Employee Involvement, Attitudes and Reactions to Technology Changes*

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This research examines the relationships between employee reactions to specific technological changes and the job-related attitudes of these employees. The specific changes include the transition, by the organization's clinical professionals, from the use of laptop computers to smaller palm-sized clinical assistant (CE) devices and the automation of clinical pathways into the computerized documentation system. Both technological changes were implemented with the intent of increasing the efficiency of the clinical professionals. Results of this longitudinal study indicated that individuals involved in making decisions related to the technology changes reacted more positively to the changes than individuals with low levels of involvement. Further, the results of this study revealed that individuals with higher pre-change levels of role ambiguity reacted more negatively to the technology changes.

Technological Change

The use of technology has grown at a phenomenal rate within organizations (Jick & Peiperl, 2003). Consequently, organizations continue to experience changes driven by technology (Hsieh & Tsai, 2005; Parsons, Liden, O'Connor, & Nagao, 1991). This trend is interesting given that research fails to reliably link technology adoption to improved organizational performance (Goodman & Rousseau, 2004).

Gaining insight into employee perspectives related to technology changes might strengthen the technology adoption-performance link. It is readily acknowledged that the implementation of technology is prompting modifications in organizational processes, tasks, and the nature of work (e.g., Dewett & Jones, 2001; Mirvis, Sales, & Hackett, 1991; Taylor, 2004). Quite often, technologically driven change has resulted in an increase in the number of individuals who use personal computers as a component of their jobs (Igbaria & Parasuraman, 1996; Nord & Nord, 1994; Sheng, Pearson, & Crosby, 2003). This infusion of technology has had a tremendous effect on employee morale, changing the nature of jobs, and impacting interactions with co-workers (Agarwal & Prasad, 1999; Mirvis et al., 1991; Reynolds, 2004; Thach & Woodman, 1994).

Researchers have studied (1) the effects of technology adoption on employee attitudes (e.g., Hebert & Benbasat, 1994; Owen & Demb, 2004; Rossetti & DeZoort, 1989); (2) ways that organizations can improve reactions to new technology (e.g., Venkatesh, 1999; Wicks, 2002); (3) the impact of technology on individuals and their job tasks (Bhattacherjee & Premkumar, 2004; Goodhue & Thompson, 1995); (4) how technology impacts individual job performance (Goodhue & Thompson, 1995; Kontogiorghes, 2005); and (5) the potential impact of certain employee attitudes on the adoption of service-related technology (Hebert & Benbasat, 1994; Tsikriktsis, Lanzolla, & Frohlich, 2004).

Findings related to the implementation of technological change suggest that the adoption of technology changes by individuals is largely based on their perceptions of how the technology will impact their jobs. Consequently, it appears that individuals who perceive that technology changes will improve their ability to perform their job tasks may be
more willing to adopt the technology. In addition, findings suggest that technology changes impact employee attitudes (Griffin, 1991; Owen & Demb, 2004). The purpose of this study is to more closely examine the dynamic relationship between employee attitudes and reactions to new technology.

**Figure 1: Employee Attitudes, Involvement and Reactions to Technology Change**

<table>
<thead>
<tr>
<th>Involvement and Participation</th>
<th>Pre-Change Attitudes</th>
<th>Reactions to Technology Change</th>
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It is readily accepted that organizational change impacts employees in a variety of ways (French, Bell, & Zawacki, 2000). Consequently, the impact of organizational change on employee attitudes has received considerable research attention (e.g., Gardner, Dunham, Cummings, & Pierce, 1987; Griffin, 1997; Lines, 2004; Saari & Judge, 2004; Schweiger & DeNisi, 1991). Research indicates that employee attitudes are related to how individuals perceive or react to change (Moss holder, Settoon, Armenakis, & Harris, 2000). This is important since positive perceptions of change can enhance the implementation of these organizational initiatives (Lines, 2004; Armenakis, Harris, & Field, 1999). In this study, employee attitudes are investigated when organizational change is caused by the introduction of new technology. As depicted in Figure 1, salient attitudes of interest include job satisfaction, organizational commitment, intent to turnover, and job stress.

**Organizational Change and Employee Attitudes**

Figure 1 depicts the relationships between technology change, employee attitudes, and involvement that will be the focus of this study.

