the fulfillment group because it is a collective of factors which influence employee contentment. Included constructs are meaning of work, job satisfaction, recognition, and supervisor support. The first construct, meaning of work, is defined as the degree of perceived importance and relevance of job functions. Employees who perceive little value or relevance in their work are generally less attached to their respective organizations and are more likely to leave (Twenge 2010). Next, job satisfaction is described as the extent to which an individual's work is gratifying. The third construct, recognition, is the perception that one's contributions are noticed appreciated by peers and supervisors. A number of studies have supported the linkage between turnover and job satisfaction within the IT field (Joseph et al. 2007). The final construct is perceived supervisor support. It is an individual's perception of the degree to which supervisors are willing to hear employee concerns and help resolve them. Previous research indicates that employees who perceive little or no support from their supervisor are more likely to formulate turnover intentions (Dawley et al. 2010).

The fourth group, strain, is based on factors which create tension and internal dissonance and ultimately have a negative psychological effect on employee morale. Three constructs are included in the strain group. They are stress, work-family conflict, and burnout. Stress is conceptualized as the degree of ambiguity, conflict, or overload arising from the characteristics of the individual and the work environment. Within the IT field it, was found that stress leads to decreased job performance and increased

turnover intention (Soil-Saether 2011). The second construct, work-family conflict, is defined as the degree of difficulty encountered when trying to balance work requirements with family obligations. In a recent study, it was found that individuals experiencing work-family conflict perform poorly in training, within their respective job functions, and exhibit elevated levels of turnover intention (Hammer et al. 2011). The relationship between work-life balance and turnover is also supported within the IT context (Ahuja et al. 2007). The final strain variable is burnout. It is framed as constant or repeated emotional pressure associated with intense involvement with people and work over long periods of time. A previous study of IT professionals indicated that job burnout is a significant predictor of turnover intention (Moore 2000).

The fifth group is classified as role definition because its constructs concern the delineation of work assignments and responsibilities. There are two factors included in role definition. The factors include role conflict and role clarity. Role conflict is the individual's perception that contradictory demands or inconsistent rules and conditions exist and are prevalent in the workplace. Previous studies on role conflicts show that they are symptoms of job stress and may impact service recovery performance, customer satisfaction, and turnover intention (Ashill and Rod 2011; Wittner and Martin 2010). The second construct is role clarity. It is defined as the extent to which work responsibilities are clearly delineated. Role clarity has been demonstrated to negatively influence service quality and increase turnover intention (Slatten et al. 2011). This relationship has been confirmed within the IT field following a study of Korean IT professionals (Lee et al. 2010).

The final group, uncertainty, is based on employee perceptions of job stability. Uncertainty is comprised of two constructs: predictability and job insecurity. The first, predictability, is the degree to which advanced notice is given for changes that impact the individual. Predictability has previously been demonstrated to impact employee attitudes such as organizational commitment and turnover intention (Yao and Wang 2006). The second construct is job insecurity. It is conceptualized as powerlessness to maintain desired continuity in a threatened work environment. Previous studies support the link between increased insecurity and absenteeism, low productivity, and turnover intention (Naswall et al. 2005; Staufenbiel and Konig 2010).

To summarize, a content analysis of practitioner-oriented literature identified the reasons why IT professionals change jobs or leave the IT field. Following multiple rounds of revisions and summary, a list of 16 possible explanations was formulated. The concepts were then matched with pre-existing constructs in a comprehensive inventory of psychosocial factors which affect the workplace. The end results ensure content validity and adequate subject coverage while remaining grounded in theory. Having summarized the concepts which impact job change, the next section focuses on identifying the relationships between each predictor and the dependent variables.

METHODS

The purpose of the methodology is to empirically align predictors with the dependent variables. This is accomplished using canonical correlation analysis, a procedure which is akin to regression testing with multiple dependent variables.

Canonical correlation analysis is a multivariate statistical technique which is used to test

the relationships between two groups of variables. In this case, the first group consisted of career and job change intention and the second group included all of the predictors. Canonical correlations were derived for job and career change intention. Each predictor construct's correlation with each of the turnover variables was determined. This provides a basis compare to construct loadings and determine whether a construct loaded stronger with career or job change intention. The procedure relies on survey-data collected from individuals currently working in the IT field. The results of the analysis indicate which constructs align with intention to change jobs and intention to leave the IT field.

