Turnover of Information Technology Professionals: The Effects of Internal Labor Market Strategies

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Abstract

Retaining information technology (IT) professionals is important for organizations, given the challenges in sourcing for IT talent. Prior research has largely focused on understanding employee turnover from an intra-individual perspective. In this study we examine employee turnover from a structural perspective. We investigate the impact on IT turnover of organizations' Internal Labor Market (ILM) strategies. ILM strategies include human resource rules, practices, and policies including hiring and promotion criteria, job ladders, wage systems and training procedures. We collect data on ILM strategies and turnover rates for eight major IT jobs across forty-one organizations and analyze the data using confirmatory agglomerative hierarchical clustering techniques. Our results show that organizations adopt distinct ILM strategies for different IT jobs, and that these strategies relate to differential turnover rates. Specifically, technically-oriented IT jobs cluster in craft ILM strategies that are associated with higher turnover, whereas managerially-oriented IT jobs cluster in industrial ILM strategies that are associated with lower turnover. Further, depending on their contingencies of goal orientation (not-for-profit versus for-profit), IT focus (IT producer versus user), and information intensity (IT critical versus support), organizations adopt an industrial ILM strategy for their technically-oriented IT jobs to dampen turnover. Not-for-profit and IT user organizations where IT is critical adopt industrial ILM strategies for their technically-oriented IT jobs to attenuate turnover and improve the predictability of their IT workforce. IT producers and IT users where IT plays a supporting role adopt craft ILM strategies that engender higher turnover to remain timely and flexible in IT skills acquisition.

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Introduction

Rapid innovations in information technology (IT), the rise of the Internet and web-based businesses, and the expansion of the information economy have posed challenges for organizations that seek to recruit and retain skilled IT professionals (Standbridge & Autrey, 2001). Although growth has slowed in the high tech industry, the demand for skilled IT professionals remains strong and is projected to increase in the future (ITAA, 2002). According to the director of the workforce development program at the Computing Technology Industry Association (http:// itmanagement. earthweb.com/staff): "while layoffs dominate the headlines, IT managers are still struggling to find the right people to keep the technology infrastructure moving forward…". Imbalances in the supply and demand for IT professionals contribute to the length of the backlog for IT services, high turnover rates of IT professionals, and IT skills shortages (U.S. Department of Commerce, 1998). Thus, organizations are challenged to develop effective recruitment and retention strategies for their IT professionals, given these characteristics of the IT labor market.

Turnover in the IT profession has been the subject of considerable research. Most research on this issue examines intent to turnover from an intra-individual perspective (Ang & Slaughter, 2000). From this psychological perspective, intent to turnover is a result of individual factors such as employee demography, job dissatisfaction, or lack of organizational commitment (e.g., Ruhl, 1988; Ryan, 1989; Discenza & Gardner, 1992; Igbaria & Siegel, 1992; Igbaria & Greenhaus, 1992; Igbaria, Meredith, & Smith, 1994; Joseph & Ang, 2003). This research has provided valuable insights into why IT professionals *intend* to leave their jobs. However, it does not explain *actual* turnover patterns. Longitudinal studies of turnover in non-IT contexts (Farkas & Tetrick, 1989; Johnston et al., 1993; Kirschenbaum & Weisberg, 1990; Vandenberg & Nelson, 1999) suggest that *intent* to turnover does not always predict *actual* turnover behavior. Recent research in psychology and organizational behavior implies that actual turnover is strongly influenced by internal labor market attributes such as promotability, wage levels, skills demand, and external labor market attributes such as mobility, and availability of jobs (Hom & Kinicki, 2001; Trevor, 2001; Kirschenbaum & Mano-Negrin, 1999). The importance of labor market parameters in influencing actual turnover patterns has also been suggested by Cappelli (1995), Steel and Griffeth (1989), and Carsten and Spector (1987).

In this study, we investigate the impact on IT turnover of organizations' human resource strategies, particularly their *Internal Labor Market (ILM) strategies.* ILM strategies refer to human resource rules, practices, and policies that organizations establish to govern their workers. To the best of our knowledge, this study represents the first effort in research on IT professionals to examine turnover issues from this perspective. Our approach differs from prior research in that we do not focus on the individual and the individual's intent to turnover. Rather, we view IT professionals as performing IT jobs that are organized using different internal labor markets, and IT turnover as a function of the different ILM strategies. The potential benefit of an ILM approach is the focus on *organizational* determinants of turnover, rather than on individual or external labor market factors that can be unpredictable, idiosyncratic or outside of organizational control.

Our study also differs from previous research that has examined IT human resource policies and practices (e.g., Ross et al., 1996; Mata et al., 1995; Roepke et al., 2000). These prior studies on IT human resource policies have tended to focus more on IT performance or effectiveness rather than turnover per se. For example, Roepke et al. (2000) examined how 3M's IT human resource strategies had shifted from a command-and-control philosophy to a more empowered and participatory model, and traced how such shifts had bolstered the effectiveness of IT within 3M. Turnover is not the central focus of the study, but an indirect measure of the success of these strategies.

In the following sections, we begin with a discussion of the two prominent kinds of ILM strategies - industrial and craft - and the theoretical relationship between ILM strategies and turnover. We hypothesize that technically-oriented IT jobs with their inherent craft-ILM characteristics generate higher rates of turnover than managerially-oriented IT jobs with their inherent industrial-ILM characteristics. We then focus our attention on technically-oriented IT jobs and hypothesize the contingencies under which organizations choose industrial-ILM strategies for their technically-oriented IT jobs to dampen the turnover rates for these jobs. To test our hypotheses, we adopt a multiple informants research design to empirically examine the job characteristics and ILM strategies for eight major IT jobs across forty-one different organizations. The organizations are purposively selected to enable us to examine the effects of differing organizational contingencies in the selection of ILM strategies. We use confirmatory agglomerative hierarchical clustering techniques and multivariate analysis of variance to evaluate our hypotheses. Finally, we discuss our findings, and conclude with suggestions for future research and implications for human resource management of IT professionals.

Internal Labor Market Strategies

According to the seminal work by Kerr (1954), Doeringer and Piore (1971), and later by Osterman (1982, 1984, 1987, 1994), ILM strategies refer to the human resource rules, practices, and procedures such as hiring and promotion criteria, job ladders, wage systems and training procedures that are established by organizations to govern their workers. From an ILM perspective, organizations establish policies that limit hiring to certain jobs or ports of entry[1] and reserve the remainder of the organization's jobs to those workers already employed within the organization (Althauser & Kalleberg, 1981; Baker & Holstrom, 1995; Baker et al., 1993, 1994; Scherer, 1996). Such practices can influence the turnover rate of jobs. For example, closing a port of entry for a job is a way of restricting the mobility of IT workers across different organizations,

[1] *Port of entry* refers to the kind of jobs for which an organization normally hires employees from outside the organization.

with the result that there is less incentive for turnover in that job as well as fewer opportunities to transfer between organizations. To illustrate, if organizations decide to hire project leaders only by promoting from within, they have closed a port of entry for project leaders from the outside, restricting the inter-organizational mobility of project leaders.