**Job Satisfaction**

Job satisfaction is one of the most extensively researched work-related attitudes (Loscocco & Roschelle, 1991). Saari and Judge (2004), however, observed that HR practitioners lack thorough knowledge of job satisfaction and related antecedents. Job satisfaction is operationally defined as an individual’s assessment of the degree to which their work-related values have been achieved (Locke, 1969; Locke, 1976). Research suggests that organizational change has a discernable impact on job satisfaction (see, for example, Ferguson & Cheyne, 1995) which is associated with organizational citizenship behaviors that are beneficial to organizational effectiveness (Organ, 1990).

**Organizational Commitment**

Organizational commitment is also a frequently studied job attitude (Lines, 2004; Loscocco & Roschelle, 1991). Definitions and conceptualizations of the organizational commitment construct are numerous and
diverse. Morrow (1983) observed at least 25 different conceptualizations of organizational commitment. Despite this diversity, O’Reilly and Chatman (1986), among others, suggest that psychological attachment to an organization is a theme underlying most conceptualizations of organizational commitment. Of particular interest in this study is the relationship between affective organizational commitment and reactions to the organizational changes since individuals with high levels of affective commitment tend to exert extraordinary effort on behalf of an organization (Porter, Steers, Mowday, & Boulian, 1974). In addition, individuals with high levels of affective commitment are likely to remain with an organization because they want to remain with the organization (Porter et al., 1974), not because they have no other alternatives or because of social pressure.

**Intent to Turnover**

Employee turnover is costly for organizations. Consequently, organizations and researchers alike are interested in understanding potential antecedents of turnover in order to avert the costly loss of valued employees. In addition to costs associated with replacing departed employees, the success of organizational initiatives such as mergers or acquisitions can also be impeded by the loss of staff (Begley & Yount, 1994). Common antecedents of employee turnover include intent to turnover, low job satisfaction, and low organizational commitment (Tett & Meyer, 1993). Of these variables, a person’s stated intentions of future turnover (intent to turnover) appears to be the most powerful predictor of actual turnover behavior (Vandenbergen & Nelson, 1999). Given the likelihood that organizational change can impact job security, as well as other antecedents, turnover (Ashford, Lee, & Bobko, 1989), in the form of intent to turnover, is included as a variable in this research.

**Job Stress: Role Stressors**

Organizational change can be stressful to employees (Bartunek, 1984; Buchanen, 2003), affecting the well being of an organization (McHugh, 1997). In their study on technology implementation, Wang and Paper (2005) reinforce the need to recognize stress in conjunction with an organizational change. Consequently, examining the relationships between levels of employee stress and employee reactions to technology change may improve our understanding of how individual reactions affect role-related stress in the midst of these changes.

**Reactions to Change**

Employee reactions to change, in part, impact the success of change initiatives (Jick & Peiperl, 2003; Jick, 1993; Kanter, Stein, & Jick, 1992). It is easier to implement change that is viewed positively by employees than that which is viewed negatively (Armenakis et al., 1999; Lines, 2004). Consequently, as shown in Figure 1, it is suggested that managing employee reactions to change is an important component in managing the overall process of change (Jick, 1993). Jick (1993) further notes that those who have not participated in the planning or implementation of the change experience the full impact of the change. Specifically, employees often experience changes in job duties or other functions that were planned and implemented solely by leaders or managers that are not directly impacted by the changes. Evidence indicates that those who have been involved in decisions related to the change may react differently, by being more supportive of the change, than those who were not involved.

There are numerous and varied forms of reactions to change (Armenakis & Bedeian, 1999). A variety of studies treat job attitudes, such as job satisfaction, as reactions to change (e.g., Gardner et al., 1987). More recent studies, however, have attempted to directly assess employees’ emotional reactions to change by analyzing the content of qualitative responses to open-ended questions (e.g., Mossholder et al., 2000). Researchers in other studies have developed their own quantitative measures to assess employees’ perceptions about specific changes (e.g., Iverson & Pullman, 2000). It has been suggested that this method of capturing employee assessments of change may be a better reflection of employee reactions to change than job attitudes (Mossholder et al., 2000). This research uses the aforementioned method for assessing employee reactions to technology change, with employee reactions defined as employee assessments or perceptions of how
each of the changes impacted them. As such, the examination of these reactions to change is intended to tap into individuals’ cognitive schema related to the change (Armenakis & Feild, 1993). According to Armenakis and Feild (1993), “A schema is the interpretive framework used by individuals to give meaning to observed objects, actions, and behaviors” (p. 405). This conceptualization of reactions to change is also consistent with Piderit’s (2000) multidimensional view of responses to change along cognitive, emotional, and intentional dimensions.