Sample & Procedure

Survey data was collected in order to operationalize the independent and dependent variables. For this study, the sample included IT workers within a medium-sized public service organization in the United States. The organization is funded by a combination of state, federal, and private contributions. Of all of its information technology workers, approximately 60% are full-time, benefited employees. The rest are classified as part-time workers, interns, contract consultants, or short-term casual laborers. These employment categories are not considered "career-track" by the organization's human resources department. This is a typical distinction in the IT field. As such, only regular, full-time IT workers were recruited to participate. Each subject was given a packet which contained a cover letter, a paper copy of the survey, and a pre-addressed, stamped return envelope. The cover letter introduced the survey and the researchers. It also explained that the survey was confidential and that the results would be published in an academic journal. Participation was completely voluntary. No inducements or gratuities were offered. Those who elected to participate were instructed to complete their survey, seal it in the pre-stamped return envelope, and drop it in the mail.

Instrumentation

The survey used a pen-and-paper format. It consisted of questions which operationalized the predictors and the dependent variables. All the antecedent measures were adopted from the short version of the Copenhagen Psychosocial Questionnaire (COPSOQ), a holistic instrument designed to provide a complete prognosis of employee occupational health (Pejtersen et al. 2010). This instrument was developed in multiple languages and tested using a sample of 3,500 workers from a range of vocations and industries. The benefits of using items from a single instrument include improved convergent and discriminant validity and increased assurance of proper content coverage. It was not necessary to modify any of the measures. The survey included 53 items. From the work requirements category, quantitative demands and cognitive demands were each measured using four items while work pace was measured using three items. The autonomy category required four items for influence and possibilities for development while three items were needed for meaning of work. The fulfillment group of constructs required a total of 16 items. Recognition, role clarity, and supervisor support each required three items and role conflict required four. From the strain category, stress, work family conflicts, and burnout each required four items. The role definition group required three items for role clarity and four items for role conflicts. The uncertainty category included two items for predictability and four items for job insecurity. The first dependent variable, intention to leave the IT field, was adapted from a previously validated measure consisting of three items (Flinkman et al. 2008). It is

necessary to reword the original measure so that it is specific to the IT field. The second dependent variable, intention to find a new job, consisted of three items and was also adapted from an earlier measure (Laine et al. 2009). All the items used five point scales with various anchors. In addition, basic demographic information (age, gender, and years in current position) was also collected.

RESULTS

One month after survey distribution, data from returned surveys was tabulated into an electronic spreadsheet in order to calculate demographics and purge incomplete responses. Of the 196 distributed surveys, 172 were returned. This generated a 86% response rate, sufficiently large to minimize non-response bias, even according to the most stringent standards (Sivo et al. 2006). Some 4 incomplete questionnaires were dropped. An additional 3 surveys were rejected because a response set was detected (Kerlinger 1973; Rennie 1982). A response set is the tendency among subjects to respond to questions automatically and independent of the content of the items (Andrich 1978). This resulted in a final sample of 165. Finally, a test of common methods variance (CMV) was conducted (Podsakoff et al. 2003). In this test, the first factor from the principal components analysis was introduced into a partial least squares model as a control variable. Because the injected factor did not produce any changes in explained variance it can be assumed that CMV is not problematic.

The SPSS software was configured to develop two canonical functions; one for intention to change jobs and another for intention to leave the IT field. As previously suggested, canonical functions may be construed as similar to regression equations. Although the testing of canonical functions differs from the testing of regression equations, the principal of correlation among dependent and independent variables remains. Several tests of correlation, including F tests, Wilk's Lambda, Pillai's Criterion, Hotelling's Trace, and Roy's GCR were used.

As indicated in Table 2, both functions were significant. This means that there is sufficient correlation between the predictors and the two dependent variables. The first canonical function, intention to leave IT, had a canonical correlation of .80111 between the independent and dependent variables, while for intention to change jobs the canonical correlation was slightly lower at .63862. Both provide strong indications of significant functions. The following steps in this analysis concern the validity of the functions and the relative significance of each of the individual predictors.

