The Relationships Between Job Characteristics, Job Satisfaction, and Turnover Intention Among Software Developers

by

Timothy Lee Doré

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A Dissertation

Presented to the
Faculty of Argosy University-Orange County

In Partial Fulfillment of
The Requirements for the Degree of

Doctor of Business Administration

by

Timothy Lee Doré

July 2004

Abstract of Dissertation Presented to the
Graduate School of Argosy University-Orange County
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Business Administration

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Timothy Lee Doré

2004

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Software developer turnover can have disastrous effects on an organization due to the loss of business process knowledge, as well as acquired technical skills. Annual rates of turnover in information technology (IT) departments have been estimated at 20% or more with the cost of replacing technology workers ranging from 1.5 to 2.5 times annual salaries. This study purposely focused only on software developers as opposed to IT employees in general due to the critical nature of their work.

The factors leading to turnover intention in this field are poorly understood; therefore, this study was designed to further understand the relationships between job characteristics, job satisfaction, and turnover intention among software developers. 326 web surveys were completed that contained questions relating to job characteristics, job satisfaction, turnover intention, and demographic information. The first four job characteristics are specific to software developers while the last five job characteristics and the job satisfaction scales are from the Hackman and Oldham Job Diagnostic Survey (JDS).

Two research questions, sixteen hypotheses, and a theoretical path model were developed to understand which job characteristic variables contribute to the various dimensions of job satisfaction and which job satisfaction dimensions contribute to turnover intention. Additionally, the indirect effects of job characteristics through job satisfaction on turnover intention were also determined. The statistical testing consisted of descriptive and inferential statistical analysis. Bivariate correlations are presented, as well as path analysis, an extension of multiple regression analysis.

The results of the study uncovered several factors that can influence turnover intention among software developers. Identified in the study as statistically significant job characteristics that can be influenced by management are training, autonomy, feedback, number of developers, task significance, and skill variety. With the results of this study, management can better understand the unique needs of software developers and design development jobs to ensure that these needs are met. The study concludes with implications for practitioners and recommendations for future research.

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DEDICATION

I dedicate this dissertation to Susie, the center of my universe, my best friend, lover, wife, confidant, mother, and camping buddy. Without you, I never would have realized my potential.

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CHAPTER ONE: THE PROBLEM

Software developers are charged with the task of knowing a user's job in such a thorough manner that they can design, code, and implement a computerized system to perform some or all of the user's tasks. To be successful, a software developer must attain an intimate knowledge of all aspects of the business, as well as the technical skills to make computerization a successful reality. Software developer turnover can have disastrous effects on an organization due to the loss of business process knowledge along with acquired technical skills. A review of the literature shows that the factors leading to turnover intention in this field are poorly understood; therefore, this dissertation seeks to understand the relationships between job characteristics, job satisfaction, and turnover intention among software developers

Problem Background

According to data from the Current Population Survey (CPS; a joint effort of the United States Departments of Labor and Commerce), the number of "computer systems analysts and scientists" (including programmers and engineers) increased by 190% between 1983 and 1998, more than six times faster than the 30.4% growth rate of U.S. jobs overall (Meares & Sargent, 1999). The annual job growth rate was especially marked for computer systems analysts and scientists as opposed to programmers. Even after the unexpected "dot.com bust" that ravaged technology industries and the overall downturn of the U.S. economy, the demand for core IT professionals remains high and is expected to rise over the coming years.

Not unexpectedly, an offshoot of the soaring demands for information technology (IT) professionals has been high turnover. Annual rates of turnover in IT departments have been estimated at up to 20% or more (S. Alexander, 1998; S.M. Alexander, 1999; Cone, 1998; Fryer, 1998; Kosseff, 1999; Shurn-Hannah, 2000; Thatcher, Stepna, & Boyle, 2002-03). The only exception to this trend is in research and development (R&D), which includes software designers, research scientists, engineers, and project and product managers. Turnover for R&D professionals ranges from a high of 9.2% in the computer and electronics sector to a low of 3.6% in general manufacturing, rates that are well below the national average of 15% for all U.S. industry (Kochanski & Ledford, 2001).

The general consensus across industries and organizations is that the loss of skilled IT professionals is expensive. Estimates of the cost of replacing technology workers range from roughly 1.5 times their annual salaries (Kosseff, 1999) to 2.5 times annual salaries (Longenecker & Scazzero, 2003). For R&D professionals, estimates range from one to seven times the employee's salary (Kochanski & Ledford, 2001). In addition to the cost of replacing experienced IT staff, turnover takes its toll on productivity and morale though disruptions of projects, heavier workloads, and negative impact on team cohesion. Industry experts propose that the cost of losing a scientist or engineer can be three to six times the cost of losing a manager (Kochanski & Ledford, 2001).

