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and Antecedents of
Turnover Intentions
among IT Professionals**

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The Measurement and Antecedents of Turnover Intentions among IT Professionals*

Guy Paré[†], Michel Tremblay[‡]

Résumé / Abstract

Dans cette étude, nous présentons et testons un modèle de recherche portant sur la rétention des spécialistes en TI. Ce modèle examine les relations entre diverses pratiques de GRH, les comportements discrétionnaires, l'engagement organisationnel et les intentions de quitter des spécialistes en TI. Un questionnaire fût développé et envoyé aux membres de la Fédération de l'Informatique du Québec (FIQ). Les données de 394 questionnaires ont servi aux fins d'analyses statistiques. Nous présentons et discutons les résultats obtenus et faisons une série de recommandations aux hauts dirigeants en TI et en RH.

The purpose of this study is to present and test an integrated model of turnover intentions that addresses the unique nature of the IT profession. We identified a multidimensional set of HR practices likely to increase retention among IT employees and considered citizenship behaviors as well as two distinct types of organizational commitment as key antecedents of turnover intentions. A questionnaire was developed and sent to the Quebec members of the Canadian Information Processing Society. Data from 394 respondents were used to validate the measures and test our research model. We present and discuss the results and make a series of recommendations for IT and HR executives.

Mots Clés : Gestion du personnel en TI, roulement du personnel en TI, attitudes

Keywords: IS staffing issues, IS turnover, attitudes

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1. INTRODUCTION

The past few years have been the most threatening period for enterprises that use, manage or deal in information technology (IT) or IT services. The source of the tumult has been people – i.e. the demand, supply, selection, recruitment and especially retention of IT professionals worldwide (Ermel and Bohl 1997; Morello 1998; Guptill *et al.* 1999). Since late 1996, the labor market for IT professionals has reached a fever pitch: IT professional compensation has soared, turnover has rocketed to 15% to 20% annually, job-hopping has become the norm and only eight out of ten IT positions get filled with qualified candidates (McNee *et al.* 1998). These trends place both IT executives and Human Resources (HR) managers under intense pressure. The risks are effectively high, not only for the IT department, but for the business as a whole. At stake is nothing less than growth, competitive positioning and the strength of the global economy.

The problems in the IT labor market will not go away for many years. Through 2004, market demand for relevant IT skills and know-how will continue to outstrip supply (Morello and Claps 2000). During that difficult period, senior HR executives and IT executives must work together to correct or refine corporate policies that inhibit retention and recruitment. Recent literature reveals that a heavy investment in the human capital and the implementation of HR practices may contribute to organizational success (Pfeffer and Veiga 1999), specifically by reducing the turnover of the IT staff (Agarwal and Ferratt 1999; Roepke *et al.* 2000). As the demand for IT professionals increases, so does the pressure on IT and HR managers to design innovative strategies for retaining talent (King and Calloway 1995). The purpose of the present study is to present and test an integrated model of turnover intentions that addresses the unique nature of the IT profession. We identified a multidimensional set of HR practices likely to increase retention among IT employees and considered citizenship behaviors as well as two distinct types of organizational commitment as key antecedents of turnover intentions. Precisely, this study addresses four research questions: 1) What are the essential HR practices necessary to create an effective plan for retaining IT professionals? 2) What is the impact of compensation and negotiation conditions on the turnover intentions of IT personnel? 3) What is the effect of employee demographic characteristics on the turnover intentions of IT personnel? and 4) Do organizational commitment and citizenship behaviors mediate the effects of HR practices, compensation and negotiation conditions as well as demographic characteristics on the turnover intentions of IT personnel?

2. RESEARCH MODEL

Conceptual and empirical models of turnover intentions provide strong support for the proposition that behavioral intentions constitute the most immediate determinant of actual behavior (Fishbein and Ajzen 1975; Triandis 1980), in the present case turnover (e.g., Lee and Mowday 1987; O'Reilley and Caldwell 1981). Previous IT empirical studies on turnover have used intent to leave rather than actual turnover behavior as a criterion variable (Baroudi 1985; Igarria and Greenhaus 1992; Guimaraes and Igarria 1992; Igarria and Guimaraes 1999). These researchers evoked, among other factors, the modest costs associated with collecting turnover intention statements. Additionally, turnover

intentions which are under more individual control can provide results much more quickly, and are less difficult to predict than actual turnover (Price and Bluedorn 1977). For these reasons, turnover intentions have been used in the present study.

Figure 1 presents the integrated model of turnover intentions tested in this study. The model comprises six sets of variables: 1) HR management practices including recognition, empowerment, procedural and distributive justice, competence development, work-family policies, and information sharing; 2) compensation conditions including salary, annual bonus, recruitment bonus, and Y2K retention bonus as well as one negotiation condition, namely, the number of formal job offers; 3) demographic characteristics including age, education, and organizational tenure; 4) organizational commitment; 5) organizational citizenship behaviors (OCB); and 6) turnover intentions. Our model predicts direct effects of HR practices, demographic characteristics and compensation and negotiation conditions on organizational commitment and turnover intentions. HR practices are also expected to have direct effects on OCB. We further predict direct effects of organizational commitment on OCB and turnover intentions as well as direct effects of OCB on turnover intentions. Last, in addition to the direct effects, our model posits indirect effects of HR practices, demographics as well as compensation and negotiation conditions on turnover intentions through OCB and/or organizational commitment. Since indirect effects are composites of direct effects, only direct effects are presented as hypotheses. The rationale for each hypothesis in the model is presented below.

Insert Figure 1 about here

Organizational Commitment

A number of empirical studies confirm the important role of organizational commitment in the turnover process for IT personnel (Igarria & Greenhaus 1992; Igarria and Guimaraes 1999). They posit that IT employees who are highly committed to their organization are less likely to leave than those who are relatively uncommitted. In the OB literature, organizational commitment was found to comprise three distinct dimensions: affective, continuance and normative commitment (Meyer and Allen 1997). First, affective commitment corresponds to an employee's personal attachment and identification to the organization resulting in a strong belief in an acceptance of the organization's goals and values. Employees with a strong affective commitment continue employment with the organization because they *want* to do so. Second, continuance commitment is conceived as a tendency to engage in consistent lines of activity based on the individual's recognition of the "costs" associated with discontinuing the activity. Employees whose primary link to the organization is based on continuance commitment remain because they *need* to do so. Third, normative commitment suggests that employees exhibit behaviors solely because they believe it is the right and moral thing to do. Employees with a high level of normative commitment feel that they *ought* to remain with the organization. Prior studies of turnover intentions among IT personnel have only considered the first and most studied component of the construct, namely, affective commitment (e.g., Igarria and Greenhaus 1992; Igarria and Guimaraes 1999). In the

present study, we decided to push further our understanding of the mediating role of organizational commitment and hence, we considered both affective and continuance commitment. We omitted to include normative commitment for three primary reasons: 1) affective and normative commitment are significantly correlated with each other (e.g. Meyer *et al.* 1993, Sommers 1995); 2) past research showed a strong overlapping in the determinants and consequences of both constructs (Meyer *et al.* 1993); and 3) in general, prior findings in the OB literature are much more conclusive for the affective dimension than for the normative one (e.g., Bolon 1997).

Past research showed a negative relationship between affective commitment and turnover intentions (Meyer *et al.* 1993). In this light, the more employees identify themselves with the organization, the greater is their intention to stay. These authors also found a negative correlation between continuance commitment and the criterion variable. One explanation for the latter result is that some individuals may not want to quit their organization even if they are not emotionally attached to it because working conditions are simply too good. Sommers (1995) and Chen *et al.* (1998) also found negative relationships between both types of commitment and turnover intentions. Interestingly, both empirical studies found a stronger relationship between affective commitment and turnover intentions than between continuance commitment and turnover intentions. These results suggest that employees are more willing to remain in an organization when they have an emotional attachment to the organization than when they perceive a cost of leaving it.

To summarize, Hypothesis 1 predicts that organizational commitment has a direct effect on turnover intentions of IT personnel. Specifically, affective commitment (H1a) and continuance (H1b) commitment are expected to be negatively related to turnover intentions. We also posit that the link between affective commitment and turnover intentions is stronger than the relationship between continuance commitment and turnover intentions (H1c).

Organizational Citizenship Behavior

OCB is considered a key element of organizational effectiveness. It is defined as an employee's willingness to go above and beyond the prescribed roles which they have been assigned (Organ 1990). These extra-role behaviors are considered as a contribution to the maintenance and enhancement of the social and psychological context that supports task performance in the organization (Organ 1997). At the same time, such discretionary behaviors are not explicitly recognized by a formal rewards system, and their contribution to organizational success is based on resource transformations, innovativeness and adaptability (Organ 1988).