Table 2: Overall Model Fit

Measures of Overall Model Fit				
Canonical Function	Canonical Correlation	F Statistic	Degrees of Freedom	P
Leave IT	.80111	3.17022	66	.002
Change Jobs	.63862	2.30644	34	.020
Multivariate Tests of Significance				
Statistic	Value	F Statistic		P
Wilks' Lambda	.21213	2.41561		.002
Pillai's Criterion	1.04961	2.34684		.001
Hotelling's Trace	2.48027	2.48027		.001

Roy's GCR	.64178

Table 3 presents the standardized canonical coefficients for the two dimensions across the six groups of predictors. For the work requirements category, all three constructs load more significantly with intention to find a new job the within IT field. The variables from the autonomy and fulfillment groups all load with career change. From the strain group, stress and work-family conflict more strongly associate with the second canonical variate, while burnout loads with intention to leave IT. Both constructs from the role definition category load more significantly on intention to leave IT. The uncertainty category was split: predictability loaded more significantly with the second canonical variate, while job insecurity aligned more closely with the first.

Table 3: Standardized Canonical Coefficients

		Dependent Variable			
		Intention to Leave the IT Field		Intention to Find a New Job	
Predictor Variable	VIF	Canonical Loading	Canonical Loading^2	Canonical Loading	Canonical Loading^2
Quantitative Demands	0.21	-0.18	0.03	-1.15	1.32
Cognitive Demands	1.47	-0.45	0.20	-0.55	0.30
Work Pace	2.04	0.56	0.31	0.83	0.70
Influence	0.87	0.33	0.11	-0.12	0.01
Possibilities for Development	1.29	-0.25	0.06	0.01	0.00
Meaning of work	1.83	-0.34	0.12	0.20	0.04
Job Satisfaction	1.05	-0.14	0.02	0.04	0.00
Recognition	0.87	0.49	0.24	-0.33	0.11
Supervisor Support	1.32	-0.26	0.07	0.08	0.01
Stress	1.84	0.26	0.07	-0.62	0.39
Work Family Conflict	1.26	-0.15	0.02	0.34	0.11
Burnout	1.99	0.45	0.20	-0.22	0.05
Role Conflicts	0.88	0.35	0.12	0.21	0.04
Role Clarity	1.25	-0.16	0.03	0.08	0.01
Predictability	2.45	0.07	0.01	-0.35	0.12
Job Insecurity	1.70	0.15	0.02	0.06	0.00

With the exception of two variables, the constructs loaded onto canonical variates with their respective groups. This gives credence to the categories developed previously in the content analysis. In order to reconcile burnout and predictability, it is necessary to amend their group memberships.

The first construct, predictability, aligns more closely with intention to find a new job (0.12) than intention to leave the IT field (.01). Based on this outcome, a further review of the construct groups was conducted. It appears that predictability shares many properties inherent to the strain group. The strain category includes stress and work family conflict. A common thread among these variables is that they can be associated with short-term anxiety (Burke and Greenglass 1995; Wood and De Menezes 2011). Stress, conflicts between work duties and family obligations, and changes in work

predictability can have an immediate effect on employee attitudes (Brough and Kelling 2002; Frone et al. 1992). Previous studies indicated they had similar causes and consequences. For instance, changes in hours or work shifts, short-term projects, unfamiliar technologies and impending deadlines can cause significant increases in stress, upset family routines, and make the job less predictable (Balducci et al. 2011). When these factors are elevated they have an immediate impact on work performance, job-related affect, and future employment intentions (Ganster and Schaubroeck 1991). Therefore, the group consisting of stress, work family conflict, and predictability will be renamed anxiety in order to capture the relational dynamics.

The second misaligned construct is burnout. It was anticipated that burnout would align with intention to find a new job. Instead it corresponded more closely with intention to change careers (0.05 versus .20, respectively).