Reactions to change in the context of this research are conceptualized as employee assessments or perceptions of how each of the changes impacted them. As mentioned previously, this method of characterizing and assessing employee reactions is intended to represent, to an extent, individuals’ cognitive schema related to the changes (Armenakis & Feild, 1993). As noted by Armenakis and Feild (1993), individuals’ schema are used by individuals to interpret and give meaning to actions and behaviors.

**Employee Participation and Reactions to Change**

Recent research provides evidence that allowing employees to participate in making decisions related to a change initiative has a positive impact on the overall success of the change (Lines, 2004). In regard to technology, it has been observed that user involvement and participation in technology decisions is of paramount importance in the successful adoption of new technology (Mirvis et al., 1991). Failure to include employees in the process, however, can have numerous deleterious implications for organizations. These implications can range from resistance to outright sabotage. Further, numerous attitudinal implications are associated with employee participation or lack of participation (Ferguson & Cheyne, 1995). Specifically, failing to include employees in the process can lead to cynicism. Cynicism, in turn, is linked negatively to job satisfaction (Reichers, Wanous, & Austin, 1997) and commitment (Reichers et al., 1997; Wanous, Reichers, & Austin, 2000).

**Hypothesis 1:** Individuals with high levels of involvement in planning the technology changes will react more positively to the changes than individuals with low levels of involvement.

**Hypothesis 2:** Individual reactions to technological changes will be positively related to pre-change levels of job satisfaction and organizational commitment (i.e., individuals who have higher levels of job satisfaction and organizational commitment will tend to react positively to the changes).

**Hypothesis 3:** Individual reactions to technological changes will be negatively related to pre-change levels of intent to turnover and role-related stress (i.e., individuals who have lower levels of intent to turnover and role-related stress will tend to react positively to the changes).

**Method**

**Contextual Overview of Data Source**

Pseudonyms are used in this study to protect the identity of the organizations discussed in this research (Mirvis et al., 1991). The organization serving as the data source is Southern Health Care (SHC). The number of individuals employed by SHC during the data collection period ranged from 169 to 190. These individuals included management staff, administrative support staff, nursing staff, and health care assistants (HCAs).

Technological changes were implemented to improve the efficiency of SHC’s nursing staff. These changes included a transition from laptop computers used by nurses for their documentation to smaller palm-sized clinical assistant (CE) devices. The CE devices are less expensive and more versatile than the laptop computers. The other technological changes implemented were automated nursing care plans (i.e., clinical pathways). These changes were undertaken to improve the efficiency of the nurses, improve the continuity of patient care and reduce the expenses associated with paper copies.

**Data Collection Procedures**

All data were collected via two separate self-report surveys administered to SHC employees. Surveys were accompanied by a cover letter stating the purpose of the survey, intended use of the data, and the assurance that
participant responses were completely anonymous.

Survey Structure - Surveys were administered to SHC employees at two distinct times with approximately 12 months between the pre-change and post-change administrations. The pre-change survey (T1), administered at the inception of the change process, was comprised of quantitative assessment of employee attitudes. The post-change survey (T2), administered approximately one year after the introduction of the technology changes, was identical to the pre-change survey (T1). In addition, the T2 survey contained questions intended to gauge participant reactions to changes including technological changes.

To the extent possible, well-known, validated measures published extensively in academic research were utilized to conduct this study. With all measures, a threshold for internal reliability, as measured by Cronbach’s Alpha exceeding .70, was necessary for inclusion in this study.