To date, the link between OCB and turnover has not received the attention it deserves. To our knowledge, only Chen *et al.* (1998) empirically tested this relationship. The results of their study revealed a negative relationship between OCB and turnover intentions and an even stronger association between OCB and actual turnover. Chen *et al.* (1998) argue that a high level of OCB "reflect employees' true willingness regarding how much they want to be involved in, or how much they like to be distant from, the organization" (p.924).

This form of employee behavioral withdrawal could thus be considered as an antecedent of turnover intention.

According to Williams & Anderson (1991), citizenship behaviors can be directed at the organization (OCBO) (e.g., carrying out role requirements well beyond minimum required levels) and/or they may benefit specific individuals (OCBI) (e.g., helping a specific other person with a relevant task) and contribute only indirectly to the organization. However, OCB has frequently been treated as a unidimensional construct (e.g., Bateman & Organ, 1983; George 1991), which may have led to results that are difficult to interpret. The present study is the first to investigate the mediating influence of OCB on turnover intentions of IT specialists. In light of the preliminary findings, Hypothesis 2 posits that citizenship behaviors have a direct effect on turnover intentions. Precisely, we predict that both OCBI (H2a) and OCBO (H2b) are negatively related to turnover intentions of IT personnel.

While few researchers have examined the nature of the association between OCB and turnover, several empirical studies have tested the link between organizational commitment and OCB. Allen and Smith (1987) and Meyer and Allen (1991) found that self-report measures of OCB correlated positively with affective commitment and negatively with continuance commitment. Meyer *et al.* (1993) tested the influence of commitment on OCB among a population of registered nurses. They found a significant positive correlation between affective commitment and OCB. More recently, Organ and Ryan (1995) and Chen *et al.* (1998) also identified a positive link between OCB and organizational commitment. However, a meta-analysis conducted by Organ and Ryan (1995) asserted that only affective commitment was related to OCB. A plausible explanation for this result is that employees are willing to invest their time and energy in OCB activities if and only if they are emotionally attached to the organization. In light of these empirical results, Hypothesis 3 predicts that organizational commitment is associated with OCB. Specifically, we posit that affective commitment will be positively related to OCBI (H3a) and OCBO (H3b). Moreover, we expect no significant relationship between continuance commitment and OCBI (H3c) and OCBO (H3d).

HR practices

Although sets of innovative HR practices were recently proposed to enhance effectiveness in organizations and to retain talented employees (Arnett and Obert 1995; Pfeffer and Veiga 1999; Dessler 1999), the configurations of such practices are narrowly focused and these suggestions are often not theoretically grounded. For example, Stokes (1995) identified team-based reward and recognition practices as a major factor; and Gilliam (1994) recommended that IT managers focus on moving computer people out into the user community, offering non cash inducements, and stressing teamwork. In our view, the conceptual model of Lawler (1986) may be a good starting point. McMahan, Bell and Virick (1998) argue that this model is the primary contributor to the evolution of contemporary strategic HR management. Precisely, Lawler (1986) suggests that four organizational processes may influence work-related attitudes and behaviors, namely, information-sharing, empowerment, competence development and reward. However,

recent studies have shown that *reward* is a complex process that may not be fully understood without taking into account some of its underlying dimensions, namely the distributive, procedural and recognition aspects (Sheppard *et al.* 1992; Milkovich and Newman 1998). In addition, recent literature suggests that work-family conflict is a critical challenge for an organization owing to its consequences on individual attitudes and behaviors (Chiu and Ng 1999). Greater individual and organizational effectiveness is expected when all these processes are spread throughout the organization. The present study examines seven HR practices that an organization can employ to increase commitment, favor extra-role behaviors and decrease turnover intentions among IT employees. We will define and illustrate each of these practices in turn.

First, for most IT professionals, a significant part of their motivation comes from the recognition they get from managers for a well job done and the feeling that they are an important part of the organization (Agarwal and Ferratt 1999; Gomolski 2000). In this study, *recognition practices* refer to non-monetary means (e.g., extended vacations, tickets to a baseball game, organizational recognition events) and monetary ways (e.g., spot cash awards) by which an organization tangibly signals its appreciation of outstanding performances and accomplishments. Second, Agarwal and Ferratt (1999) found that successful IT organizations are devoting resources toward *empowering* IT professionals to take increasing responsibility for their work and for decision making. Third, we posit it is easier to recruit and retain people in an organization where IT professionals have a sense of equity. In this study, we distinguish between distributive and procedural justice. *Distributive justice* refers to the perceived fairness with regard to issues such as mandates, compensation conditions, performance evaluations and promotions while *procedural justice* relates to the perceived equity of the means used to determine mandates assignments, compensation conditions as well as evaluation and promotion criteria (Folger 1977). Fourth, *competence development practices* (e.g. job rotation programs, mentoring, training) convey to the employees that the organization considers human resources to be a competitive advantage (Schwochau *et al.* 1997), and that it is seeking to establish a long-term relationship with employees (Tsui *et al.* 1995). That signal is likely to be an important factor in retaining productive IT professionals (Guptill 1998; Agarwal and Ferratt 1999). Fifth, with the shortfall of IT staff not expected to disappear in the near term, it is sensible business practice to accommodate those employees who may not join the workforce for a typical 9-to-5 workday because of other constraints in their personal life (Agarwal and Ferratt 1999). Here, *work-life policies* correspond to work conditions provided by organizations to take into account the needs of the IT workforce and to minimize the consequences of conflict between the work and family issues ((Honeycutt and Rosen 1997; Kopelman *et al.* 1983). Last, IT professionals need to be made aware of the larger context within which their work fits and to develop a sense of community (Agarwal and Ferratt 1999). One path to accomplish this is through *information sharing* practices (e.g., group meetings to discuss timely issues) which aim at clarifying the expectations of the organization along with efforts made by the organization to listen to preoccupations and employee suggestions.

All seven practices have been found to be positively related to affective commitment (Grover and Crooker 1995; Rodwell *et al.* 1998; Smith 1995; Fiorito *et al.* 1997; Chen *et*

al. 1998). Further, researchers found a positive relationship between continuance commitment and distributive justice (Meyer and Allen 1990; Ward and Davis 1995). As in the case of affective commitment, all HR practices, except work-family policies, have been determined to have a direct and positive impact on OCB (Morrisson 1996; Cappelli and Rogovsky 1998; Allen and Rush 1998; Schnake *et al.* 1995; Konovsky and Pugh 1994; Tremblay *et al.* 1998). While findings support the direct effects of HR practices on turnover (Huselid 1995, Arthur 1994), the influence on turnover intentions over and above their effects on organizational commitment and OCB have, however, not been fully tested to date. For instance, Chen *et al.* (1998) found that turnover intentions was more strongly correlated with organizational commitment than OCB and job rewards, and that OCB and turnover intentions had a significant effect on actual turnover. However, they did not test the influence of job rewards, organizational commitment and OCB on the willingness to quit.

Given these recent empirical results, we posit that HR practices have direct effects on organizational commitment, both forms of OCB, and turnover intentions. Specifically, it is predicted that all seven practices are positively related to OCBI and OCBO (H4a to H4n) and affective commitment (H5a to H5g), and are negatively related to turnover intentions (H6a to H6g). We also posit that not only rewards related to distributive justice perceptions but also work-life policies (work conditions) and affective commitment will be positively related to continuance commitment (H7a to H7c).

Compensation and negotiation conditions

Conventional wisdom suggests that in order to retain productive IT employees, companies must pay them well. Four compensation variables and one negotiation condition were examined in this study. Compensation variables include salary, annual bonus, recruitment bonus and Y2K retention bonus. These variables are differentiated from distributive justice practices because they represent *objective variables* and they are not founded on judgments or comparisons of employees. In this study, the negotiation conditions correspond to the number of formal job offers. It is expected that compensation and negotiation conditions have a direct impact on organizational commitment and turnover intentions. Salary has been found to be positively related to organizational commitment and negatively to turnover intentions among IT personnel (e.g., Igarria and Greenhaus 1992). Similar results are anticipated for annual bonus, recruitment bonus and Y2K retention bonus. Meyer and Allen (1990) found continuance commitment and lack of alternative job offers to be positively associated. In consequence, Hypothesis 5 predicts that compensation and negotiation conditions have direct effects on organizational commitment and turnover intentions. Specifically, salary, annual bonus, recruitment bonus, and retention bonus are hypothesized to all be positively related to continuance commitment and negatively related to turnover intentions (H8a to H8h), whereas the number of formal job offers is negatively related to continuance commitment (H8i) and positively related to turnover intentions (H8j).