Originally incorporated into the strain group, burnout appears to correspond with job insecurity. One possible explanation for the alignment of these variables is that they take relatively longer to manifest (Fishbein and Ajzen 1975). For instance, burnout is defined as exposure to pressure over long periods of time. Although some stress and pressure can cause temporary increases in worker performance, the long-term effects can be detrimental (Briner et al. 2004; Gross 2001). For instance, temporary, low levels of stress may help actually help a worker meet challenging goals such as deploying new platforms or integrating complex systems, but the long-term pressure may cause burnout. Likewise, it takes time for an IT worker to become fully acquainted with the career field and its prospects before it is possible to gain perspective on job insecurity (Ashford 1988; George and Jones 2001). Besides a longer development period, these factors may also impact work-related attitudes over longer timeframes (Griffin et al. 2007). Once formed, job insecurity affects may influence employee perceptions of the IT field for a long time, giving them ample time to reexamine their career-related intentions (Ashford et al. 1989; Han and Williams 2008). Because the pressures associated with burnout and job insecurity are developed gradually and remain influential for relatively long timeframes, the term tension is a more appropriate group name, as it characterizes these circumstances. Thus, constructs burnout and job insecurity collectively comprise the strain group. The final listing of dependent variables, groups, and constructs is organized below (Table 4).

Table 4: Determinants of Work-Related Change

Dependent Variable	Category	Construct
Intention to Find a New Job in IT	Work Requirements	Quantitative Demands
		Cognitive Demands
		Work Pace
	Anxiety	Stress
		Work Family Conflict
		Predictability
Intention to Leave the IT Field	Autonomy	Influence
		Possibilities for Development
	Fulfillment	Meaning of work
		Job Satisfaction

		Recognition
		Supervisor Support
	Role Definition	Role Conflicts
		Role Clarity
	Tension	Job Insecurity
		Burnout

To summarize, certain factors stimulate an initial reaction to find a new job while other variables slowly convince an individual to choose a career path outside IT. The variables leading to job change include quantitative demands, cognitive demands, work pace, stress, work-family conflict, and predictability. The factors which cause career change are meaning of work, job satisfaction, recognition, role conflicts, role clarity, job insecurity, burnout, and perceived supervisor support. The next section describes the implications of these findings for theory and practice.

DISCUSSION

This study marks several important contributions to research. First, it employed canonical correlation testing, a novel multivariate analytic technique for grouping antecedent constructs with their most correlated dependent variables. This tool is well-established in the statistical literature although it sees relatively little use within the IT research tradition. Second, the study incorporated a timely research sample, given the current political and economic climate. Public sector IT workers currently face a relatively-inhospitable work environment. After years of overspending and underserving, the public sector faces significant debt and liabilities for worker pensions and benefits. The conditions which traditionally encourage turnover have been met or exceeded. Normally entrenched IT professionals have indicated that for the first time, they would accept employment in the private sector. Previous turnover studies rarely captured samples which were facing structural pressures in addition to an abundance of lucrative opportunities within the same field. For the third and most important research contribution, this research provides a first step to understanding the differences between job change and career change. Further, the antecedents of each outcome were identified and separated based on their correlation with job and career change intention. By extending the work of previous studies within social psychology, the present research provides a unique contribution and gives insight into a field with consistently high turnover (Mitchell et al. 2001).

In practice, managers strive to retain their most productive, trained IT workers. Replacing talent is costly, difficult, and risky. Every effort should be made to reduce losses. The present study shows that approaches for handling career changers should be different than for situations in which IT workers seek new jobs. This is not a homogeneous group, and a generic response is not the most effective means for reducing talent loss. It might be possible to reverse a worker's decision if specifics regarding the purpose of the change and the employee's motivations are appreciated. For instance, an employee who wants to leave public sector IT work for an IT position in industry might be retained if he or she can be convinced that the job will soon become more stable and predictable, and that new hires will reduce the current workload. If an IT worker wants to leave the firm for a career in a new field, it might be possible to keep them within the organization performing an alternative role. Such a scenario offers

change to the employee and keeps organizational knowledge in house. Regardless of the strategy, a more discrete understanding of turnover improves organizational performance.