Industrial and Craft ILM strategies

Industrial and *craft* are two prominent forms of ILM strategies (Osterman, 1982). In industrial ILM strategies, employees enter the organization at a limited number of ports of entry and progress along clearly marked job ladders. Well-defined procedures and company norms govern job security rules. Jobs have a high level of human asset specificity: skills and knowledge that are unique to an organization and are not readily available in the labor force (Williamson, 1980). Training is provided by the organization and can be on the job or can take the form of brief in-house courses. Limited ports of entry make inter-organizational mobility difficult. In contrast, craft ILM strategies are characterized by greater mobility and more loyalty to the skill or profession than to the organization. The job skills are not very organization specific, and hence workers have more market power than under industrial arrangements. Mobility, which is often penalized under industrial arrangements, is more commonly rewarded here. Table 1 summarizes the entry features associated with industrial and craft ILM strategies.

Table 1. Entry Features of ILM strategies

Features	Industrial	Craft
Entry from Within the Organization	High	Low
Entry from Outside the Organization	Low	High

The classification of jobs into industrial and craft ILM strategies depends not only on entry features but also on certain job attributes including *education requirements*, *length of time required for average proficiency*, *skill specificity*, *importance of personality and merit in promotion*, and *extent of control* (Osterman, 1984). *Education requirements* are defined in terms of the minimum level of training required for an entry worker to perform successfully in the organization. As such, these requirements are high under industrial ILM strategies and lower under craft ILM strategies, because the level of organization-specific skill required of the industrial worker is higher than that demanded of a craft worker. In the same vein, a worker in a job in an industrial ILM requires a *longer length of time to perform at an average level of proficiency* than one in a craft ILM.

In terms of *skill specificity*, a skill is said to be organization-specific if it cannot be easily transferred from one organization to another. For example, a particular configuration of machines or an idiosyncratic work procedure may mean that workers trained in one organization cannot easily perform seemingly comparable tasks elsewhere. As craft ILM jobs require a relatively low level of organization-specific skill, it would be expected that the skills acquired in one organization can easily be transferred to another. Hence, skill specificity is low. The opposite would be true of jobs in industrial ILM strategies.

Merit assesses the importance of excellence in job performance for promotion. *Personality* measures the importance of cooperative and collaborative skills for promotion. Both merit and personality are particularly significant factors for success in industrial ILM strategies because workers are promoted from within. As for the *extent of control* that is determined by how much initiative individuals have in carrying out their duties, industrial workers are typically given more control while craft workers have less autonomy. The relative variation in these job attributes across the different ILM strategies is summarized in Table 2.

Table 2. Job Attributes of ILM Strategies

Job Attribute	Industrial	Craft
	Level of Characteristic	
Education Requirements	High	Low
Length of Time for Average Proficiency	High	Low
Skill Specificity	High	Low
Importance of Personality	High	Low
Importance of Merit	High	Low
Extent of Control	High	Low

IT Jobs and ILM Strategies

Prior empirical research of IT employees' career orientations has found that the most prevalent career orientations are managerial and technical (Igbaria et al., 1991). Roles such as Chief Information Officer (CIO), Application Development Manager (ADMs), and Infrastructure Management (IM) are more managerially oriented than technically oriented. These roles require incumbents to manage projects, allocate resources, plan, organize, lead, and motivate subordinates to ensure that the goals of the organization and the objectives of the IT department are fulfilled. Managerially-oriented IT jobs are typically occupied by individuals promoted from within the organization because these jobs require high levels of organization-specific knowledge, and are characterized by high requirements for education, length of time for proficiency, level of skill specificity, importance of personality and merit, and extent of control (O'Bryan & Pick, 1995). In contrast, roles such as programmers, analysts, database administrators, and network specialists are more technically than managerially oriented. Incumbents of these roles focus on tasks and projects that require strong technical competencies in programming languages, skills in analysis and design, and knowledge in networks and IT infrastructure. Technically-oriented IT jobs require less organization-specific skills and have relatively lower required levels of education, length of time for proficiency, and extent of control. Thus, technically-oriented IT jobs tend to be occupied by individuals hired from outside the organization rather than promoted from within (Slaughter & Ang, 1995; 1996). This implies that,

Hypothesis 1: *Organizations adopt industrial ILM strategies for managerially-oriented IT jobs and craft ILM strategies for technically-oriented IT jobs.*

ILM Strategies and IT Turnover

The significance of ILM strategies lies in the impact they have on the mobility of the workers organized under them, which in turn relates to the rate of turnover and the expected tenure of the workers in an organization (Boh et al., 2001). In industrial ILM strategies, because entry from outside the organization is low, there is less inter-organizational mobility and thus lower turnover and higher expected tenure of workers. In craft ILM strategies, the opposite is expected (Table 3).

Table 3. Exit Features of ILM Strategies

Features	Industrial	Craft
Turnover Rate	Low	High
Expected Tenure	High	Low

In the context of IT, this implies that professionals in managerially-oriented IT jobs have lower turnover and higher tenure within the organization relative to those in technically-oriented IT jobs because they belong to an industrial ILM rather than a craft ILM. For example, an Application Development Manager is typically hired from within the organization and after a number of years of experience in information systems development and maintenance in the organization. In contrast, programmers are typically hired from outside the organization and frequently move between organizations to keep their technical skills current (Spain, 1995). Thus, we hypothesize,

Hypothesis 2: *Managerially-oriented IT jobs exhibit lower turnover rates and higher expected tenure in the organization relative to technically-oriented IT jobs.*

Organizational Contingencies and ILM strategies for Technically-Oriented IT Jobs

Implicit in the above arguments is the assumption that job attributes are the driving force behind the classification of an ILM strategy for an IT job. This suggests that technically-oriented IT jobs will generate higher turnover rates than managerially-oriented IT jobs. In reality, organizations may choose to re-organize their technically-oriented IT jobs from their inherently craft-ILM to an industrial-ILM strategy to dampen the high turnover rate of their technical IT professionals. An example of this is the creation of "technical career paths" in a dual ladder approach (Ginzberg & Baroudi, 1988). In a dual ladder approach to career paths, a technical path is created that runs parallel to a managerial path. A hierarchical set of positions defines a technical career with increasing technical responsibility, but no managerial responsibility. In ILM terms, a technical career path is akin to an industrial ILM strategy for technically-oriented jobs. A technical career path is created where an employee starts in programming, works as a technical specialist such as a software or systems engineer, and eventually becomes promoted to senior technical consultant or specialist. Such a path will enable programmers to achieve high promotion, pay, and status in an organization while remaining in a technical, non-managerial role (Chesebrough & Davis, 1983).