Survey Administration - All of SHC’s 169 employees were given the opportunity to participate in the initial, pre-change survey (T1). Ninety-eight individuals completed T1 surveys for a response rate of 58 percent. In addition to responding to survey questions, participants were asked to provide a five-digit personal identification code that would be used for matching their responses on subsequent surveys. All of SHC’s employees were given the opportunity to complete the post-change survey (T2). Approximately 190 individuals were employed by SHC during the T2 administration. One hundred thirty five individuals completed T2 surveys for a response rate of 71 percent. Of those 135 individuals, 72 indicated that they had completed T1 surveys. The responses for T2 were matched with T1 responses resulting in 72 matched pairs of respondents for the final sample. These 72 usable pairs represented an overall response rate of 43 percent (72/169). This response rate and sample size are similar to response rates reported in other organizational behavior studies (e.g., Begley & Czajka, 1999; Cartwright & Cooper, 1989; Daniels & Bailey, 1999; Parsons et al., 1991).

Survey respondents were classified into four job categories. These job categories included administrative support (21.1 percent), HCA’s (22.5 percent), nurses (45.1 percent), and management (11.3 percent). Racial composition of the participants was 30.4 percent African American and 68.1 percent white. The majority of participants were female (94 percent), over age 40 (71.4 percent), and had worked with SHC for over five years (74.6 percent).

Measurement of Reactions to Technological Changes

Reactions to technology change (i.e., upgrading from laptops to CE devices and automating clinical paths) were assessed using a two-item measure. The first item asked participants to indicate how they felt the “changes in the clinical documentation system from laptops to CE devices” impacted them by circling the corresponding item on the response scale. The second item asked participants to indicate how they felt “automating clinical pathways from hard copies” impacted them. The response scale for both items ranged from 1 = “very negative” to 5 = “very positive.” The mean of participant responses to these two items reflects their reaction to these technological changes with lower averages indicating less positive reactions and higher averages indicating more positive reactions. Combining these items into a single measurement scale is appropriate given the reasonably high correlation between these two items (r = .61, p < .001).

Measurement of the Level of Involvement in Planning Technology Changes

Participants were divided into two distinct groups based on their level of involvement in planning the technology changes. For the purpose of this research, a code of “1” was assigned to individuals with high levels of involvement and a code of “0” was assigned to participants with lower levels of involvement in planning the technology changes.

Measurement of Employee Attitude Variables

Job Satisfaction - Job satisfaction was assessed using the three-item measure from the Michigan Organizational Assessment Questionnaire (MOAQ) (Cammann, Fichman, Jenkins & Klesh, 1983; Seashore, Lawler, Mirvis, & Camman, 1982). Participants indicated their level of agreement with scale
items based on a seven-point Likert-type scale with options ranging from 1 = “strongly agree” to 7 = “strongly disagree.” After reverse scoring appropriate items, scale scores were obtained by calculating the mean of the participants’ three responses. This measure and a subset of items from this measure have demonstrated external validity as evidenced through repeated use (e.g., Brasher & Chen, 1999; Sanchez, Kraus, White & Williams, 1999).

Organizational Commitment - Organizational commitment was assessed using Mowday, Steers & Porter (1979) Organizational Commitment Questionnaire (OCQ). The OCQ is recognized as the most popular measure of affective organizational commitment (Cohen, 1996; Cook & Wall, 1980; Meyer, Paunonen, Gellatly, Goffin, & Jackson, 1989; Tett & Meyer, 1993) and has demonstrated respectable reliability through repeated use (e.g., Angle & Perry, 1991; Ashford et al., 1989; Begley & Czajka, 1993; Brooke, Russell, & Price, 1988; Giffin, 1991; Judge, Thoreson, Pucik, & Welbourne, 1999; Lau & Woodman, 1995; Leong, Furnham, & Cooper, 1996; Mowday et al., 1979; Reichers, 1986; Reichers et al., 1997). As Tett and Meyer (1993) noted in their 155 study meta-analysis, the OCQ is applied in either the 15-item version or a nine-item version. The characteristic difference between the long and short version is that six items deleted from the long version are negatively scored and have been criticized as reflecting intentions to turnover more so than organizational commitment (Morrow, 1983; O’Reilly & Chatman, 1986; Reichers, 1986). In an effort to reduce potential multi-collinearity, organizational commitment was assessed using data from nine of the 15 items from the OCQ. Participants indicated their level of agreement with each item based on a seven-point Likert-type response scale with 1 = “strongly disagree” to 7 = “strongly agree.” Levels of organizational commitment were obtained by computing the mean of the items.