LIMITATIONS AND FUTURE RESEARCH

This study adhered to a rigorous methodological format in order to ensure the validity of its findings. Despite this, it is not completely without limitations. For instance, although the sample was large enough for canonical correlation analysis, it is relatively smaller than contemporary studies. Even though it would have been possible to collect additional data from IT departments in other organizations, the homogeneity of the sample would have been significantly reduced. It was determined that this would create more complex problems than sample size. Therefore, only IT workers from one organization were included.

Future studies should provide guidance on this aspect of sample selection and analyze the differences among populations.

This study is a first step toward understanding the conceptual differences between workers who wish to leave their present organization for other positions in IT and those who seek alternative careers outside the field. Future research should use this study's findings to create more specific models for predicting IT worker behavior. Although significant effort was expended to ensure comprehensive representation of predictors, future research should identify other constructs which may stimulate employment changes. Finally, the study was limited to behavioral intention and not actual behavior. In the future, research should link intention with other behavioral outcomes in order to ensure the utility of this and related studies.

CONCLUSION

The IT workforce must be preserved. Unless plans are undertaken, there will be a shortage of qualified IT professionals. If a labor shortage does occur, the implications are complex and far-reaching. Organizations would be forced to spend more to hire replacements. Individual contributors would be expected to work harder and longer to make up the projected shortage. As a result of these circumstances all parties would be dissatisfied. Avoiding this pitfall is not an easy task. Simply recruiting more students into the technical fields will not solve the problem. It will take years for new graduates to develop the skills which experienced IT workers already possess. Perhaps the most viable mitigation is to reduce workforce attrition. To that end, this research provides value by distinguishing between intention to seek a new job and intention to leave IT. It was determined that quantitative demands, cognitive demands, work pace, stress, work family conflict, and predictability impact job change intention. Furthermore, meaning of work, job satisfaction, recognition, role conflicts, role clarity, job insecurity, burnout, and perceived supervisor support predict career change intention. Based on the characteristics of their determinants, it was inferred that job change intentions were largely reactionary while career change intentions were the result of a slower and more deliberate process.

This research provides a solid foundation for researchers to further explore the negative

consequences of the IT work environment and its implications for practitioners' careers. Despite the progress made in this study, numerous research questions remain unanswered. Future research can provide even more clarity on this complex topic so that managers can implement solutions which lead to an improved IT workforce.

REFERENCES

AHUJA, M., CHUDOBA, K., KACMAR, C., MCKNIGHT, D. & GEORGE, J. 2007. IT road warriors: Balancing work-family conflict, job autonomy and work overload. *MIS Quarterly,* 31**,** 1-17.

AKBULUT-BAILEY, A. 2009. A measurement instrument for understanding student perspectives as stereotypes of IS professionals. *Communications of the AIS,* 25**,** 321-338.

ANAFARTA, N. 2011. The relationship between work-family conflict and job satisfaction: A structural equation modeling (SEM) approach. *International Journal of Business & Management,* 6**,** 168-177.

ANDRICH, D. 1978. A rating formulation for ordered response categories. *Psychometrika,* 43**,** 561-573.

ASHFORD, S. 1988. Individual strategies for coping with stress during organizational transactions. *Journal of Applied BehavioralScience,* 24**,** 101-119.

ASHFORD, S., LEE, C. & BOBKO, P. 1989. Content, causes, and consequences of job insecurity: A theory-based measure and substantive test. *Academy of Management Journal,* 32**,** 21-48.

ASHILL, N. & ROD, M. 2011. Burnout processes in non-clinical health service encounters. *Journal of Business Research,* 64**,** 1116-1127.

BALDUCCI, C., SCHAUFELI, W. & FRACCAROLI, F. 2011. The job deamnds-resources model and counterproductive work behavior: The role of job-related affect. *European Journal of Work & Organizational Psychology,* 20**,** 467-496.

BENAMTI, J., OZDEMIR, Z. & SMITH, J. 2010. Aligning undergraduate IS curricula with industry needs. *Communications of the ACM,* 53**,** 152-156.

BENDER, I., KEITH, A. & HEYWOOD, J. 2010. Out of Balance? Comparing Public and Private Sector Compensation over 20 Years. Washington, D.C.: Center for State and Local Government Excellence

BLAU, G. 2007. Does a corresponding set of variables for explaining voluntary organizational turnover transfer to explaining voluntary occupational turnover? *Journal of Vocational Behavior,* 70**,** 125-148.