According to Osterman (1987), implementing industrial ILM strategies is costly because of the heavy investments in training and the development of organization-specific skills. This implies that an organization's decision to adopt an industrial ILM strategy for technically-oriented jobs must be justified, depending on factors such as the organization's need for predictability, cost minimization, and flexibility. In the context of this study, predictability means that organizations are able to plan based upon the availability of a qualified labor supply at foreseeable prices. On the other hand, achieving cost minimization means that an organization estimates a potential wage cost for each ILM strategy and then chooses the strategy with the lowest cost for a given set of technological choices and labor market conditions. Finally, flexibility is defined with respect to staffing levels, to deployment of labor, and to the knowledge, skills, and abilities of the labor force. In other words, organizations prefer flexibility in hiring and layoffs so as to be able to respond to rapidly changing environmental circumstances.

The importance of predictability, flexibility and cost minimization in driving ILM strategies depends on contingencies arising from differences in the goal orientation of the organizations in terms of whether it is not-for-profit or for-profit (Ang et al., 2002). In for-profit organizations, contingencies emerge from their IT

Table 4. Organizational Contingencies and ILM Strategies

Organizational Contingencies	Primary Needs	Preferred ILM for Technically-Oriented IT Jobs
Not-for-Profit Organizations:	Predictability	Industrial
For-Profit Organizations: --IT Producers	Predictability	Industrial
--IT Users > IT Critical > IT Support	Predictability Cost Minimization & Flexibility	Industrial Craft

focus (IT producer versus IT user) and within the IT user organizations, from their degree of information intensity (IT plays a critical role versus IT plays a supporting role). Table 4 shows the organizational contingencies and the preferred ILM strategy for the technically-oriented IT jobs in the different types of organizations.

For not-for-profit organizations, predictability is more important than cost minimization and flexibility in that predictability enables these organizations to plan their IT strategies more confidently. As Pfeffer and Baron (1988) observe, the constraints of personnel budgeting are particularly prominent in the not-for-profit sector, including state and federal agencies, utilities, and universities. Work rules and implicit employment guarantees can hamper a not-for-profit organization's ability to modify employment levels. This implies that not-for-profit organizations would prefer the lower turnover associated with an industrial ILM strategy to minimize fluctuations in their IT employment levels, thereby maximizing predictability. Thus,

Hypothesis 3: *Not-for-profit organizations adopt industrial ILM strategies for their technically-oriented IT jobs.*

The for-profit sector can be divided into IT producers and IT users. IT producers include both management information systems (MIS) product organizations that specialize in producing software packages and IT consulting organizations that are hired by user organizations to develop software or to manage the user organization's IT infrastructure (Niederman & Trower, 1993). We hypothesize that IT producers would also choose predictability as their management objective, even in situations where the overall goal is cost minimization. For IT producers, the core competencies reside in their technical IT professionals. This implies that IT producing organizations would prefer predictability and stability in their IT workforce in order to nurture the competencies necessary to make revenue-generating IT products and services, and to re-coup costly investments in building and upgrading the IT skills of their workforce (Slaughter & Ang, 1996). We posit that,

Hypothesis 4: *IT producers adopt industrial ILM strategies for their technically-oriented IT jobs.*

IT user organizations differ by their levels of information intensity (Applegate et al., 1996; Cash et al., 1994). IT user organizations whose operations depend critically on the IT function cannot afford to lose their technical IT expertise (Kettinger et al., 1994). Thus, we expect that similar to IT producers, these organizations prefer an industrial ILM strategy for their technically-oriented IT jobs to reduce staff turnover and to maintain predictability. Therefore,

Hypothesis 5: *IT user organizations in which IT is a critical function adopt industrial ILM strategies for their technically-oriented IT jobs.*

Finally, for IT user organizations that do not view technical IT resources as critical to their operations, the focus will be on cost minimization and flexibility in choosing an ILM strategy for their technically-oriented IT jobs. Cost minimization implies that these organizations would prefer to hire from outside rather than spend money on training internal staff or hiring workers from other job ladders in the organization (Ang & Slaughter, 2001). In this way, these organizations also make fewer commitments or investments in particular workers, thus increasing their flexibility in hiring and layoffs. If circumstances call for more IT resources, these organizations would hire from outside, and if circumstances are otherwise, the organizations would use layoffs to reduce their technical IT workforce since they have not made heavy investments in it. This suggests that these organizations would prefer to organize their technically-oriented IT jobs within a craft ILM strategy to take advantage of cost savings in training and flexibility in the deployment of IT resources. Thus, we advance the following hypothesis:

Hypothesis 6: *IT user organizations in which IT is a support function adopt the craft-ILM strategy for their technically-oriented IT jobs.*

Methodology

Research Design

To examine our hypotheses, we conducted multiple case studies with key IT and human resource (HR) informants from forty-one (41) organizations. We chose the case study method as most appropriate for our study due to the variety of data sources and the intensive nature of data collection required to identify the ILM strategies in the organizations (Yin, 1994). We purposively sampled organizations based on their contingencies of goal orientation (not-for-profit versus for-profit), IT focus (IT producers versus IT users), and different levels of information intensity (IT critical versus IT support) to test our hypotheses on ILM strategies. Our sampling was designed to ensure both theoretical replication (across industry sector) and literal replication (within industry sector). As recommended by Yin (1994), we selected multiple similar organizations for literal replication *within* an industry or business sector, and organizations *across* multiple industries or business sectors for theoretical replication.

Figure 1 summarizes our strategy for the selection of organizations in the study. Of the forty-one organizations, eleven are not-for-profits including universities and government agencies and thirty are for-profits. Out of the thirty for-profit organizations, eleven are IT producers providing hardware, software and consulting services. Nine for-profits are IT users where IT is a critical function (four in financial services and five in transportation services). The remaining ten organizations are IT users where IT is a support function (two in printing, three in shipping, two in healthcare, two in manufacturing, and one in construction).

Data Collection

We used several methods of data collection and multiple data sources including semi-structured interviews based on questionnaire items adapted from Osterman (1984) (see Appendix A) and company archival data and documentation. Our subjects were key informants in each organization (including the Chief Information Officer, other IT managers, and HR managers) who were responsible for hiring and firing IT professionals and for establishing human resource policies in their organizations. The triangulation made possible by multiple data collection methods and sources provides stronger substantiation of our hypotheses, improving the convergence and internal validity of our results (Eisenhardt, 1989).

To elicit the ILM strategies for IT jobs in each organization, we identified eight major jobs in the IT profession: Chief Information Officer (CIO), Divisional Manager (Applications), Project Leader, Analyst/ Programmer, Divisional Manager (Infrastructure), Database Administrator, Network Specialist and Systems Programmer. We developed a set of structured questions based on Osterman (1984) as shown in Appendix A to assess the different ILM attributes for each job. Consistent with commonly accepted practice (Wanous & Reichers, 1997), we used single item questions to elicit factual information (such as turnover rate) and multi-item questions to elicit responses on more complex, subjective constructs (including the importance of personality, extent of control and skill specificity). The multi-item constructs have good reliability: Cronbach's alpha for the "importance of personality" construct is .83; for "extent of control" is .90; and for "skill specificity" is .89, all well above the acceptable threshold of .70 (Nunnally, 1978).