Intent to Turnover - Intent to turnover was assessed using Campan et al.’s (1983) three-item propensity to quit measure from the MOAQ. Participants indicated their level of agreement with scale items based on a seven-point Likert-type scale with options ranging from 1 = “strongly agree” to 7 = “strongly disagree.” As noted above, scale scores were obtained by calculating the mean of the participants’ three responses. This measure, or questions from this measure, have been utilized in several recent organizational field studies (e.g., Becker, 1992; Covin, Sightler, Kolenko, & Tudor, 1996; Griffin, 1991; Larwood, Wright, Desrochers, & Dah, 1998; Morris, Shinn, & DuMont, 1999; Mossiholder et al., 2000).

Role Stressors - Role-related or job stress is multi-faceted, with a diversity of research conceptualizations (Motowidlo, Packard, & Manning, 1986; Sager & Wilson, 1995). This diversity in conceptualizations has prompted some researchers to use multiple measures of stress in their studies. Jamal (1997), for example, used Rizzo, House, and Lirtzman’s (1970) role conflict and role ambiguity scales to measure job stress in his study of self-employed and non-self-employed participants. Similarly, two different stress-related variables, role conflict and role ambiguity, were utilized to measure role-related stress in this study. As noted by Rahim & Psenicka (1996) and Sager & Wilson (1995), role conflict and role ambiguity have been used as variables to assess stress in numerous studies.

Role conflict (conflicting job demands) and role ambiguity (inadequate information about job requirements) have been characterized as role stressors in related research (Brooke et al., 1988; Reichers, 1986). Furthermore, role conflict and role ambiguity are recognized as common stressors in the nursing profession (Hemingway & Smith, 1999). In this study, role conflict was measured using seven items from Rizzo et al.’s (1970) scale. Participants were asked to respond to the seven items by circling one of seven choices on the response scale ranging from “very definitely true” (scored as 7) to “very definitely untrue” (scored as 1). Scale scores were then obtained by calculating the mean of participants’ responses. The external validity of this scale has been bolstered by repeated use in related literature (e.g., Hemingway & Smith, 1999; Moore, 2000; Sargent & Terry, 1998). Role ambiguity was measured using Rizzo et al.’s (1970) six-item scale. Participants were asked to respond by circling one of seven choices ranging from “very definitely true” (scored as 1) to “very definitely untrue” (scored as 7). Scale scores were then
obtained by calculating the mean of participants’ responses. The external validity of this scale has been strengthened by repeated use in related literature (e.g., Hemingway & Smith, 1999; Moore, 2000; Sargent & Terry, 1998).

Control Variables

Demographic Variables - Participants were asked to provide demographic information including their job category, age, organizational tenure, gender, and race. Tenure (Losocco & Roschelle, 1991) is among the most widely researched determinants of work-related attitudes. Consistent with prior research (Ashford et al., 1989; Begley & Czajka, 1993; Reichers, 1986) variance associated with tenure will be controlled in subsequent regression analyses. Given Buchanan’s (1974) assertion that organizational commitment reaches a mature stage of non-growth within the fifth year of tenure, participants with five years or more tenure will be dummy coded “1” while participants with less than five years tenure with SHC will be dummy coded “0.” This paper will refer to individuals with over five years of tenure as “high tenure” and those with less than five years were referred to as “low tenure.”

Negative Affectivity - Negative affectivity is a common control variable in studies examining attitudes such as job satisfaction and organizational commitment (e.g., Begley & Czajka, 1993), and has been shown to influence relationships between stressors and subsequent levels of distress. Similarly, Fox, Dwyer, & Ganster (1993) suggested that the results of research regarding job stress could be confounded by the dispositional influence of negative affectivity. Negative affect was measured using Levin and Stokes (1989) 21-item measure. Participants indicated their level of agreement with each item by responding to a seven-item Likert-type scale with responses ranging from 1 = “strongly disagree” to 7 = “strongly agree.” Consistent with customary use of this scale, participant scores were obtained by computing a mean of their responses after reversing scores for negatively worded items. Consequently, lower averages indicate lower levels of negative affect while higher averages indicate higher levels of negative affect.

Data Analyses

Hypotheses were tested using hierarchical regression. Hierarchical regression models are particularly effective in showing the incremental and cumulative impact of independent variables in explaining variation in the dependent variable (Cohen & Cohen, 1975).