BOSCH, T., MATHIASSEN, S., VISSER, B., LOOZE, M. & DIEEN, J. 2011. The effect of work pace on workload, motor variability, and fatigue during simulated kight assembly work. *Ergonomics,* 54**,** 154-168.

BRINER, R., HARRIS, C. & DANIELS, K. 2004. How do work stress and coping work? Toward a fundamental theoretical reappraisal. *British Journal of Guidance and Counselling,* 32**,** 223-234.

BROUGH, P. & KELLING, A. 2002. Women, work and well-being: An analysis of the work-family conflict. *New Zealand Journal of Psychology,* 31**,** 29-38.

BURKE , M. & GREENGLASS, E. 1995. A longitudinal study of psychological burnout in teachers. *Human Relations,* 48**,** 187-202.

BYRD, T. & TURNER, D. 2000. Measuring the flexibility of information technology infrastructure: exploratory analysis of a construct. *Journal of Management Information Systems,* 17**,** 167-208.

CAREY, P. 2011. *Boom in Silicon Valley tech hiring* [Online]. Available: http://www.sanfranciscosentinel.com/?p=119961 [Accessed 5/11/2011.

COOK, J., HEPWORTH, S., WALL, T. & WARR, P. 1981. *The Experience of Work,* London, UK, Academic Press.

DAWLEY, D., HOUGHTON, J. & BUCKLEW, N. 2010. Percieved organizational support and turnover intention: The mediating effects of personal sacrafice and job fit. *Journal of Social Psychology*, 150, 238-257.

DE CROON, E., SLUITER, J., BLONK, R., BROERSEN, J. & FRINGS-DRESEN, M. 2004. Stressful work, psychological job strain, and turnover: A 2-year prospective cohort study of truck drivers. *Journal of Applied Psychology,* 89**,** 442-454.

FISHBEIN, M. & AJZEN, I. 1975. *Belief, Attitude, Intention, and Behavior,* Reading, MA, Addison-Wesley.

FLINKMAN, M., LAINE, M., LEINO-KILPI, H., HASSELHORN, M. & SALANTERA, S. 2008. Explaining young Finnish nurses' intention to leave the profession: a questionnaire survey. *International Journal of Nursing Studies,* 45**,** 727-739.

FLYNN, M. 2010. Who would delay retirement? A typology of older workers. *Personnel Review,* 39**,** 308-324.

FRONE, M., RUSSELL, M. & COOPER, M. 1992. Antecedents and outcomes of workfamily conflict: Testing a model of the work-family interface. *Journal of Applied Psychology,* 77**,** 23-38.

GANSTER, D. & SCHAUBROECK, J. 1991. Work stress and employee health. *Journal of Management,* 17**,** 20-57.

GEORGE, J. & JONES, G. 2001. Towards a process model of individual change in organizations. *Human Relations,* 54 20-46.

GHAPANCHI, A. & AURUM, A. 2011. Antecedents to IT personnel's intentions to leave: A systematic literature review. *Journal of Systems and Software,* 84**,** 238-249.

GOODMAN, A. 2009. The aging workforce: Preventing the knowledge gap. *Profiles in Diversity Journal,* 11**,** 42-43.

GRANGER, M., DICK, G., JACOBSON, C. & VAN SLYKE, C. 2007. Information systems enrollments: Challenges and strategies. *Journal of Information Systems Education,* 18**,** 303-311.

GRIFFIN, M., NEAL, A., PARKER, S. & PARKER, S. 2007. A new model of work role performance: Positive behavior in uncertain and interdependent contexts. *Academy of Management Journal,* 50**,** 327-347.

GROSS, J. 2001. Emotion regulation in adulthood: Timing is everything. *Current Directions in Psychological Science,* 10**,** 3-9.

GUYNN, J. 2011. *What recession? It's boom time again in Silicon Valley* [Online].

HACKMAN, J. & OLDHAM, G. 1975. Development of the job diagnostic inventory. *Journal of Applied Psychology,* 60**,** 159-170.