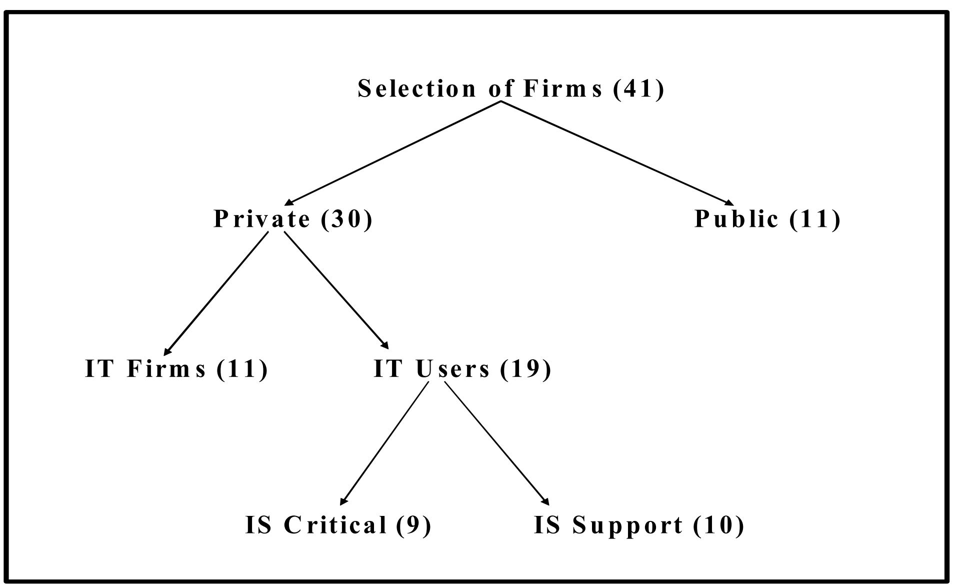

Figure 1. Purposive Sampling Strategy based on Theoretical & Literal Replication Designs

The number of key informants varies by organization. We interviewed the informants in a focus group meeting in each organization. In all organizations, the key informants included the Chief Information Officer and the Human Resource Director. In some organizations, the CIOs recommended also including the Application Development Manager and the Infrastructure Manager in the focus group meeting. Based upon the input from the key informants in each organization, we gathered data on the ILM attributes for each of the eight different IT job positions from each organization.

The CIO and other IT managers responded to questions about the job attributes for the IT positions as they had the most knowledge regarding the characteristics of IT jobs in their organizations. HR Directors responded to factual questions concerning entry into and exit from the IT positions based upon archival human resource management data and documentation. We conducted structured two to three hour interviews with the informants to discuss their responses to the questionnaires, to clarify and resolve ambiguities, and to ask additional questions relating to the organization and the role of IT. After initial results from the study were compiled, we presented our findings to the participating organizations in order to obtain further feedback and validation.

Analytical Strategy

We tested our hypotheses using confirmatory agglomerative hierarchical clustering techniques (Romesburg, 1984; Everitt, 1980) to analyze the data collected on the attributes for the IT jobs from interviews and questionnaires with the participating organizations. Cluster analysis is appropriate for identifying relatively homogeneous groups of objects and is commonly used for data exploration, data reduction, hypothesis generation and hypothesis testing (Ball, 1971). In the context of our study, we use cluster analysis in a theory-driven fashion (Kabanoff et al., 1995) to test our hypotheses about the relationship between ILM strategies and IT turnover and about the motivation for organizations' choices of particular ILM strategies. We confirmed the coherence and stability of our cluster solutions by repeating the cluster analysis in several different ways and by comparing the cluster membership from each procedure. We also conducted statistical tests to verify cluster solutions and to evaluate the relationships posed in our hypotheses.

The scores for each of the job attributes (education requirements, length of time for average proficiency, skill specificity, importance of personality and merit, and extent of control) and the two entry features (entry from outside, and entry from within) for each of the eight IT jobs in the organizations are used as input data to the cluster analysis. Because the variables are measured using different scales, each variable was standardized to its Z-score before input into the cluster analysis. Table 5 summarizes the design of our cluster analysis strategy.

Table 5. Design of Cluster Analysis Strategy

TYPE OF ANALYSIS	WITHIN	ORGANIZATION	ACROSS	ORGANIZATION
Hypotheses Tested	1 & 2 (initial)	1 & 2 (confirmatory)	3, 4, 5 & 6 (initial)	3, 4, 5 & 6 (confirmatory)
Purpose	Identify ILM strategies for IT jobs using data from all organizations	Validate ILM strategies for IT jobs using data from different subsets of organizations	Identify Organizations' Choices for ILM strategies	Validate Organizations' choices for ILM strategies using different subsets of organizations
Input	Job attribute variables, entry variables for each job	Job attribute variables, entry variables for each job	Job attribute variables, entry variables averaged for IT technical jobs	Job attribute variables, entry variables averaged for IT technical jobs
Method	Agglomerative hierarchical clustering using data from all organizations, and pattern similarity measure	Agglomerative hierarchical clustering repeated using different subsets of organizations, and pattern similarity measure	Agglomerative hierarchical clustering using all organizations, pattern similarity measure	Agglomerative hierarchical clustering repeated using different subsets of organizations, and pattern similarity measure
Tests	# of clusters: *Beale's F test.* cluster variable differences: *MANOVA, Univariate F.* outcome variable differences: *Univariate F.*	# of clusters: *Beale's F test.* cluster variable differences: *MANOVA, Univariate F.* outcome variable differences: *Univariate F.*	# of clusters: *Beale's F test.* cluster variable differences: *MANOVA, Univariate F.* outcome variable differences: *Univariate F.*	# of clusters: *Beale's F test.* cluster variable differences: *MANOVA, Univariate F.* outcome variable differences: *Univariate F.*

The variables were clustered using the average linkage within groups method and the cosine similarity measure. We preferred the within groups method for our analysis over other methods because the within groups method minimizes the distance between all possible pairs of cases in the resulting cluster (Milligan, 1980). The cosine distance measure is a pattern similarity measure. We selected it rather than other distance measures because we are interested in clustering based upon relationships *among* the ILM dimensions, not actual differences *in* the ILM dimensions (Romesburg, 1984).