Demographic variables

Prior research reveals that age and organizational tenure are positively related to affective commitment (Meyer and Allen 1991), while education has been found to be negatively related to continuance commitment (Meyer and Allen 1990). Regarding OCB, there is little evidence that demographic variables have a direct influence on this type of behavior (Organ and Ryan 1995; Chen *et al.* 1998). Lastly, prior research suggests that demographic variables may have direct effects on turnover intentions over and above their effects on OCB and organizational commitment (Chen *et al.* 1998). Therefore, Hypothesis 6 predicts that demographic characteristics have direct effects on organizational commitment and turnover intentions. Specifically, it is predicted that age and organizational tenure are positively related to affective commitment (H9a and H9b) and continuance commitment (H9c and H9d), and are negatively related to turnover intentions (H9e and H9f). In contrast, education is predicted to be positively related to turnover intentions (H9g), and is negatively related to continuance commitment (H9h).

3. METHODOLOGY

In order to test our research hypotheses, a questionnaire was developed and sent to the Quebec members of the Canadian Information Processing Society (CIPS). The sample was chosen because CIPS members represent a wide variety of IT jobs and organizational settings. The research instrument contained ten sections and included empirically established measurement scales. A pretest of the questionnaire was conducted with a convenient sample of 10 IT practitioners and academics. Each of the respondents completed a preliminary version of the questionnaire and provided feedback about the process (e.g. administration time, clarity of directions) and the measures. In general, respondents indicated that the questionnaire was relatively clear and easy to complete. Following the pretest, a number of modifications to the instrument were made in order to improve the measures, along with the overall structure and clarity of the questionnaire.

The revised version of the questionnaire, with a cover letter indicating the purpose and the importance of the study, was sent to all Quebec members ($n = 2,398$) of CIPS. Excluded from the sample were two CIPS members who had been surveyed in the pretest of the instrument. It should be noted that participation was voluntary, and respondents were assured that their individual responses would be treated as confidential. Two weeks following the initial mailing, a follow-up letter was sent to the Quebec members of CIPS. This letter stressed the importance of their responses and provided a number to call if they had any questions or required a new copy of the survey.

A total of 394 questionnaires were returned to the researchers within an 8-week period; 134 questionnaires were returned because of unspecified address changes (response rate of 17.4%). The somewhat low response rate was to be expected for several reasons. First, the questionnaire was distributed toward the end of November 1999. Several members of CIPS telephoned us upon reception of the reminder letter to let us know they could not complete the questionnaire simply because of the “red tape” associated with the Y2K problem and/or the end of the fiscal year. Another reason is related to the characteristics of the sample itself: a small portion of CIPS members in Quebec are believed to be self-

employed, and hence not directly concerned by the current study. Notwithstanding, it is worth noting that several of these workers have shown a great interest in receiving a copy of the results of this research. In short, we believe these reasons to be more plausible causes for non-response than the nature of the question under study.

Seventy-seven questionnaires were received after the mailing of the follow-up letter. They were used in order to assess the possibility of a non-response bias. In fact, a comparison of the responses returned early (first wave: $n = 317$) with those returned late (second wave: $n = 77$) was conducted (Linsky 1975). Crosstabs analyses, Mann-Whitney tests and t-tests were conducted to determine whether differences in response time (early vs. late) were associated with differing responses. Results indicated no significant differences in any of the variables of interest; hence, no significant bias was detected.

Measures

The dependant variable was adapted from the measurement instrument developed by Meyer *et al.* (1993). This measure used in the present study consists of two items: “How often do you feel like quitting your job in this organization?”, and “How likely is it that you will actually leave your organization within the next year?” The response options to the first item ranged from 1) almost never to 7) almost every day, while the options to the second item ranged from 1) very unlikely to 7) very likely. The responses to the items were coded such that high scores reflected stronger intentions to leave the organization.

The ten items used to construct the commitment scale were derived from two of the three dimensions of the instrument developed by Meyer and Allen (1990), namely affective (5 items) and continuance (5 items). Sample items of affective commitment are: “I really feel as if my organization’s problems are my own” and “My organization has a great deal of personal meaning for me.” The items measuring continuance commitment include: “It would be very hard for me to leave my organization right now, even if I wanted to” and “It would be too costly for me to leave my organization now.” The response options to all ten items ranged from 1) strongly disagree to 7) strongly agree. The responses to the items were coded such that high scores reflected greater commitment to the organization. The items measuring both types of commitment are presented in Appendix.

OCBI and OCBO were measured using a 5-item scale and a 7-item scale, respectively. These scales were adopted from Podsakoff *et al.* (1990) and Williams and Anderson (1991). Respondents were asked to think how their supervisor would evaluate their own citizenship behaviors on 7-point Likert-type scales. Sample items of OCBI include: “I help colleagues who have been absent from work,” and “I am mindful of how my behavior affects other people’s job.” The items measuring OCBO include: “I attend meetings that are not mandatory but are considered important” and “I adhere to informal rules devised to maintain order.” The response options to all items ranged from 1) strongly disagree to 7) strongly agree. The responses to the items were coded such that high scores showed higher levels of OCB. The items used to measure OCBI and OCBO are presented in Appendix.

Recognition practices were measured using a 14-item scale adapted from Tremblay *et al.* (1997) and Tremblay & Guay (1998). Empowerment was measured by a 9-item scale developed by Tremblay *et al.* (1997), and adapted by Tremblay and Guay (1998). Two scales were designed to measure the different types of organizational justice: distributive and procedural. The first scale comprises 11 items while the second scale includes 12 items. Competence development practices were measured using a 9-item scale mainly based on the work of Tremblay *et al.* (1997). Work-family policies were measured using a 6-item scale based on Beehr *et al.*'s (1976) study of work overload and Kopelman *et al.*'s (1983) work on work-family conflict. Last, information sharing was measured by a nine-item scale developed by Tremblay *et al.* (1997) and adapted by Tremblay and Guay (1998). The response options to all items ranged from (1) strongly disagree to (7) strongly agree. The items used to measure the HR practices included in our research model are presented in Appendix.

All compensation and negotiation variables were each measured by one item. The salary measure was based on annual salary in current position. Categories ranged from 1) below \$40,000 to 5) \$100,000 or above. Annual bonus was measured using categories that ranged from 1) 0% of annual salary to 6) 100% or above of annual salary. We also asked respondents if they had received a recruitment bonus when they were hired, and if they had signed a Y2K retention bonus (no=0, yes=1). In addition, the number of formal job offers received by the respondent was measured using a Likert-type scale ranging from 1) no job offers to 7) several job offers.

Age was measured in years. Organizational tenure was measured by the number of years an individual has been employed in his or her current organization. Education consisted of six levels from 1) some high school to 6) doctorate. Respondents were also instructed to indicate their job title and the sector of activity of their current organization in open-ended scales.

4. ANALYTICAL TECHNIQUES

In order to perform the various statistical analyses, our sample was divided into three sub-samples. One hundred respondents were randomly assigned to the initial sample (S1) while another 100 respondents were randomly grouped in a holdout sample (S2). S1 was utilized for instrument validation purposes only while S2 served for further validation purposes and preliminary hypothesis testing. The remaining 194 questionnaires were used to test the revised research model (S3). The reason for selecting 100 cases in both the initial and the holdout samples was to provide us with enough cases to adequately perform a factor analysis (Kerlinger 1986). Crosstab, Kruskal-Wallis and Oneway tests were conducted to confirm the similarity of the three groups.

Analysis begins with an examination of the measurement model in terms of its reliability and construct validity. Table 1 presents the results associated with the assessment of the internal consistency of each scale using S1. The composite reliability coefficients of all the scales, but one, satisfied Nunally's (1978) guidelines. Indeed, only OCBO obtained an alpha inferior to the cutoff point of .70. Based on the results of the reliability analysis,

the inter-item correlation coefficients matrix (not shown here), and the results of a principal components factor analysis (not shown here), 18 of the 70 items measuring the various HR practices were removed from the instrument. The *information sharing*, *work-life policies* and *competence development* scales remained unchanged following these analyses.

Insert Table 1 about here

The first five items to be removed pertain to the construct *procedural justice*. PROJUS8 loaded more highly on the *information sharing* scale while the factor loadings for PROJUS1, PROJUS2, PROJUS8 and PROJUS17 were not above the cutoff point. Next, six items from the distributive justice scale had to be removed based on the results of the reliability and factor analysis. Both DISJUS14 and DISJUS19 loaded more highly on the *competence development* scale while DISJUS15, DISJUS16, DISJUS18 and DISJUS22 were removed because of their weakness regarding the convergent validity criterion. Three items also had to be removed from the *empowerment* scale, two of which (EMP1 and EMP4) did not satisfy the 0.50 cut off point. The third item to be eliminated, EMP9, loaded more highly on another scale. The last four items to be removed pertained to the *recognition* scale (REC8, REC10, REC13, REC14). All four items were removed based on the results of the factor analysis. As for the other constructs included in our research model, namely, *affective commitment*, *continuous commitment*, *turnover intentions*, *OCBI* and *OCBO*, only the latter had to be modified. Precisely, item OCB7 did not satisfy the convergent validity criterion and hence was removed from the scale.