Independent variables thought to have the strongest linear relationship with the dependent variables are entered first, with other variables entered into subsequent blocks to determine if they explain additional, incremental variation in the criterion variables of interest (see, for example, Parsons et al., 1991). As a result, demographic variables, including tenure, are often entered first into the regression model since the researcher wishes to control for the potential influence of these variables (see, for example, Becker, 1992; Begley & Czajka, 1993; Reichers, 1986). Consequently, job tenure will be included in the first block of the hierarchical regression model. The potential effect of negative affectivity on reactions to the technology changes will also be controlled for by entering this variable into the first block of the hierarchical regression model.

Results

Means, standard deviations, reliabilities (as measured by Cronbach’s Alpha), and zero-order correlations among research variables are shown in Table 1.

All variables demonstrated respectable internal reliability coefficients (i.e., coefficient alpha; Cronbach, 1951) exceeding the accepted threshold of .70 (Litwin, 1995; Nunnally, 1978). Internal reliability for the variables ranged from $\alpha = .74$ for post-change (T2) job satisfaction to $\alpha = .96$ for post-change (T2) intent to turnover.

Descriptive statistics (i.e., mean and standard deviation) for dummy variables are also shown in Table 1. As stated previously, dummy variables were coded as either “1” or “0.” As a result, the mean shown for each dummy variable in Table 1 indicates the proportion of participants coded as “1” (Hardy, 1993). For
Table 1

Means, Standard Deviations, Reliabilities, and Correlations for Research Variables

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<th>Variable</th>
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<td><strong>Control Variables</strong></td>
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<td>3. Job Satisfaction</td>
<td>5.49</td>
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<td>4. Organizational Commitment</td>
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<td><strong>Intent to Turnover</strong></td>
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<td>5. Role Ambiguity</td>
<td>17.31</td>
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<td>-.37**</td>
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<td>7. Job Satisfaction</td>
<td>5.66</td>
<td>1.25</td>
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<td>9. Organizational Commitment</td>
<td>5.49</td>
<td>1.25</td>
<td>.12</td>
<td>-.26*</td>
<td>.36**</td>
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<td><strong>Intent to Turnover</strong></td>
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<td>10. Role Ambiguity</td>
<td>16.89</td>
<td>4.42</td>
<td>-.28*</td>
<td>.26*</td>
<td>-.22</td>
<td>-.13</td>
<td>.19</td>
<td>.53**</td>
<td>.09</td>
<td>-.51**</td>
<td>-.42**</td>
<td>.46**</td>
<td>(.82)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Role Conflict</td>
<td>26.80</td>
<td>6.09</td>
<td>-.04</td>
<td>.11</td>
<td>-.28*</td>
<td>-.01</td>
<td>.26*</td>
<td>.31**</td>
<td>-.08</td>
<td>-.32**</td>
<td>-.20</td>
<td>.33**</td>
<td>.23</td>
<td>(.83)</td>
<td></td>
</tr>
<tr>
<td><strong>Reactions to Change</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Technology</td>
<td>4.00</td>
<td>.94</td>
<td>-.03</td>
<td>-.25*</td>
<td>.46**</td>
<td>.01</td>
<td>-.30</td>
<td>-.32**</td>
<td>.02</td>
<td>.38**</td>
<td>.32**</td>
<td>-.41**</td>
<td>-.17</td>
<td>-.10</td>
<td>(.76)</td>
</tr>
</tbody>
</table>

Note: Internal reliability coefficients for each of the variables are shown in ( ) along the diagonal. Internal reliability for the tenure and the two involvement variables was were not assessed since these were dummy variables.
example, the mean for the tenure variable (M = .74) indicates that the proportion of higher tenure individuals was larger than the proportion of lower tenure individuals (since high tenure was coded “1”). The mean for the involvement in technology change variable (M = .76) is merely an indication that there was a higher proportion of individuals involved in the technology changes compared to those not involved. Also, it is interesting to note that a significant negative correlation existed between negative affectivity and reactions to technological changes (r = -.25, p < .05) suggesting that individuals who had high levels of negative affectivity tended to react more negatively to the technological changes.