To test hypothesis 1, we conducted both initial and confirmatory cluster analysis and a multiple analysis of variance (MANOVA). An initial cluster analysis was conducted using the IT job attribute and entry feature data for all organizations to determine the cluster membership for each job and the Beale's F test (Beale, 1969) to determine the number of clusters present in the data. We then repeated the cluster analyses with different subsets of the data to confirm the stability of cluster memberships for each job identified in the initial cluster analysis. The confirmatory analysis involved conducting the cluster analysis organization by organization and also for two randomly selected 50% sub-samples of the organizations. Once the cluster memberships were confirmed, we calculated cluster means for each job attribute and entry feature, and then conducted multivariate and univariate F tests to examine whether the six attributes and two entry features that differentiate the eight IT jobs significantly differ between the clusters in the hypothesized direction. To test hypothesis 2 concerning the relationship between ILM strategies and IT turnover, we calculated cluster means for the exit variables (turnover and expected tenure), and tested whether the means were significantly different in the hypothesized direction using multivariate and univariate F tests. The exit variables were not used as input to the cluster analysis. As Aldenderfer and Blashfield (1984) have argued, an effective way to demonstrate the construct validity of a cluster solution is to show that clusters differ in theoretically meaningful ways on variables that were not used to determine the initial clusters.

To test hypotheses 3 to 6, we averaged the scores for the job attributes and entry and exit variables for each organization's technically-oriented IT jobs and conducted a cluster analysis across the forty-one organizations. As in our earlier analysis, each variable was standardized to its Z-score before input into the cluster analysis, and the variables were clustered using the average linkage within groups method and the cosine measure. We conducted both initial and confirmatory cluster analysis and a MANOVA to evaluate hypotheses 3 to 6. An initial cluster analysis was conducted using the job attribute and entry and exit feature data averaged for the IT technical jobs for all organizations to determine the cluster membership for each organization and the Beale's F test to determine the number of clusters present in the data. We then repeated the cluster analyses with different subsets of the data to confirm the stability of cluster memberships for each organization in the initial cluster analysis. Once the cluster memberships were confirmed, we calculated cluster means for each job attribute and entry and exit feature, and then conducted multivariate and univariate F tests to examine whether the cluster means were significantly different in the hypothesized direction for the clusters.

Results

Relationship between IT Job Orientation and ILM Strategies (Hypothesis 1)

We hypothesized in Hypothesis 1 that organizations adopt industrial ILM strategies for managerially-oriented IT jobs and craft ILM strategies for technically-oriented jobs. Beale's F-test indicated that a two-cluster solution sufficiently explained the variation in the data (F_2 = 4.56, $p < 0.01$). Visual inspection of the cluster assignments indicates that the managerially-oriented jobs are in the first cluster, and the technically-oriented jobs are in the second cluster (Table 6).

The calculated cluster means for each job attribute and entry feature show significant differences overall (Hotelling's T = .575, F = 12.30, $p < 0.01$) with job attributes and entry features different in the hypothesized direction (Table 7).

Table 6. Cluster Membership for ILM Strategies for IT Jobs

IT Job	Hypothesized Cluster Membership	Actual Cluster Membership
Chief Information Officer (CIO)	Industrial	Industrial
Applications Manager (AM)	Industrial	Industrial
Project Leader/Analyst (PLA)	Craft	Craft
Programmer (PGM)	Craft	Craft
Infrastructure Manager (IM)	Industrial	Industrial
Database Administrator (DBA)	Craft	Craft
Network Specialist (NWS)	Craft	Craft
Systems Programmer (SP)	Craft	Craft

Note: Beale's $F(1,2) = 4.56$, $p < 0.01$; $F(2,3) = 2.76$, $p > 0.05$.

Table 7. Differences in Job Attributes & Features Across ILM Strategies for IT Jobs

	Industrial	Craft	Managerial Jobs Mean (s.d.)	Technical Jobs Mean (s.d.)	Univariate F value	p-value
Entry from Within the Organization	High	Low	2.67 (1.80)	2.54 (1.79)	0.13	0.34
Entry from Outside the Organization	Low	High	3.53 (2.03)	5.12 (1.71)	56.32	0.01
Minimum Level of Education	High	Low	4.21 (0.71)	3.65 (0.67)	50.53	0.01
Months required for average Proficiency	High	Low	3.81 (2.25)	4.13 (2.75)	1.04	0.16
Skill Specificity	High	Low	3.68 (1.03)	3.50 (1.02)	2.41	0.05
Importance of Personality	High	Low	5.58 (1.01)	4.68 (0.98)	52.79	0.01
Importance of Merit (%)	High	Low	76.56 (25.26)	70.17 (29.12)	2.55	0.05
Extent of Control	High	Low	5.80 (0.96)	4.86 (1.01)	55.49	0.01
Annual Turnover Rate (%)	Low	High	6.27 (11.14)	8.30 (10.08)	9.64	0.01
Expected Tenure (Years)	High	Low	9.68 (10.83)	5.27 (8.57)	13.00	0.01

Note: p values for univariate F tests. The multivariate Hotelling's T is .575, F = 12.30, p < 0.01, n=328.

Table 8 shows the means and standard deviations of the job attributes and features for each IT job position. As evident in this table, the managerial jobs (CIO, Application Development Manager, and Infrastructure Manager) each individually have job attributes and entry features that are of similar levels and that differ from those of the technical jobs (Project Leader/Analyst, Programmer, Network Specialist, Database Specialist and Systems Programmer) in predicted direction. In sum, the results confirm that, as hypothesized, the managerially-oriented IT jobs have the attributes of an industrial ILM, and the technically-oriented IT jobs have the attributes of a craft ILM.

Table 8. Job Attributes & Features For Each IT Job Across All Organizations

	Managerially-Oriented Jobs with Industrial ILM Strategy			Technically-Oriented Jobs with Craft ILM Strategy				
	CIO Mean (s.d.)	AM Mean (s.d.)	IM Mean (s.d.)	PLA Mean (s.d.)	PGM Mean (s.d.)	DBA Mean (s.d.)	NWS Mean (s.d.)	SP Mean (s.d.)
Entry from Within the Organization	2.93 (2.12)	2.69 (1.65)	2.67 (1.56)	2.52 (1.60)	2.50 (1.97)	2.34 (1.68)	2.48 (1.86)	2.43 (1.84)
Entry from Outside the Organization	3.07 (1.92)	3.82 (2.02)	3.72 (2.12)	4.71 (1.77)	5.44 (1.65)	4.94 (1.91)	4.96 (1.61)	5.53 (1.53)
Minimum Level of Education	4.42 (0.87)	4.12 (0.56)	4.08 (0.62)	3.93 (0.47)	3.45 (0.71)	3.69 (0.64)	3.64 (0.66)	3.52 (0.78)
Months required for average Proficiency	4.28 (2.88)	3.54 (1.69)	3.62 (2.01)	4.25 (3.88)	3.85 (2.34)	4.30 (2.43)	3.66 (2.20)	4.61 (2.60)
Skill Specificity	3.77 (1.10)	3.65 (1.01)	3.62 (1.00)	3.40 (1.04)	3.37 (0.97)	3.55 (0.91)	3.61 (1.14)	3.45 (1.03)
Importance of Personality	5.69 (0.98)	5.54 (0.91)	5.50 (1.15)	4.38 (0.65)	4.78 (0.93)	4.34 (0.94)	4.47 (0.96)	4.39 (1.00)
Importance of Merit (%)	78.82 (21.1)	75.86 (26.3)	74.99 (28.29)	70.79 (28.2)	71.18 (29.5)	69.46 (29.43)	69.07 (30.44)	70.39 (29.49)
Extent of Control	6.07 (0.84)	5.78 (0.78)	5.52 (1.17)	5.04 (0.93)	4.49 (1.07)	5.01 (1.00)	4.94 (1.00)	4.81 (0.99)
Annual Turnover Rate (%)	5.81 (7.09)	6.30 (6.08)	5.61 (5.88)	8.00 (9.39)	9.38 (14.60)	8.45 (9.53)	8.00 (8.60)	7.74 (7.62)
Expected Tenure (Years)	10.45 (9.05)	9.76 (6.80)	9.17 (9.81)	5.63 (5.05)	4.24 (9.17)	6.63 (11.05)	6.54 (9.13)	5.17 (5.85)