Once the appropriate modifications to the measurement instruments were made, the same statistical analyses were conducted using the holdout sample (S2). Table 2 reports the reliability coefficients associated with the revised scales. The reliability coefficients showed an improvement in comparison with S1; the composite reliability coefficients of the revised scales ranged from 0.70 to 0.93. Convergent and discriminant validity were also tested using S2. As mentioned earlier, to demonstrate convergent validity, items that measure the same trait or construct should correlate highly with one another. Results show that inter-item correlations were all significant at the .001 level for all scales but two. First, the correlation coefficients between items 1 and 3 as well as between items 1 and 4 pertaining to the affective commitment scale were significant at the 0.05 level. Item 1 was then removed from the scale. Second, the correlation coefficients between item 5 and all the other items of the continuance commitment scale were not significant at the 0.05 level. For this reason, item 5 was removed from the measurement scale. In general, though, our data supports the convergent validity of the ten scales comprised in the research model.

Insert Table 2 about here

Finally, a principal components factor analysis for HR practices was also performed using S2. As shown in Table 3, results provided strong support for discriminant validity. Only four additional items had to be removed, leaving a total of 48 items for the seven measurement scales. First, INFOSHA7, INFOSHA9 and COMP1 all loaded more highly

on the recognition scale, and hence, were all removed. Second, REC12 was removed from the recognition scale since it loaded more highly on the information sharing scale. Accordingly, the removed items were not considered in further statistical analyses. In summary, the reliability and construct validity of our measures using S2 are highly satisfactory.

Insert Table 3 about here

5. RESULTS

Hypotheses were initially tested through Pearson correlation coefficients and Mann-Whitney tests (S2). It may be seen from Tables 4 and 5 that 43 of the 58 sub-hypotheses were statistically significant ($p < .05$ or inferior). Hypotheses 1, 2 and 3 were supported. First, both types of organizational commitment are significantly and negatively related to turnover intentions and, as expected, the association between affective commitment and turnover intentions is stronger than the relationship between continuance commitment and turnover intentions. Second, both forms of citizenship behaviors (OCBI and OCBO) were found to be significantly and negatively related to the criterion variable. Third, we found strong support for the link between affective commitment and OCB and for the lack of a significant relationship between continuance commitment and OCB. Most hypotheses linking HR practices to OCB, affective commitment and turnover intentions were supported, providing strong support for H4, H5 and H6. Indeed, only four sub-hypotheses were not supported, namely, the association between work-life policies and affective commitment as well as those between both forms of OCB and two HR practices (distributive justice and work-life policies). Next, the expected link between distributive justice and continuance commitment was not supported (H7b) providing partial support for H7. In regard to the compensation and negotiation variables, we found that annual bonus and number of job offers were positively related to both continuance commitment and turnover intentions while salary, recruitment bonus and retention bonus were not found to have any influence on these variables. Therefore, only partial support was found for H8. This result suggests that while salary might be crucial for getting good IT staff, it has much less to do with keeping good IT workers. Last, the relationships between demographic variables and commitment and turnover intentions were all significant but one. Indeed, only education was not found to be significant. These results provide strong support for H9.

Insert Tables 4 and 5 about here

A revised model containing only those hypotheses found to be significant at the .001 or inferior level (see last column of Tables 4 and 5) was tested using a different data set (S3). As shown in Table 6, a linear regression of predictors on turnover intentions was conducted. The independent variables account for 48% of the variance in the criterion variable. Six of the predictors were statistically different from zero. The standardized regression coefficients show that affective commitment, number of job offers, OCBI, organizational tenure and two HR practices, namely, distributive justice and competence development had significant and *direct* effects on turnover intentions. On the other hand,

continuance commitment, age, OCBO, and five HR practices (information sharing, procedural justice, recognition, work-life policies and empowerment) had no significant direct effect on turnover intentions.

Insert Table 6 about here

Table 7 presents the results pertaining to the relationships of the predictors of affective commitment. Three HR practices were found to have significant positive effects on affective commitment, namely, recognition, empowerment and competence development. As expected, tenure within the organization was found to have a significant effect on affective commitment. On the other hand, the data show that equity practices (distributive and procedural) and information sharing practices were not found to have a significant and direct effect on affective commitment. The study variables explained 36% of the variance in affective commitment.

Insert Table 7 about here

Last, Table 8 reports the results pertaining to the determinants of OCBI. Eighteen percent of the variance in OCBI is explained by the independent variables. Among the seven hypothesized predictors, only recognition was found to have a significant positive influence on citizenship behaviors among IT personnel. Affective commitment, continuous commitment, information sharing, distributive justice, empowerment and competence development were all found to be nonsignificant. Summary of the significant findings are shown in Figure 2.

Insert Table 8 and Figure 2 about here

6. DISCUSSION

In this section, we will present and discuss the key conclusions derived from our results and we will make consistently a series of recommendations for IT and HR executives.

As illustrated in Figure 2, several HR practices have both direct and indirect effects on turnover intentions. Precisely, the results demonstrate clearly that IT specialists, whether they are systems analysts, programmers, systems engineers, consultants, directors or data base administrators, are particularly sensitive to two types of practices, namely, distributive justice and competence development. First, results show that distributive justice practices have a negative and significant effect on turnover intentions among IT specialists. Indeed, the more an employee will perceive a high level of internal equity (in comparison with other employees of the same department and/or the same company) and external equity (in comparison with individuals occupying a similar job in other organizations) in regard to issues such as compensation and benefits, performance evaluation, promotions, and mandates, the less he will intend to leave his current employer. Given that distributive justice practices have a direct influence on turnover intentions, it seems clear that the notion of equity, both internal and external, must be considered as a critical component of a corporate IT retention strategy.

A second significant set of HR practices is the opportunity to build and apply new skills. Indeed, it is well-known that IT professionals have a vested interest not only in keeping in tune with the industry, but also in staying several steps ahead of the experience and skill curve (Morello and Claps 2000). Training is too often seen as a perk when it should be seen as essential investment in the intellectual capital of the organization. This is true in every professional field, but is perhaps more acute in IT where change is rapid and one can become the «department's dinosaur» in a flash. The implementation of HR practices such as training, coaching, job rotation programs, and opportunities for experimentation send a clear message that management is seeking to establish a long-term relationship with employees. While such investments in human capital could backfire eventually by making employees “too” attractive to outside recruiters, it is seen as necessary and beneficial to the organization (Guptill, 1998). In this regard, we argue that for such practices to be really effective, managers must also help employees shape and direct their careers, so they can gain experience within the enterprise rather than outside it.

A careful examination of Table 6 shows that affective commitment was found to be the strongest predictor of turnover intentions in this study. This corroborates previous results in the OB (e.g., Price and Mueller 1986; Tett and Meyer 1993) and IT (e.g., Igbaria and Greenhaus 1992) fields. Managers must therefore keep in mind that IT specialists who identify themselves and feel emotionally attached to their organization and/or work unit are those who risk least to leave. This result leads us to ask the following question: «What are the most compelling HR practices for increasing the level of affective commitment of IT specialists?» Figure 2 shows that three particular HR practices have significant and direct effects on affective commitment. Precisely, results show that a company which 1) invests though divers means in its human capital (skills and know-how) and helps employees shape their career, 2) sets up systems allowing IT managers and project team leaders to recognize individual contributions to the organization and 3) encourages greater participation in decision making and latitude in the definition, organization and conduct of work, sees its workforce demonstrating a greater identification to the organization and a higher level of affective commitment.

Interestingly, citizenship behaviors that benefit specific individuals (OCBI) constitute another key indication of intentions to stay. Indeed, behaviors such as helping a colleague who has been absent from work, helping others who have heavy workloads, being mindful of how one's own behavior affects others' jobs, and providing help and support to new employees represent clear indications of an employee's interest for its work environment and, hence, have direct effects on turnover intentions. This result leads us to pose the following question: «What are the most compelling HR practices for motivating IT employees to adopt extra-role behaviors?» Our results are clear once again. Recognition of performance is the only predictor of OCBI. Indeed, it seems that a successful employee whose work performance is recognized by his superiors and his peers will tend to do more than what is formally required of him. The most obvious form of recognition comes in the form of salary increases and bonuses. But in the broader terms of a positive work environment, recognition can take many forms from a formal award program to a thank you note for a job well done. Importantly, as Bolon (1997), we

argue that if IT leaders truly want to create a culture that encourages employees to display OCB, they may want to exhibit such citizenship behaviors themselves in order to communicate to employees that such discretionary behaviors are valued by the organization.