Some sources view high turnover as an inevitable consequence of the tremendous demand for technology skills. From this perspective, rational models of turnover, which assume job dissatisfaction is the first step toward leaving, are insufficient for explaining turnover among IT professionals (Rouse, 2001). Rouse argues that "Due to the incredible demand for qualified IT professionals, unsolicited job offers are constantly bombarding members of this group." Thus, "Even though there is nothing dissatisfying about their current position, the new offer may be too good to forego" (p. 285). Utilizing a comprehensive model that takes economic factors into account, Thatcher et al. (2002-03) concluded that while job market opportunities have a definite impact on the intentions of IT workers to quit, this effect can be offset by organizational programs that provide IT employees with more rewards. In fact, many companies have successfully reduced turnover by creating a work environment that provides IT professionals with the challenging and creative work, professional status and recognition, advancement opportunities, and technology training that are routinely identified as key factors in recruiting and retaining skilled software developers.

Literature Review

The present study holds the rationale that turnover intentions among software developers are largely in agreement with theoretical models of job satisfaction, organizational commitment, and turnover. Research on turnover and retention in IT does not so much support the claim that IT turnover can be independent of job dissatisfaction, but rather suggests that "IT employees seem to be quicker to change jobs than other employees when they are dissatisfied with their current employer" (Hacker, 2003, p. 14). The fact that organizations of varying sizes and across industry sectors have effectively reduced turnover through aggressive strategies that take into account the preferences of IT professionals clearly shows that high turnover is not an "inevitable" consequence of the technology field, but rather a problem that can be successfully addressed by understanding the root causes and adopting proven strategies such as work redesign and strategic alignment of management and IT.

Ironically, while industry experts are acutely aware of the expense involved in replacing skilled technology staff, the problem is exacerbated by the fact that executive management often lacks understanding of the full economic impact of high technology turnover (Kochanski & Ledford, 2001). Outside of the technology sector, IT has traditionally been excluded from strategic management operations. A major consequence of this outdated practice is that managerially oriented IT employees are deprived of opportunities for advancement while technically oriented employees are frustrated by lack of professional respect, recognition, and challenge (Hopkins, 1998). In large corporations, IT staffers often report feeling frustrated when their jobs involve maintaining systems rather than working on new projects (Goldstein, 1989; McEachern, 2001). Overall, the historical "disconnect between the business line and the IT department" (McEachern, 2001, p. 44) is a key contributor to job dissatisfaction among software developers and consequently to turnover intentions.

For software developers in high technology firms, turnover is more often related to organizational upheaval, restructuring, and instability (Baron, Hannan, & Burton, 2001; Walsh, 2001). Additionally, the business environment in the technology sector is characterized by short product life cycles, intense market competition, and pressures from clients to complete projects "on time and within budget" (Meares & Sargent, 1999, p. 9). Unrelenting pressures and sometimes unrealistic expectations and deadlines can make IT professionals especially vulnerable to work exhaustion and burnout (Moore, 2000). This problem is not limited to software developers employed in technology companies; in fact, job pressures may be perceived more negatively by programmers whose jobs entail maintenance and who thus lack the challenge and innovation of working with cutting edge technologies. By definition, "IT workers are expected to keep technologies working and computer applications functioning around the clock in organizations" (Moore, 2000, p. 144). Excessive demands on time (including ubiquitous reports of being on call on weekends and vacations) can easily lead to work exhaustion. Studies within and outside of the IT field consistently find correlations between work exhaustion and intentions to leave.

In addition to job dissatisfaction and burnout, which transcend professional boundaries as causes of voluntary turnover, other job features are unique to IT occupations. First, as Rouse (2001) observed, IT employees are more likely to be approached by recruiters than most other professional groups. A 1999 *InformationWeek* survey disclosed that more than two-thirds of IT professionals had been contacted by a headhunter within a year; in fact, they received an average of three prospects in six months (Meares & Sargent, 1999). The percentage was only slightly lower in the 2000 survey: 60% of IT staff and 67% of IT managers reported being approached by headhunters with the same average frequency (Zurier, 2000). The competition is particularly powerful for employees with "hot skills," such as Java or data mining experience (Meares & Sargent, 1999).

Second, the rapid obsolescence of acquired knowledge and skills that characterizes IT has contributed to a "mindset" in which changing jobs frequently is viewed as a professional asset as opposed to a stigma or liability (Hacker, 2003). A report by the Office of Technology Policy (OTP) stated succinctly, "Unlike so many occupations in which job stability is a hallmark of success, the business environment in IT has created a labor market in which job hopping serves as a means to gain the vital skills needed for career opportunities" (Meares & Sargent, 1999, p. 13). For many IT professionals, "Jobs are now regarded as another element of the training process, of learning by doing, and employees move from job to job to gain new skill sets and experiences….Acquiring new skills allows them to move within the entire IT work community for opportunities, rather than solely within a particular company" (p. 13).