Table 9. Cluster Membership Across Organizations

Organizational Group#	Organization Type	Hypothesized Cluster Membership (Hypothesis#)	Actual Cluster Membership
1	Not-for-Profit	Industrial (H3)	Industrial
2	IT Producer	Industrial (H4)	Craft
3	IT User, IT Critical	Industrial (H5)	Industrial
4	IT User, IT Support	Craft (H6)	Craft

Note: Beale's $F(1,2) = 2.85$, $p < .01$; $F(2,3) = 1.66$, $p > .10$.

Relationship between ILM strategies and IT Turnover (Hypothesis 2)

We hypothesized in Hypothesis 2 that managerially-oriented IT jobs have lower turnover and higher expected tenure in the organization relative to technically-oriented IT jobs. A test of the cluster means on exit features indicate that turnover rates and expected tenure are significantly different between the clusters (turnover: $F = 9.64$, $p < 0.01$; tenure: $F = 13.00$, $p < 0.01$). Table 7 shows that the managerially-oriented IT jobs have lower turnover and higher expected tenure than the technically-oriented IT jobs, as hypothesized.

Organizational Contingencies and ILM Strategies for Technically-Oriented IT Jobs

(Hypotheses 3, 4, 5 & 6)

Finally, we hypothesized that not-for-profit organizations (Hypothesis 3), IT producers (Hypothesis 4), and IT users where IT plays a critical role (Hypothesis 5) prefer to ensure predictability of IT resources, and would therefore adopt industrial ILM strategies for their technically-oriented IT jobs to dampen turnover. In contrast, we hypothesized that IT user organizations where IT plays a supporting role (Hypothesis 6) would prefer flexibility or cost minimization and would thus retain the craft-ILM strategy for their technically-oriented IT jobs because a craft-ILM strategy would enable them to easily expand and contract their IT workforce.

Beale's F-test indicated that a two-cluster solution sufficiently explained the variation in the data ($F_2 = 2.85$, $p < 0.01$). A visual inspection of the cluster assignments indicates that the not-for-profit and IT user organizations where IT is critical are in the first cluster, and that the IT producers and IT user organizations where IT plays a supporting role are in the second cluster (Table 9). The calculated cluster means for each job attribute and entry feature show significant overall differences (Hotelling's $T = 3.728$, $F = 11.19$, $p < 0.01$). The accompanying multivariate and univariate analyses provide support for Hypotheses 3, 5, and 6 (Table 10). We find that as hypothesized (Hypothesis 3), technically oriented IT jobs in the not-for-profit organizations are in the industrial ILM cluster. Also consistent with our hypotheses, technically oriented IT jobs in IT user organizations where IT is a critical function are in the industrial ILM cluster (Hypothesis 5), and those in IT user organizations where IT is a support function are in the craft ILM cluster (Hypothesis 6). However, contrary to our hypothesis (Hypothesis 4), IT producers are in the craft ILM cluster. Table 11 shows the means and standard deviations of the job attributes and features for each organization type.

Discussion

Relationship between IT Jobs, ILM strategies, and IT Turnover

The results from the confirmatory cluster analysis support Hypotheses 1 and 2, and suggest that IT professionals in organizations cannot simply be classified as falling under one ILM strategy. In fact, there are significant variations in ILM strategies within an organization. The managerially-oriented IT jobs are classified within an industrial ILM strategy exhibiting relatively low levels of turnover, while the more technically-oriented IT jobs exhibit characteristics of a craft ILM strategy with relatively high levels of turnover.

Further, the cluster of managerially-oriented IT jobs has the job attributes of an industrial ILM, and the cluster of technically-oriented IT jobs has the job attributes of a craft ILM. As suggested by Osterman (1984) and reflected in our data, managerially-oriented IT jobs have relatively long tenure and low turnover rates. For example, the average annual turnover rate is 6.27%, and the average expected tenure is 9.68 years for IT managerial jobs (Table 7). In terms of entry features and job attributes, managerially-oriented IT jobs have lower entry from outside the organization, higher levels of required education, higher levels of skills specificity, higher importance of personality, higher importance of merit & promotion, and greater extent of control.

Turning to the cluster of technically-oriented IT jobs, our results indicate that the craft ILM dimensions are dominant. The more technically-oriented IT jobs are characterized by open entry to external labor market forces, thus leading to high mobility of IT professionals belonging to this cluster. This is reflected in high turnover rate (average turnover rate is 8.30%) and low

Table 10. Means for Organizations' Choices for IT Technically-Oriented Jobs by Cluster

	Industrial	Craft	Not-for-Profits & IT Users (IT is Critical) Mean (s.d.)	IT Producers & IT Users (IT is Support) Mean (s.d.)	Univariate F value	p-value
Entry from Within the Organization	High	Low	3.40 (1.67)	1.71 (1.29)	9.17	0.01
Entry from Outside the Organization	Low	High	4.48 (1.20)	5.82 (1.61)	13.04	0.01
Minimum Level of Education	High	Low	3.69 (0.37)	3.36 (0.67)	3.76	0.05
Months required for average Proficiency	High	Low	4.67 (2.04)	3.45 (2.15)	3.75	0.05
Skill Specificity	High	Low	3.88 (0.71)	3.19 (0.90)	7.64	0.01
Importance of Personality	High	Low	4.28 (0.83)	4.59 (0.69)	1.67	0.20
Importance of Merit (%)	High	Low	54.90 (34.51)	81.41 (13.01)	10.39	0.01
Extent of Control	High	Low	4.72 (0.86)	4.73 (0.93)	0.01	0.98
Annual Turnover Rate (%)	Low	High	5.51 (2.62)	12.58 (12.27)	6.66	0.01
Expected Tenure (Years)	High	Low	14.09 (8.00)	3.40 (1.83)	33.98	0.01

Note: p values for univariate F tests. The multivariate Hotelling's T is 3.728, F = 11.19, $p < 0.01$, n=41.