Agarwal and Ferratt (1999) recently recommended that, considering the variety of HR practices available, IT executives must choose among those practices that are likely to address best the particular needs of IT specialists. In light of the results obtained in the present study, it appears that an effective IT retention strategy will focus on four key categories of HR practices, namely, 1) distributive justice, 2) competence development and career paths; 3) recognition of performance, and 4) empowerment. Altogether, these practices attest to the company's concern for the specific needs of its IT workforce (sense of equity/justice, recognition and empowerment) and they indicate the extent to which an organization seeks a long-term relationship with its IT workforce (development of competencies and career planning). That is in radical opposition with a short-term view of IT retention where additional resources will be expended on "hygiene" factors such as compensation and benefits. According to our results, it seems that many IT professionals will willingly remain in organizations where work is stimulating and challenging, chances for advancement are high and if they feel reasonably well paid (enterprise-based and market-based pay), even if they are paid somewhat less than what they could obtain elsewhere. This confirms the estimations of *GartnerGroup* which estimates at only 20% the proportion of IT professionals who are ready to accept another job on the one base of compensation conditions (Morello and Clapps 2000). In short, organizations adopting a long-term investment strategy which considers the specific needs of IT professionals are likely to experience the highest intentions to stay and, most likely, the least turnover.

Further, our results indicate that three out of the seven types of HR practices included in our research model seem to have a somewhat smaller influence on OCBI, organizational commitment, and turnover intentions. These practices are associated with procedural justice, information sharing, and work-life policies. A potential explanation might be that while such practices might not favor commitment, extra-role behaviors and retention, their weakness might generate some dissatisfaction. In short, we believe that these practices must not be perceived by top IT and HR executives as being ineffective but rather as being complementary to the more essential practices of distributive justice, recognition, competence development and empowerment.

Most IT and HR managers face another challenge in implementing a retention strategy. They have a mix of IT people, some of whom, for instance, are in much greater demand or far lower supply than normal. Our results show that the number of formal job offers (likely those employees with skills in high demand) has a direct and positive influence on turnover intentions while organizational tenure has a direct and negative influence on the criterion variable. Should managers adopt different strategies for these groups of IT employees? In agreement with Agarwal and Ferratt (1999), our recommendation to management is to implement a dominant retention strategy for the overall IT population. This will ensure that employees do not receive mixed signals or conflicting messages from diverse groups of IT leaders. Contrary to Igarria and Greenhaus (1992), age and

education did not correlate significantly with commitment and turnover intentions. This reinforces our contention to articulate and adopt a dominant strategy for all IT employees regardless of their individual characteristics. But if it is necessary to vary one or two practices (e.g., compensation) to retain key groups of IT people, those variations should be clearly identified as variations from the main practices and communicated fully within the organization.

In summary, IT professionals look for a compelling place to work and hence, an effective corporate IT retention strategy will consider the following essential building blocks:

- Affective commitment constitutes the primary predictor of turnover intentions. IT specialists grant a lot of importance for the alignment between their own values and those conveyed by management and they look for a work environment or milieu which will allow them to develop a strong feeling of belonging;
- Citizenship behaviors of IT employees provide further evidence of their interest for their work environment and constitute a reliable indicator of their intention to remain within the organization.
- In the view of IT specialists, internal and external equity as well as competence development and opportunities for growth, recognition of individual contribution and good work and expanded job responsibilities form the essence of compelling places to work. IT managers must therefore 1) stay informed on the going rates for various IT positions and make sure their staff feel they are adequately and fairly compensated for their work; 2) make training a centerpiece of staff development and work closely with their staff on goal setting and career development; 3) develop a culture where staff feel appreciated and rewarded; and 4) empower IT staff and encourage innovation and creativity in daily work;
- Procedural justice, information sharing, and work-life policies practices must be considered as complementary means to achieve lower IT turnover rates;
- Compensation, though important, becomes a secondary concern when enterprises demonstrate their investment in long-term relationships. A retention strategy that solely focuses on compensation conditions and benefits is not likely to favor commitment and loyalty of employees and offer any guarantee in satisfaction and retention. Further, such a strategy is not likely to compensate for the lack of professional recognition and chances of advancement and for a little stimulating IT job;
- Finally, executives should articulate and adopt a dominant retention strategy for the overall IT organization. If needed, variations should be clearly identified and communicated fully within the organization.

To conclude, we should recognize that every organization has its unique contingencies that can impede or favor retention among IT specialists. More often than not, events beyond the control of IT executives contribute to creating such special circumstances (e.g., corporate downsizing, growth, highly competitive geographic region). For this reason, we posit that several different manifestations of a global or dominant retention strategy will emerge. Even with such differences, however, the managerial logic and values embedded in a given strategy should be similar. Thus, we support Agarwal and

Ferratt's (1999) contention that there is a «best» set of beliefs and values regarding the nature of IT intellectual capital. In our view, IT specialists should not be managed as disposable productive resources but considered as humans with specific needs and interests such as equity and justice, opportunity to learn and innovate, recognition of peers and managers, attainment of new levels of responsibility, and empowerment. Therefore, managers have to bolster IT professionals' sense of self-worth by treating them as intellectual assets, not operating expenses, and by helping them shape and direct their careers, so they can gain experience within the enterprise rather than outside it. Within this set of beliefs IT executives have a very large number of degrees of freedom to implement specific HR practices.

7. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Several limitations of this study must be acknowledged. First, common method variance is a major concern and in an attempt to control for it, we used Harman's one-factor test (Podsakoff and Organ 1986). Results of the unrotated factor solution suggests that no substantial amount of common method variance was present in our data since several factors were generated and no one general factor accounted for the majority of the covariance in the independent and dependent variables. Nevertheless, future research should attempt to gather data from multiple methods such as structured interviews, questionnaires, and observation and from multiple sources including peers, subordinates, and supervisors. A second issue concerns the use of more objective HR practices measures. Indeed, IT professionals' perceptions regarding HR practices may differ from a more objective assessment of these practices obtained via interviews with executives and/or HR professionals. Future investigations shall attempt to assess the extent of congruity between management's vision of how IT professionals are managed and the IT professionals' perception of management's vision. Third, the exclusion of actual turnover should also be taken into account in future research efforts. Longitudinal studies are needed in order to validate the predictive dimension of the model. Furthermore, it would be interesting to examine turnover in another light. Researchers could view turnover as an extreme on one side of a withdrawal continuum. Less extreme manifestations might include increased sick days, missed meetings, and formal job interviews. As stressed earlier, lack of citizenship behaviors should also be considered as one indication of organizational withdrawal. This approach would move turnover from a binary to a continuous variable, at the same time increasing insights into what causes IT people to leave. Fourth, other attitudinal variables must be included in future research models. For one thing, peer-based commitment where employment revolves around the pressure, status, and prestige of working with a particular company (Ajzen 1991; Triandis 1980) must be considered. It would also be relevant to investigate how satisfaction (or dissatisfaction) mediate the effect of compelling HR practices on organizational commitment and turnover intentions. Last, future models could consider the inclusion of personality traits such as positive/negative affect (Watson *et al.* 1988).

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Table 1: Assessment of the internal consistency of each scale (S1)

Scale	Cronbach's alpha	Number of items
Recognition	0.78	14
Distributive justice	0.87	11
Procedural justice	0.91	12
Competence development	0.90	9
Empowerment	0.70	9
Work-life policies	0.85	6
Information sharing	0.90	9
Affective engagement	0.78	5
Continuous engagement	0.71	5
OCBI	0.88	5
OCBO	0.55	7
Turnover intentions	0.91	2

Table 2: Assessment of the internal consistency of each scale (S2)

Scale	Cronbach's alpha	Number of items
Recognition	0.88	10
Distributive justice	0.90	6
Procedural justice	0.89	6
Competence development	0.92	9
Empowerment	0.70	6
Work-life policies	0.91	6
Information sharing	0.93	9
Affective engagement	0.74	5
Continuous engagement	0.70	5
OCBI	0.86	5
OCBO	0.71	6
Turnover intentions	0.83	2

Table 3. Principal Factor Analysis (S2)