HAMMER, L., KOSSEK, E., ANGER, K., BODNER, T. & ZIMMERMAN, K. 2011. Clarifying work-family intervention processes: The role of work-family conflict and family supportive supervisor behaviors. *Journal of Applied Psychology,* 96**,** 134-150.

HAN, T. & WILLIAMS, K. 2008. Multilevel investigation of adaptive performance: Individual and team-level relationships. *Gourp & Organization Management,* 33**,** 657-684.

IGBARIA, M. & GREENHAUS, J. 1992. Determinants of MIS employees' turnover intentions: A structural equation model. *Communications of the ACM,* 35**,** 35-49.

JOSEPH, D., NG, K., KOH, C. & ANG, S. 2007. Turnover of information technology professionals: A narrative review, meta-analytic structural equation modeling, and model development. *MIS Quarterly,* 31**,** 547-577.

KERLINGER, F. 1973. *Foundations of Behavioral Research,* London, UK, Holt Reinhart & Winston.

KOCH, H. & KAYWORTH, T. 2009. Partnering with majors: A process approach to increasing IS enrollment *Journal of Information Systems Education,* 20**,** 439-449.

LAINE, M., VAN DER HEIJDEN, B., WICKSTROM, G., HASSELHORN, M. & TACKENBERG, P. 2009. Job insecurity and intent to leave the nursing profession in Europe *The International Journal of Human Resource Management,* 20**,** 420-438.

LAM, S. & CHUNG, W. 2010. The changing landscape of aging workforce in Hong Kong- The importance of ICT training in lifelong corporate learning *International Journal of Advanced Corporate Learning,* 3**,** 11-16.

LAYER, J., KARWOSKI, W. & FURR, A. 2009. The effect of cognitive demands and perceived quality of work life on human performance in manufacturing environments. *International Journal of Industrial Ergonomics,* 39**,** 413-421.

LEE, K., JOSHI, K. & BAE, M. 2010. An investigation of the influence of the IS context on the determinants of turnover intentions in Korea. *Journal of Organizational Computing & Electronic Commerce,* 20**,** 45-67.

LEE, P. 2000. Turnover of information technology professionals: A contextual model. *Accounting, Management & Information Technology,* 10**,** 101-124.

LEE, P. The social context of turnover among information technology professionals. Proceedings of the Special Interest Group Computer Personnel Research Annual Conference, 2002 Kristianland, Norway. 145-153.

LEWIS, B., TEMPLETON, G. & BYRD, T. 2005. A methodology for construct development in MIS research. *European Journal of Information Systems,* 14**,** 40-57.

MARCH, J. & SIMON, H. 1958. *Organizations,* new York, NY, Wiley.

MATHIEU, J. & ZAJAC, D. 1990. A review and meta-analysis of the antecedents, correlates, and consequences of organizational commitment. *Psychological Bulletin,* 108**,** 171-194.

MEREDITH, B. & SALTER, J. 2008. How prepared is the retirement industry for meeting the needs of retiring American workes? *Financial Services Review,* 17**,** 87-103.

MIKKELSEN, A., ØGAARD, T. & LANDSBERGIS, P. 2005. The effects of new dimensions of psychological job demands and job control on active learning and occupational health. *Work & Stress,* 19**,** 153-175.

MITCHELL, T., HOLMES, B., LEE, T., SABLYNSKI, C. & EREZ, M. 2001. Why people stay: Using job embeddedness to predict voluntary turnover. *Academy of Management Journal,* 44**,** 1102-1121.

MOORE, J. 2000. One road to turnover: An examination of work exhaustion in technology professionals. *MIS Quarterly,* 24**,** 141-168.

NASWALL, K., SVERKE, M. & HELLGREN, J. 2005. The moderating role of personality charateristics on the relationship between job insecurity and strain. *Work & Stress,* 19**,** 37-49.

PEJTERSEN, J., KRISTENSEN, T., BORG, V. & BJORNER, J. 2010. The second version of Copenhagen Psychsocial Questionnaire. *Scandinavian Journal of Public Health,* 38**,** 8-24.

PODSAKOFF, P., MACKENZIE, S., LEE, J. & PODSAKOFF, N. 2003. Common

methods bias in behavioral research: Critical review of the literature and recommended remedies. *Journal of Applied Psychology,* 88**,** 879-903.