Table 11. Job Attributes & Features for IT Technically-Oriented Jobs by Organization Type

	Industrial ILM Strategy for IT Technical Jobs		**Craft ILM Strategy for IT Technical Jobs**	
	Not-for-Profits (s.d.)	IT Users, IT Critical (s.d.)	IT Producers (s.d.)	IT Users, IT Support (s.d.)
Entry from Within the Organization	3.26 (2.25)	2.95 (1.41)	2.61 (1.62)	1.45 (0.66)
Entry from Outside the Organization	4.85 (1.60)	4.33 (1.16)	5.40 (1.15)	5.88 (1.94)
Minimum Level of Education	3.64 (0.45)	3.76 (0.28)	3.61 (0.78)	3.10 (0.34)
Months required for average Proficiency	5.22 (2.95)	4.49 (1.10)	2.61 (1.33)	3.05 (1.91)
Skill Specificity	3.47 (0.82)	3.74 (0.65)	3.70 (1.05)	3.28 (0.93)
Importance of Personality	4.15 (1.02)	4.40 (0.46)	4.88 (0.66)	4.29 (0.68)
Importance of Merit (%)	52.51 (38.39)	62.90 (32.48)	77.12 (15.73)	84.63 (11.27)
Extent of Control	4.82 (1.19)	4.54 (0.42)	5.20 (0.83)	4.25 (0.65)
Annual Turnover Rate (%)	4.63 (5.36)	5.01 (1.34)	10.53 (7.80)	15.54 (14.11)
Expected Tenure (Years)	11.51 (9.35)	12.50 (9.10)	8.71 (6.44)	2.89 (1.11)

expected tenure (the average tenure is 5.27 years). In terms of entry features and job attributes, technically-oriented IT jobs have higher entry from outside the organization, lower levels of required education, lower levels of skills specificity, lower importance of personality, lower importance of merit and promotion, and lower extent of control as compared to managerially-oriented jobs (Table 7).

Organizational Contingencies and ILM strategies for Technically-Oriented IT Jobs

The results from the confirmatory cluster analysis to test Hypotheses 3 to 6 suggest that there are significant differences in how organizations organize their technically-oriented IT jobs. Our cluster analysis reveals two clusters: as shown in Table 10, the turnover rate in the first cluster (5.51%) is significantly lower than in the second cluster (12.58%), and the expected tenure is greater in the first cluster than in the second cluster (14.1 years versus 3.4 years), suggesting that the first cluster of organizations has adopted an industrial ILM strategy while the second cluster has adopted a craft ILM strategy. In addition, the values shown in Table 10 for the job attributes of entry from within, entry from outside, minimum level of education, months for proficiency, and skill specificity provide further support that the first cluster of organizations has adopted an industrial ILM strategy for their technical IT professionals, and the second cluster of organizations has adopted a craft ILM strategy.

We predicted in Hypothesis 3 that not-for-profit organizations would adopt industrial ILM strategies for their technically-oriented IT jobs. Our results support this hypothesis. Not-for-profit organizations have a significantly lower annual turnover rate (4.63%) and higher tenure (11.5 years) than do organizations in the craft ILM cluster. For not-for-profit organizations, our results can be explained by the fact that the philosophy is to keep their employees for as long as possible and to avoid high turnover of their staff because of the work rules and implicit employment guarantees governing the human resource philosophy in not-for-profit organizations. Thus, it can be said that these organizations have industrialized the otherwise craft-ILM characteristics of their technically-oriented IT jobs. Not-for-profits do this by minimizing the number of ports of entry from outside the organization. These organizations tend to hire IT professionals at the entry level, provide them with extensive training, and then move them up the organizational ladder. To illustrate, Table 11 shows that the not-for-profits have the highest level of hiring from within the organization. Job security is also a hallmark of not-for-profit organizations, and is ensured through promotions that are often tied to organizational tenure rather than job performance. This practice is reflected in the importance of merit and personality for promotion in not-for-profits (Table 11), which have the lowest values relative to the other organizations. Therefore, by closing ports of entry from outside the organization, by providing training, and by ensuring job security through promotions, these organizations have succeeded in placing their IT technically-oriented jobs in an industrial ILM, reducing their high turnover rate.

Like the not-for-profit organizations and consistent with Hypothesis 5, IT users where IT is a critical function have relatively lower annual turnover rates (5.01%) and higher expected tenure (12.5 years) for their technical IT professionals than do organizations in the craft ILM cluster. IT user organizations where IT is critical, have also adopted an industrial ILM strategy for technical jobs to avoid losing their technical staff. As reflected in relatively higher values for the job attributes shown in Table 11, including entry from within, minimum level of education, skill specificity and months for average proficiency, these organizations focus on closing ports of entry, providing extensive training, constructing elaborate internal job ladders and concentrating on internal promotions.

We now consider those organizations that have adopted craft ILM strategies for their technically-oriented IT jobs. As we had hypothesized (Hypothesis 6), IT user organizations where IT plays a supporting role will tend to adopt a craft ILM strategy for their technically oriented IT jobs. Compared to other types of organizations, IT users where IT is a support function have the highest annual turnover rates (15.54%) and the lowest expected tenure (2.9 years) of their technical IT professionals. For organizations where IT is a support function, the focus is on cost minimization and flexibility in hiring and layoffs. Thus, a craft ILM strategy is preferred to take advantage of cost savings in training and flexibility in the acquisition of IT human resources.

Finally, we consider the IT producers. Our study reveals a surprising and unexpected finding for IT producers: they have adopted a craft ILM strategy for their technically-oriented IT jobs. We had hypothesized that in such organizations, IT is a core competence, and thus these organizations would prefer the stability and lower turnover associated with an industrial ILM strategy (Hypothesis 4). However, as can be observed from Table 11, these organizations have significantly higher turnover (at an annual rate of 10.53%, almost double the rate for the organizations in the industrial cluster) with an average expected tenure of 8.7 years. In addition, although IT professionals in IT producing organizations have high levels of control over their work, and greater importance of personality and merit in promotion (which are characteristic of an industrial ILM strategy), IT producers are also very open to outside entries into different jobs, require less organization-specific skill, and have the lowest number of months required for proficiency (all of which are characteristics of a craft ILM strategy). Hence, it appears that IT producer organizations have primarily adopted the craft ILM strategy for their IT human resources, even though they have to bear with the problem of high turnover among their technical IT professionals.