Info_sharing1	,162	,721	,301	,208	,176	-,005	,112
Info_sharing2	-,006	,655	,253	,233	,230	-,004	-,165
Info_sharing3	,189	,803	,195	,139	,112	,004	,108
Info_sharing4	,507	,636	,227	-,000	,185	,002	,110
Info_sharing5	,289	,695	,130	,245	,293	-,005	,003
Info_sharing6	,249	,706	-,004	,135	,272	-,000	-,006
Info_sharing7	,605	,467	,251	,200	,109	,002	,005
Info_sharing8	,415	,533	,383	,105	,231	-,002	,003
Info_sharing9	,675	,484	,319	,008	-,008	,007	-,004
Recognition1	,428	,320	,368	,009	,008	,170	,113
Recognition2	,646	,190	,153	,201	,008	,001	-,009
Recognition3	,671	,206	,159	,170	,168	,005	-,007
Recognition4	,471	,346	,008	,329	,184	,001	,141
Recognition5	,597	,434	,236	,294	,007	,009	,166
Recognition6	,519	-,000	-,234	,468	,147	,108	0,07
Recognition7	,628	,148	,279	,164	,006	,004	,001
Recognition9	,558	,262	,533	,124	,006	,005	,191
Recognition11	,661	,002	,005	,222	,002	,007	,162
Recognition12	,376	,540	,193	,005	,009	-,109	,250
Distributive_jus10	,158	,297	,168	,729	,206	,003	-,108
Distributive_jus11	,122	,224	,150	,743	,000	,000	,122
Distributive_jus12	,266	,145	,141	,654	,118	,239	,005
Distributive_jus20	,381	,008	,254	,655	,178	,000	,009
Distributive_jus21	,299	,133	,300	,629	,105	-,002	-,001
Distributive_jus23	,357	,112	,398	,674	,156	,006	,007
Procedural_jus3	-,002	,289	,004	,344	,680	,008	,009
Procedural_jus4	-,003	,215	,125	,007	,809	,202	,142
Procedural_jus5	,005	,130	,293	,107	,711	,004	-,003
Procedural_jus7	,363	,125	,139	-,004	,740	,003	,162
Procedural_jus9	,355	,172	,008	,009	,766	,009	,125
Procedural_jus13	,119	,360	,165	,239	,609	,103	,009
Empowerment2	-,008	,132	-,001	,008	,004	,007	,845
Empowerment3	,220	,101	,336	,181	,224	,007	,676
Empowerment5	,171	-,006	,298	-,007	,293	,005	,622
Empowerment6	-,101	-,001	,130	,007	-,006	,007	,805
Empowerment7	,191	,320	,123	,172	,214	,009	,692
Empowerment8	,170	,295	-,103	-,005	,265	,007	,660
Competence1	,543	,178	,298	,288	,301	,003	,004
Competence2	,221	,247	,638	,292	,388	,002	,004
Competence3	,200	,423	,524	,396	,008	,003	,009
Competence4	,204	,360	,635	,130	,176	,009	,206
Competence5	,365	,008	,639	,252	,379	-,001	,315
Competence6	,002	,252	,718	,257	,126	,154	,003
Competence7	,425	-,002	,611	,125	,008	-,001	,134
Competence8	,329	,340	,601	,174	,006	,226	,008
Competence9	,232	,304	,652	,208	,255	,122	,001
WLP1	,185	,001	,143	,002	,150	,669	-,005
WLP2	-,005	,008	-,141	,007	,008	,755	-,006
WLP3	,002	-,004	,111	,007	-,007	,751	,166
WLP4	,005	-,005	,114	-,005	,109	,907	,007
WLP5	-,002	,004	,001	-,002	,101	,905	,005
WLP6	,114	-,004	,009	,007	,003	,884	,001
φ Squared Loadings	6,44	5,84	5,35	4,46	4,45	4,35	2,20
% of variance	13,1	11,9	10,9	9,1	9,1	8,9	5,4

Table 4: Hypothesis testing using Pearson correlation coefficients (S2)

Hypothesis	Pearson coefficient	p	Supported	Included in revised model ¹
H1a: affective commitment to turnover intentions	-.504	<.001	Yes	Yes
H1b: continuance commitment to turnover intentions	-.254	<.001	Yes	Yes
H1c: H1a > H1b	----	----	Yes	----
H2a: OCBI to turnover intentions	-.249	<.001	Yes	Yes
H2b: OCBO to turnover intentions	-.221	<.005	Yes	No
H3a: affective commitment to OCBI	.265	<.001	Yes	Yes
H3b: affective commitment to OCBO	.215	<.005	Yes	No
H3c: continuance commitment to OCBI	.077	ns	Yes	No
H3d: continuance commitment to OCBO	.009	ns	Yes	No
H4a: information sharing to OCBI	.172	<.05	Yes	No
H4b: information sharing to OCBO	.293	<.001	Yes	Yes
H4c: recognition to OCBI	.307	<.001	Yes	Yes
H4d: recognition to OCBO	.292	<.001	Yes	Yes
H4e: empowerment to OCBI	.266	<.001	Yes	Yes
H4f: empowerment to OCBO	.156	<.005	Yes	No
H4g: distributive justice to OCBI	.163	<.05	Yes	No
H4h: distributive justice to OCBO	.090	ns	No	No
H4i: procedural justice to OCBI	.070	ns	No	No
H4j: procedural justice to OCBO	.088	ns	No	No
H4k: work-life policies to OCBI	.080	ns	No	No
H4l: work-life policies to OCBO	.010	ns	No	No
H4m: competence development to OCBI	.241	<.001	Yes	Yes
H4n: competence development to OCBO	.217	<.005	Yes	No
H5a: information sharing to affective commitment	.365	<.001	Yes	Yes
H5b: recognition to affective commitment	.507	<.001	Yes	Yes
H5c: empowerment to affective commitment	.301	<.001	Yes	Yes
H5d: distributive justice to affective commitment	.262	<.001	Yes	Yes
H5e: procedural justice to affective commitment	.401	<.001	Yes	Yes
H5f: work-life policies to affective commitment	.043	ns	No	No
H5g: comp. development to affective commitment	.491	<.001	Yes	Yes
H6a: information sharing to turnover intentions	-.351	<.001	Yes	Yes
H6b: recognition to turnover intentions	-.331	<.001	Yes	Yes
H6c: empowerment to turnover intentions	-.332	<.001	Yes	Yes

¹ Only those hypotheses found to be significant at the .001 level were included in the revised model.

H6d: distributive justice to turnover intentions	-.347	<.001	Yes	Yes
H6e: procedural justice to turnover intentions	-.413	<.001	Yes	Yes
H6f: work-life policies to turnover intentions	.136	<.01	Yes	No
H6g: competence development to turnover intentions	-.446	<.001	Yes	Yes
H7a: affective commitment to continuance commitment	.299	<.001	Yes	Yes
H7b: distributive justice to continuance commitment	.055	ns	No	No
H7c: work-life policies to continuance commitment	.184	<.001	Yes	Yes
H8a: salary to continuance commitment	-.084	ns	No	No
H8b: salary to turnover intentions	-.121	ns	No	No
H8i: job offers and continuance commitment	-.120	<.05	Yes	No
H8j: job offers and turnover intentions	.182	<.001	Yes	Yes
H9a: age to affective commitment	.190	<.01	Yes	No
H9b: organizational tenure to affective commitment	.246	<.001	Yes	Yes
H9c: age to continuance commitment	.111	<.05	Yes	No
H9d: organizational tenure to continuance commitment	.313	<.001	Yes	Yes
H9e: age to turnover intentions	-.280	<.001	Yes	Yes
H9f: organizational tenure to turnover intentions	-.351	<.001	Yes	Yes
H9g: education to continuance commitment	-.025	ns	No	No
H9h: education to turnover intentions	-.051	ns	No	No

Table 5: Hypothesis testing using Mann-Whitney tests (S2)

H8c: annual bonus and continuance commitment

No annual bonus (n=62)	Annual bonus (n=126)	Mann-Whitney	Sig.	Supported	Included in revised model
Mean rank: 88,73	Mean rank: 106,22	3179,500	<.05	Yes	No

H8d: recruitment bonus and continuance commitment

No recruitment bonus (n=164)	Recruitment bonus (n=23)	Mann-Whitney	Sig.	Supported	Included in revised model
Mean rank: 94,33	Mean rank: 91,65	1832,000	ns	No	No

H8e: retention bonus and continuance commitment

No retention bonus (n=158)	Retention bonus (n=30)	Mann-Whitney	Sig.	Supported	Included in revised model
Mean rank: 95,49	Mean rank: 89,27	2213,000	ns	No	No

H8f: annual bonus and turnover intentions

No annual bonus (n=61)	Annual bonus (n=124)	Mann-Whitney	Sig.	Supported	Included in revised model
Mean rank: 104,61	Mean rank: 87,29	3074,000	<.05	Yes	No

H8g: recruitment bonus and turnover intentions

No recruitment bonus (n=161)	Recruitment bonus (n=23)	Mann-Whitney	Sig.	Supported	Included in revised model
Mean rank: 91,45	Mean rank: 99,87	1682,000	ns	No	No