Third, "Because much of IT work is project oriented, the technical employee's loyalty may be more to the project, and not necessarily to the employer" (Hacker, 2003, p. 15). The *InformationWeek* survey reported that the average job duration was four years for IT staff members and five years for IT managers. During the dot.com boom, *Digital Nation* found that the average job stay in Silicon Valley was 18 months (Meares & Sargent, 1999, p. 13).

Although it can be argued that no theoretical model effectively captures *all* dimensions of job satisfaction and turnover, research on IT professionals is generally in agreement with the existing models. For example, Guimares and Igbaria (1992) found that for information systems (IS) and information center (IC) personnel, the most powerful predictors of turnover intentions were organizational commitment, overall job satisfaction, role dynamics, and employee age and tenure. These factors are systematically reported in business literature and appear to transcend professional and organizational boundaries.

The conceptual model proposed by Thatcher et al. (2002-03) for investigating turnover in IT employees adds economic factors. According to Thatcher et al. two disparate perspectives on turnover in IT exists. The first is consistent with Rouse's (2001) theory that IT turnover is driven by a tight labor market and soaring demands for employees with high technology skills. The second perspective does not ignore the impact of market forces, but focuses on organizational features that produce job dissatisfaction such as work overload, unrealistic demands, poor advancement opportunities, and lack of respect for technical expertise.

The findings of Thatcher et al. (2002-03) supported Steer's and Mowday's model of turnover Lee and Mowday (1987) and Hackman and Oldham's (1980) Job Characteristics Model (JCM). Organizational commitment was inversely related to turnover while intent to leave predicted actual leaving. Job satisfaction and task significance both had a positive influence on organizational commitment, and task significance, task variety, and autonomy were linked with job satisfaction. Perceptions of job alternatives did show a positive impact on intentions to leave although the effect of organizational commitment remained strong. Unlike Guimares and Igbaria (1992), Thatcher et al. (2002-03) found no effect for age. Research is inconsistent on the impact of age on turnover, although some evidence exists that younger employees are most likely to have hot skills, which makes them ready targets for headhunters (Fryer, 1998; Lu, 1999). Task significance, task variety, and autonomy are invariably cited as critical factors in job satisfaction and turnover among software developers.

The OTP report divides employers of IT professionals into two categories. In the first group are those employers "*for which IT is the core business* [emphasis in original]" (Meares & Sargent, 1999, p. 9). They stand at the cutting edge of developing and distributing new technologies where they routinely contend with short product life cycles, intense market competition, and budget and time demands. The second group of employers includes those that hire IT professionals to work on the "*application of information technologies to enhance their core businesses in other fields*" (p. 9). Pressures and intensity are lower in this sector, and product life cycles are generally longer.

The dot.com crash resulted in an exodus of IT workers from high technology firms into manufacturing, financial services, retail, and other businesses in the second category (Walsh, 2001). Traditionally, IT workers had left jobs in these sectors due to lack of respect for their skills and poor opportunities for advancement. Recent articles suggest that IT professionals are more interested in job security than they were when jobs were plentiful, although they invariably stress the importance of the workplace environment in attracting and retaining qualified IT staff (McEachern, 2001; Russo, 2002; Walsh, 2001; Zetlin, 2001; Zurier, 2001).

Numerous sources emphasize that even with generous financial rewards, programmers and software developers are likely to be dissatisfied in a work environment that stifles creativity and fails to respect their professional expertise; indeed, this complaint is ever present in the professional literature (Fisher, 2000; Rouse, 2001; Thatcher et al., 2002; Walsh). Conversely, firms that have effectively reduced IT turnover have generally been proactive in creating flexible working conditions and an environment that fosters innovation, challenge, and “fun” (S.M. Alexander, 1999; Cone, 1998; Zemke, 2000; Zetlin, 2001; Zurier, 2000). Investing in professional development and training as well as providing ample opportunities for IT staff to utilize new skills rank high on the list of effective retention strategies (Cone, 1998; Deakin, 2002; DeMers, 2002; Russo, 2002; Zetlin, 2001).

Two decades ago, Goldstein and Rockart (1984) attributed aspects of job dissatisfaction among programmers and analysts to the practice of focusing on technical skills to the exclusion of training and experience in management processes. To address this problem they advocated training IT employees in management skills to reduce conflict and enhance job satisfaction and productivity. Despite massive workplace upheavals, and the predominance of IT in all areas of business and industry, these recommendations have been largely ignored. In fact, the exclusion of IT staff from management training is a prominent cause of turnover. The traditional