One potential explanation for this result is that for the IT producers, the continual need for "cutting-edge" IT skills could drive their choice of ILM strategy. Organizations that operate on the technology frontier experience rapid growth, volatile environments, and the constant demand for new, "cutting-edge" IT skills because IT knowledge, skills, and abilities quickly degrade. Such organizations do not usually have the luxury of time and resources to continually re-train existing employees when their skills become obsolete (Cappelli, 1995). A craft ILM strategy affords these organizations flexibility in quickly acquiring new IT skills and discarding obsolete IT skills. These organizations are extremely open to outside entry, and are also relatively "flat" in their organizational hierarchy. Such organizations rely on turnover to continually refresh their IT capabilities.

Conclusions and Implications

This study has employed the ILM model to analyze the variations in the internal human resource strategies of organizations for their IT professionals and to relate these strategies to IT turnover. First, we classified the IT profession into eight general jobs based on the nature of work and skill requirements. We then observed the variations in the ILM strategies among these IT jobs across forty-one different organizations. We found that managerially-oriented IT jobs clustered under an industrial ILM strategy while the technically-oriented IT jobs clustered under a craft ILM strategy. Our results also show that the industrial ILM strategy experienced higher retention of IT professionals than the craft ILM strategy. Second, we analyzed the variations across organizations and found that some organizations chose to organize their technically-oriented IT jobs in a craft ILM strategy while other organizations preferred an industrial ILM strategy. Differences in the need for flexibility, cost minimization and predictability as manifested in institutional and industry factors and the focus on IT were associated with an organization's choice of a particular ILM strategy for its technically-oriented IT jobs.

Theoretical and Practical Contributions

Our study has a number of strengths and makes important theoretical and practical contributions in the examination of the antecedents of IT turnover. Theoretically, to the best of our knowledge, this is the first study that uses an ILM strategic perspective to study the phenomenon of IT turnover. The results of this study demonstrate that turnover is related to the type of ILM strategy under which a particular IT job is placed. We find that IT jobs organized under craft ILM strategies are associated with higher turnover than those organized under industrial ILM strategies. In addition, our study provides insight into why organizations choose different ILM strategies. An organization can influence the rate of turnover of its IT professionals by choosing particular ILM strategies.

In many respects, our findings complement research on turnover from the individual perspective. For example, our finding that technically-oriented IT jobs have higher turnover relative to managerially-oriented IT jobs is consistent with the result that programmers have higher turnover intentions than do IT managers (Igbaria & Siegel, 1992). In addition, our results indicate that use of an industrial ILM strategy with its emphasis on hiring from within the organization is associated with lower IT turnover. This is congruent with findings that perceptions of promotability opportunities within the organization influence an individual's turnover intentions (Igbaria & Greenhaus, 1992).

Practically, our study suggests that organizations choose an ILM strategy based on their primary needs in managing IT human capital. Organizations that need to achieve either timeliness in the acquisition of new IT skills or to minimize personnel costs organize their IT professionals under a craft ILM strategy to reduce costs of re-training and to maximize their flexibility in hiring and firing. On the other hand, organizations that rely on predictability of their IT workforce implement an industrial ILM strategy that would lower turnover so that they can plan their IT strategies more confidently.

Limitations and Suggestions for Future Research

This study differs from prior work on IT turnover in two important ways that suggest future research opportunities. The first important difference is that we study actual turnover, not intent to turnover that is the predominant focus of interest in IT turnover research (Joseph & Ang, 2003). Empirical studies of turnover in the organizational behavioral literature suggest that intent to turnover can be poorly correlated with actual turnover because of moderating organizational, industry and labor market effects. Further research of IT turnover should thus include studies that assess the relationship between intent to turnover and actual turnover.

Another key difference is that we focus on structural characteristics, specifically internal labor market factors rather than individual perceptions, and find that structural factors exert significant influences on IT turnover. In this study, we have examined labor market characteristics that are internal to the organization. However, turnover can also be affected by labor market forces in the external environment. For example, research in psychology and organizational behavior has shown that actual turnover is also strongly influenced by external labor market attributes such as mobility and availability of jobs (Hom & Kinicki, 2001; Kirschenbaum & Mano-Negrin, 1999; Lee & Mitchell, 1994; Lee et al., 1999; Trevor, 2001). The importance of external labor market parameters in influencing actual turnover patterns has also been suggested by Cappelli (1995), Steel & Griffeth (1989), and Carsten & Spector (1987). In particular, meta-analyses by Hom & Griffeth (1995), and Griffeth et al. (2000) found that changes in labor market conditions such as alternative job opportunities, although distal causes of turnover, are mediated through individuals' perceptions of job alternatives and subjective comparisons of alternatives to their present position to predict turnover modestly at a meta-analytic population correlation of .12. This implies that future research on the structural determinants of IT turnover should juxtapose both internal labor market factors as we have examined in this study, and external industry and labor market determinants.

Finally, as with all research, ours was conducted on a restricted sample. In our design, we adopted a purposive sampling strategy, interviewed forty-one organizations to ensure both theoretical and literal replication (Yin, 1994), and collected data from multiple sources within each organization. We suggest future research to examine the internal labor market strategies in other organizations to determine the extent to which the results from our study generalize to organizations outside of our sample.

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Appendix A: Questionnaire

The following items were used in the questionnaires and structured interviews.
Note that every item was completed for each of the eight IT jobs.

A. The Entry Features of Internal Labor Market Strategies

1. Entry from Within Company (1=not at all, 7=all the time):
   - How common is entry into this job from outside the company?
2. Entry from Outside Company (1=not at all, 7=all the time):
   - How common is entry into this job from another ladder elsewhere in the company?

B. Job Attributes of Internal Labor Market Strategies

3. Education Requirements (1=high school diploma; 2=high school degree; 3=community college education; 4=some college education; 5=college degree; 6= masters; 7=PHD):
   - What is the minimum level of education required for the job?
4. Length of Time for Average Proficiency (absolute number):
   - On the average, how many months do new entrants need to acquire proficiency to perform the job?
5. Skill Specificity (1=strongly disagree; 7=strongly agree):
   - If you can do the job in one company, then you can quickly perform as well at another.
   - Although skills may seem similar, each company's procedures are so different that movement among them involves substantial retooling.
6. Importance of Personality (1=strongly disagree; 7=strongly agree):
   - Personality and manner are as important as skills in this job.
   - If a person gets along well with his fellow workers, then (s)he is well on the road to being successful at this job.
7. Importance of Merit (absolute number):
   - What % weight does merit (how well you perform on the job) have in promotion for this job?
8. Extent of Control (1=strongly disagree; 7=strongly agree):
   - Employees can control their pace of work.
   - Employees are often left to their own judgment as to how to handle problems.
   - People set their own goals for each day's work.

C. The Exit Features of Internal Labor Market Strategies

9. Exit - Turnover Rate (absolute number):
   - What is the average annual turnover rate (%) for this job over the last 3 years?
10. Exit - Tenure (absolute number):
    - What is the expected number of years a new hire will remain in the company?