H8h: retention bonus and turnover intentions

No retention bonus (n=156)	Retention bonus (n=29)	Mann-Whitney	Sig.	Supported	Included in revised model
Mean rank: 93,56	Mean rank: 90,00	2175,000	ns	No	No

Table 6: Linear regression of independent variables on turnover intentions (S3)

Variable	Parameter Estimate	SE	Standardized Coefficients	t-value	p<
Intercept	8,569	,696	.000	12,305	,000
Affective commitment ***	-,346	,073	-,246	-4,761	,000
Continuous commitment	-,103	,058	-,079	-1,769	,078
Information sharing	-,108	,072	-,083	-1,503	,134
Competence development **	-,279	,082	-,193	-3,385	,001
Procedural justice	,000	,066	-,061	-1,110	,268
Distributive justice ***	-,225	,061	-,179	-3,714	,000
Recognition	,000	,117	,044	,659	,510
Empowerment	,124	,085	,093	2,001	,064
OCBI **	-,288	,095	-,152	-3,042	,003
OCBO	,000	,092	,042	,866	,387
Work-life policies	,000	,045	,037	,880	,379
Age	,000	,010	,011	,243	,808
Organizational tenure *	,000	,011	-,132	-2,817	,005
Number of job offers ***	,189	,035	,221	5,350	,000

*** p<.001

** p<.005

* p<.01

Overall model, $F = 23.25$, $p < .001$; $R^2 = 0.48$; Adjusted $R^2 = 0.46$

Table 7: Linear regression of independent variables on affective commitment (S3)

Variables	Estimated Parameters	SE	Standardized Coefficients	t-value	p<
Intercept	,745	,297	,001	2,505	,013
Information sharing	,007	,052	,079	1,394	,164
Competence development H	,136	,063	,132	2,140	,033
Procedural justice	,002	,049	,035	,612	,541
Distributive justice	,002	,045	,027	,536	,592
Recognition ***	,307	,079	,255	3,906	,000
Empowerment **	,216	,063	,179	3,444	,001
Organizational Tenure ***	,002	,007	,154	3,659	,000

*** p<.001

** p<.005

H p<.05

Overall model, F=29.09, p<.001; R²=0.36; Adjusted R²=0.35

Table 8: Linear regression of independent variables on OCBI (S3)

Variables	Estimated Parameters	SE	Standardized Coefficients	t-value	p<
Intercept	3,620	,256	,001	14,139	,000
Affective commitment	,002	,044	,037	,640	,523
Information sharing	-,003	,045	-,052	-,809	,419
Competence development	,008	,054	,111	1,574	,116
Procedural justice	-,005	,041	-,089	-1,373	,170
Distributive justice	-,005	,038	-,078	-1,356	,176
Recognition ***	,358	,069	,395	5,226	,000
Organizational tenure	,000	,006	,082	1,674	,095
Empowerment	,006	,054	,065	1,090	,276

*** p<.001

Overall model, F=10.419, p<.001; R²=0.18; Adjusted R²=0.16

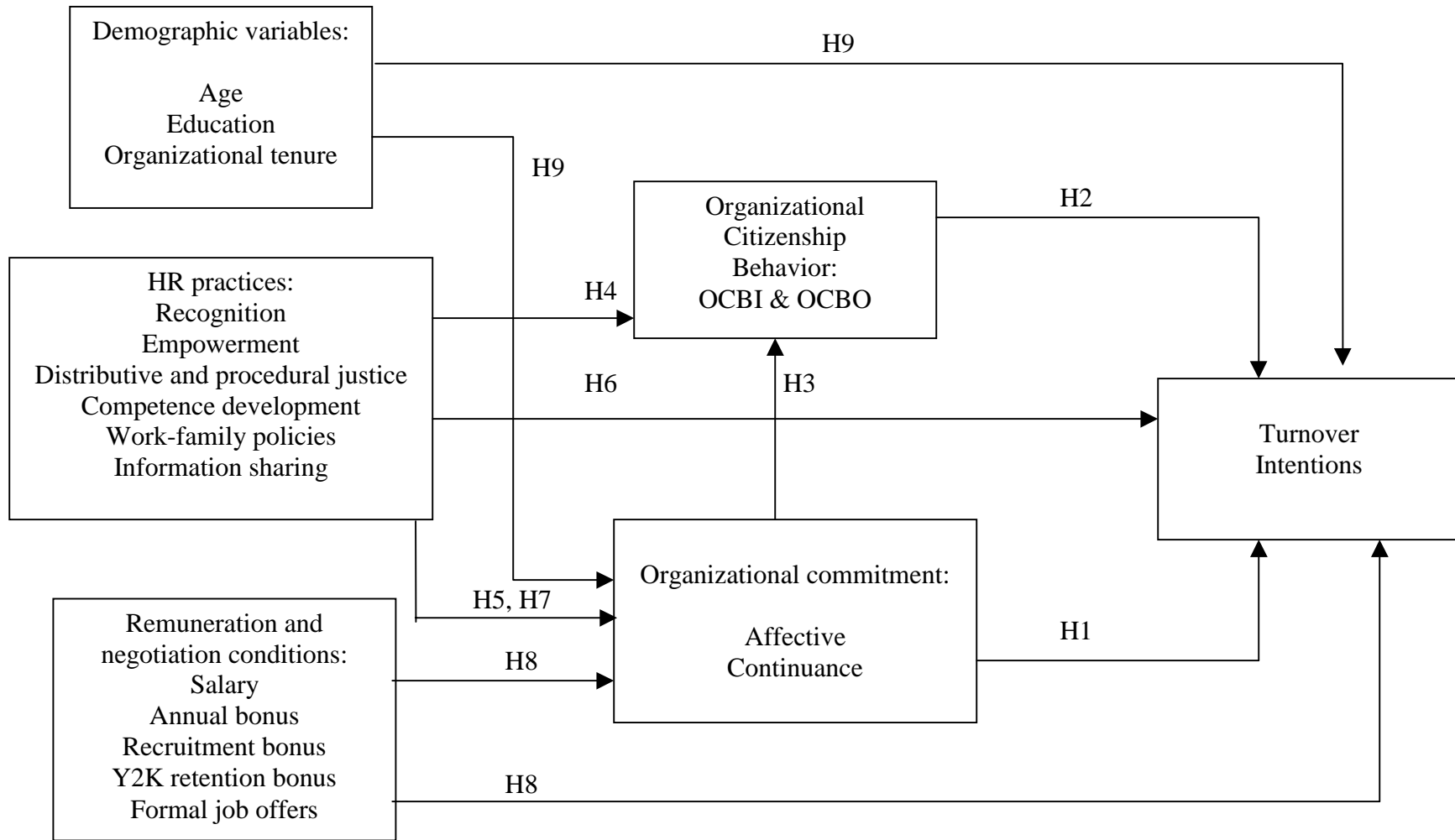
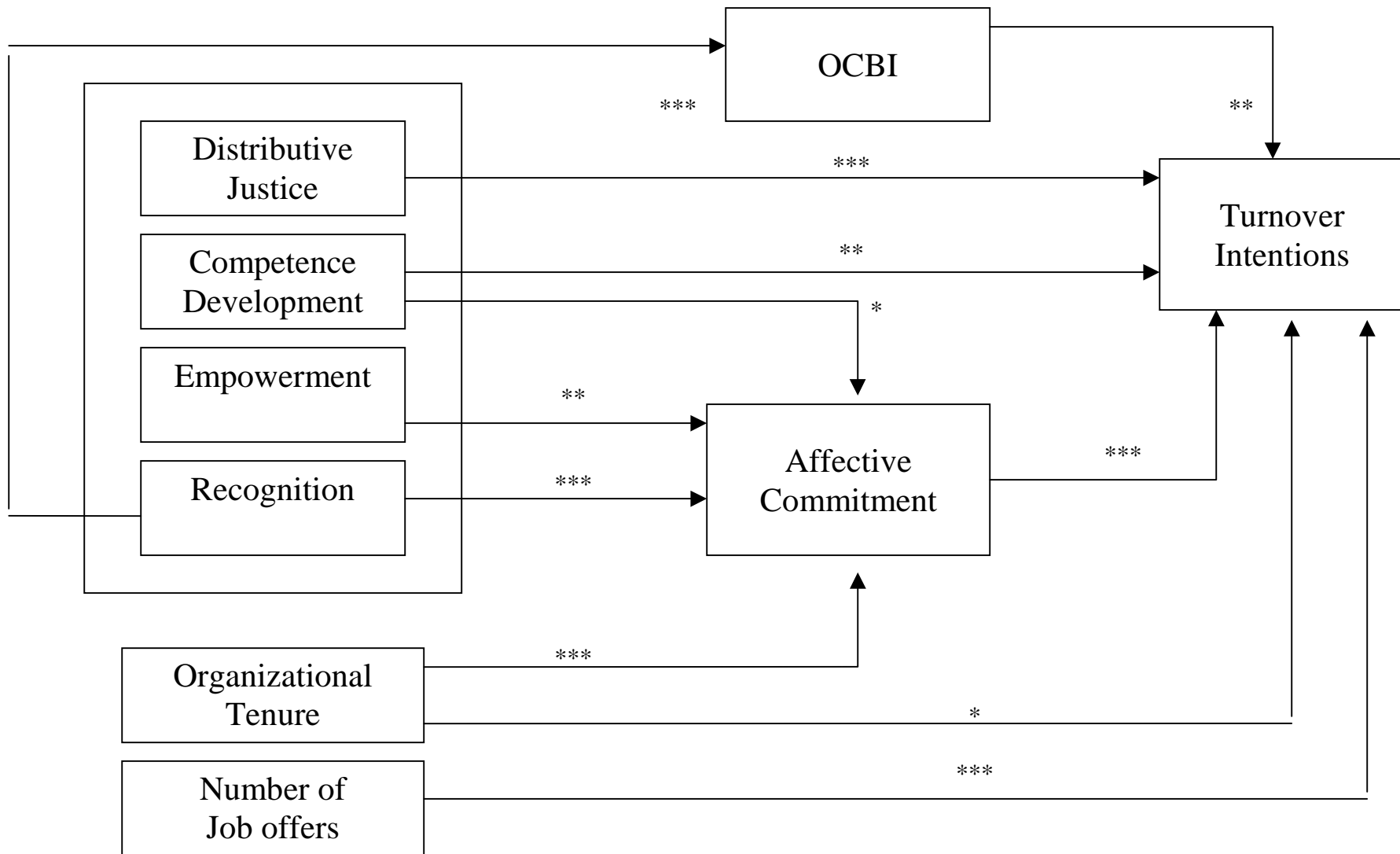