RENNIE, L. 1982. Research note: Detecting a response set to Likert-style attitude items with the rating model *Educational Research and Perspectives,* 9**,** 114-118.

ROWE, R. 2010. IT faces retiring mainframe workforce challanges. *Mainframe Computing,* 23**,** 1-2.

SAVANEVICIENE, A. & STANKEVICIUTE, Z. 2011. Human resource management practice linkage with organizational commitment and job satisfaction. *Economics & Management,* 16**,** 921-928.

SIMON, D. 2011. *Silicon Valley experiencing new hiring boom* [Online]. Available: http://articles.cnn.com/2011-04-05/tech/silicon.valley.job.market_1_software-engineers-job-market-simplyhired?_s=PM:TECH [Accessed 4/5/2011.

SIVO, S., SAUNDERS, C., CHANG, Q. & J., J. 2006. How long should you go? Low response rates and the validity of inference in IS questionnaire research. *Journal of the AIS,* 7**,** 361-414.

SLATTEN, T., SVENSSON, G. & SVAERI, S. 2011. Service quality and turnover intentions as perceived by employees. *Personnel Review,* 40**,** 205-221.

SOIL-SAETHER, H. 2011. Transplants' role stress and work outcome in IT outsourcing. *Industrial Management & Data Systems,* 111**,** 227-245.

STAUFENBIEL, T. & KONIG, C. 2010. A model for the effects of job insecurity on performance, turnover intention, and absenteeism. *Journal of Occupational & Organizational Psychology,* 83**,** 101-117.

TETT, R. & MEYER, J. 1993. Job satisfaction, organizational commitment, turnover intention, and turnover: Path analyses based on meta-analytic findings. *Personnel Psychology,* 43**,** 259-293.

TWENGE, J. 2010. A review of empirical evidence on generational differences in work attitudes. *Journal of Business & Psychology,* 25**,** 201-210.

Weber, R. 1985. "*Basic content analysis*," Sage, London, UK.

WITTNER, J. & MARTIN, J. 2010. Emotional exhaustion among employees without social or client contact: The key role of nonstandard work schedules. *Journal of Business & Psychology,* 25**,** 607-623.

WOOD, S. & DE MENEZES, L. 2011. High involvement management, high-performance work systems and well-being *International Journal of Human Resource Management,* 22**,** 1586-1610.

YAO, X. & WANG, L. 2006. The predictability of normative organizational commitment for turnover in Chiese companies: a cultural perspective. *International Journal of Human Resource Management,* 17**,** 1058-1075.

APPENDIX A: CONTENT ANALYSIS

Table A1 depicts the results of the content analysis. The left column lists the "motivations for change" identified in the practitioner literature. The middle column contains the refined categories which were generalized from the identified units. The right column represents the final form of each construct, as referenced from the COPSOQ psychosocial inventory.

Table A1: Results of Content Analysis

Identified Units	Refined Categories	COPSOQ Dimension
Overstressed	High Stress	Stress
Too Difficult		
Drained		
Strain		
Development Opportunities	No Advancement	Possibilities for Development
Room for Growth		
Without Purpose	Dull	Meaning of Work
Boring		
Unpredictable	Unpredictable	Predictability
Control	Lack of Control	Influence
Burnout	Burnout	Burnout
Contradictory Rules	Unclear Expectations	Role Conflicts
Blurred Responsibilities	Poorly Defined Role	Role Clarity
Unclear Expectations		
Awards	Lack of Compensations	Recognition
Salaries		
Bonuses		
Recognition	Lack of Recognition	
Congratulations		
High Speed Environment	Fast Pace	Work Pace
Uncertain Future	Insecurity	Job insecurity
Fear of Outsourcing		
Possibility of Change		
Manager Does Not Help	No Managerial Support	Supervisor Support
Bad Boss		
Too Challenging	Overtaxing	Cognitive Demands
Overworked	Workload	Quantitative Demands
Hard to Keep Up		
Work Never Ends	Lack of Family Life	Work Family Conflict
No Family Time		
Not Flexible		
Unsatisfied	Work Satisfaction	Job Satisfaction