Figure 1. Integrated Model of Turnover Intentions of IT Personnel



*** p<.001; ** p<.005; * p<.01; H p<.05

Figure 2. Revised model

Appendix: Survey items pertaining to organizational commitment, OCB and HR practices

Affective commitment

1. I really feel as if my organization's problems are my own
2. I do not feel a strong sense of belonging to my organization (reverse)
3. My organization has a great deal of personal meaning for me
4. I feel emotionally attached to the strategic choices of my organization
5. The values advocated by top management are aligned with my own

Continuance commitment

1. It would be very hard for me to leave my organization right now even if I wanted to
2. It would be too costly for me to leave my organization now
3. Too much in my life would be disrupted if I decided to leave my organization now
4. I feel I have too few options to consider leaving my organization
5. One of the few serious consequences of leaving my organization is the scarcity of current alternatives

OCBI and OCBO

1. I help colleagues who have been absent from work (I)
2. I help colleagues who have heavy work loads (I)
3. I am mindful of how my behavior affects other people's job (I)
4. I go out of way to help new employees (I)
5. I take a personal interest in my colleagues' job (I)
6. My attendance at work is above the norm (O)
7. I take undeserved brakes at work (reverse) (O)
8. I often complain about insignificant things at work (reverse) (O)
9. I tend to make "mountains out of molehills" (reverse) (O)
10. I adhere to informal rules devised to maintain order (O)
11. I attend meetings that are not mandatory but considered important (O)
12. I perform duties that are not required but which improve corporate image (O)

Information sharing practices

1. Employees are regularly informed of major corporate projects (e.g., investment, rationalization, acquisition)
2. Employees are regularly informed of financial results
3. Employees are regularly informed of new products and/or services
4. Employees are regularly informed of their respective work unit's performance and productivity
5. Employees are regularly informed of the technological changes ahead
6. Managers regularly inform employees about the level of customer satisfaction
7. Employees' suggestions are seriously taken into consideration
8. In my work unit, employees are regularly informed of the criteria used for their performance evaluation
9. In my work unit, follow-ups are regularly given to employees concerning prior suggestions they had made

Recognition practices

1. When an employee does good quality work, his colleagues regularly show him their appreciation
2. Disciplinary actions against employees are generally justified
3. Disciplinary measures against employees are done in a respectful and human manner
4. I am not scared to denounce practices that I think are unfair or unjustified
5. In my work unit, supervisors use different ways to recognize in a tangible way the employees' efforts (e.g., more flexibility with schedules, more interesting projects, tickets for cultural or sports events)
6. In my work unit, certain employees receive special treatments from their supervisors that they do not deserve
7. Employees know exactly what to do to get recognition from their supervisors
8. Employees who do not hand out quality work are regularly reprimanded by their supervisors
9. In my work unit, supervisors regularly congratulate employees in recognition of their efforts
10. In my work unit, employees' personal efforts are regularly recognized in a monetary way by spot cash awards
11. In my work unit, only a few employees get the consideration of the supervisors (reverse)
12. In my work unit, exceptional performances are regularly publicized (e.g., memos, reunions, awards ceremonies)
13. In my work unit, employees that make mistakes are regularly reprimanded
14. In my work unit, employees can be retrograded or even fired from their current job if their productivity at work is not sufficient

Procedural (P) and distributive (D) justice practices

1. Performance evaluation criteria appear to me as coherent with the corporate values (e.g. customer satisfaction, team spirit, collaboration) (P)
2. There exists a well-known corporate procedure in regard to performance evaluation (P)
3. The criteria used to grant promotions are clearly defined (P)
4. Employees do not exactly know how to obtain a promotion (reverse) (P)
5. Promotions are fundamentally determined by unfair politic games (reverse) (P)
6. Good performance fairly increases the chances of being promoted (P)
7. The criteria used to grant salary raises are known from all employees (P)
8. Management provides clear information in regard to any compensation discrepancies with the market (P)
9. Management is transparent in terms of compensation management (P)
10. I estimate my salary as being fair internally (D)
11. My salary is equitable in comparison with what is offered for a similar job elsewhere (D)
12. Mechanisms adopted to determine salary levels are fair to all employees (P)
13. In my work unit, the criteria used to grant salary raises are clearly defined (P)
14. In my work unit, our supervisors hand out mandates in a fair manner (D)
15. My supervisor has the tendency to give the same performance ratings to all of his employees (reverse) (D)
16. I estimate that my performance evaluations reflect adequately the quality of my job (D)
17. My supervisor judges my performance on criteria that have nothing to do with my actual responsibilities (reverse) (P)
18. In my work unit, mandates are assigned on a fair basis (D)
19. I am satisfied with the way mandates have been assigned (D)
20. In my work unit, employees perceive their compensation as being fair considering the financial performance of the enterprise (D)
21. In my work unit, employees consider that their compensation level reflects adequately their level of responsibility in the organization (D)

22. In my work unit, employees perceive the salary gap between managers and employees as being totally inequitable (reverse) (D)
23. The salary increases and/or bonuses I received in the last two years reflect adequately my recent performance evaluations (D)

Empowerment practices

1. In my organization, my work unit plays a strategic role
2. A great latitude is given to employees for the organization of their work (e.g., work schedules)
3. Employees in my work unit have a lot of autonomy in regard to project management
4. My supervisor manages our unit's budgets
5. In my work unit, employees have a great deal of liberty in the conduct of their work
6. Employees in my work unit are extensively involved in the recruitment process
7. Employees in my work unit are regularly consulted in technological investments decisions
8. Employees' empowerment in my work unit is highly valued
9. My work unit is considered as a strategic division in my organization

Competence development and utilization practices

1. Managers usually give responsibilities to employees according to their respective background and interests
2. Employees have the possibility to develop their skills in order to increase their chances of being promoted
3. Employees have the possibility to rotate jobs to develop their own skills
4. Several professional development activities (e.g., coaching, training) are offered to employees to improve their skills and knowledge
5. Managers encourage employees to apply their new abilities and skills in the context of their daily work
6. Proficiency courses such as specialized technical courses and professional certification are encouraged by management
7. I am able to apply my new skills in my work
8. In my work unit, it is easy to get the resources (e.g., time, financial aid, flexible schedules) necessary to acquire new competencies
9. In my work unit, employees are encouraged to experiment and share knowledge

Work-life policies

1. Managers allow generally enough time for the completion of projects so that employees can do good quality work with limited stress
2. I often feel like there is too much work to do (reverse)
3. My organization provides work conditions (e.g., flexible schedules, child care facilities, telecommuting programs) which take into account the emergent needs of employees
4. My work schedule is often in conflict with my personal life (reverse)
5. My job affects my role as a spouse and/or a parent (reverse)
6. My work has negative effects on my personal life (reverse)

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