Pre-change (T2) job satisfaction was positively correlated with reactions to the technological changes (r = .46, p < .01). This suggests that participants who had higher job satisfaction prior to the changes tended to report more positive reactions to the technology changes. By contrast, pre-change (T1) levels of role ambiguity were negatively correlated with reactions to the technological changes (r = -.32, p < .01). This suggests that those participants who viewed their roles as less ambiguous prior to the changes reported more positive reactions to the technology changes.

The level of involvement (i.e., high involvement) participants had in the changes were also related, in a bi-variate sense, to participants’ reactions to the technological changes (r = .43, p < .01). This indicates that individuals with high levels of involvement in planning the technology changes reported comparatively more positive reactions to the changes than those individuals with lower levels of involvement.

**Results of Hypotheses Tests**

Table 2 reports results of the hierarchical regression model for reactions to the technological changes. An examination of the results indicate that the level of involvement in the technology changes was significantly and positively related to reactions to the technological changes (β = .29, p < .01).

Hypothesis 1 predicted that individuals with high levels of involvement would react more positively to changes than individuals with lower levels of involvement. Thus, the results support this hypothesis. It is also important to note that the involvement variable explained an additional 14 percent (ΔR² = .14, p < .01) of the variation in the reactions to technological changes variable above the control variables.

Hypothesis 2 predicted that reactions to the changes would be positively related to pre-change levels of job satisfaction and organizational commitment. The regression coefficients for the job satisfaction variable (β = .03) and organizational commitment variable (β = -.01) were not statistically significant. Consequently, the results of this model did not support Hypothesis 2.

Hypothesis 3 predicted that reactions to the organizational events and changes would be negatively related to pre-change (T1) levels of intent to turnover and stress. As the results in Table 2 indicate, the regression coefficient for the intent to turnover variable (β = -.23, p < .10) was moderately significant, but did not meet the a priori type I error cutoff of α <= .05.

The regression coefficient for the role ambiguity variable (β = -.23, p < .05) was statistically significant indicating that higher levels of pre-change (T1) role ambiguity were predictive of more negative reactions to the technological changes. The role conflict variable (β = .05) was not statistically significant. Consequently, it appears that pre-change levels (T1) of intent to turnover and role conflict were not predictive of reactions to the technological changes with this sample, while role ambiguity demonstrated a statistically significant, negative relationship with reactions to the technological changes. Thus, the results partially supported Hypothesis 3.

Results indicate that individuals who perceived more ambiguity in their roles prior to the technological changes tended to react more negatively to the technological changes. The subset test for block 3 was moderately significant (F = 2.25; p = .06) indicating that pre-change attitudes did explain significant variation in reactions to the technology changes, above and beyond the variation explained by the variables in blocks 1 and 2. The full model F statistic was statistically significant (F = 3.31, p < .01) with the variables collectively explaining approximately 30 percent (R² = .31) of the variation in reactions to the technology changes.
Discussion

Individuals with a high level of involvement in the technology changes included employees predominantly in the management job category, nurse job category, and the administrative support job category. The health care assistant job category had a low level of involvement in the technology changes. Nurses were most directly impacted by the technological changes since individuals in this job category were required to make the transition from using laptop computers to using smaller palm-sized CE devices. Nurses were also required to switch from hard copy versions of clinical pathways that are used to plan the services provided to patients to an automated version of these pathways. Leadership was also directly involved in these changes since the changes were made at their direction, and since management staff required frequent reports on the status and effectiveness of these changes. Administrative support staff experienced a decrease in their workload since it was no longer necessary for them to make photocopies of the hard copy versions of the clinical pathways. As hypothesized, individuals with high levels of involvement reported higher mean reactions (i.e., more positive reactions) than individuals with low levels of involvement. Again, these results were anticipated since individuals in HCA jobs were not directly impacted by the technology changes. It is

Table 2
Hierarchical Regression Results of Pre-change Attitudes and Reactions to Technological Changes

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>b</th>
<th>β</th>
<th>t</th>
<th>ΔR²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tenure</td>
<td>.05</td>
<td>.03</td>
<td>.23</td>
<td></td>
</tr>
<tr>
<td>Negative Affectivity</td>
<td>-.07</td>
<td>-.06</td>
<td>-5.3</td>
<td>.04</td>
</tr>
<tr>
<td>Block 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of Involvement</td>
<td>.62</td>
<td>.29</td>
<td>2.56</td>
<td>.14</td>
</tr>
<tr>
<td>Block 3 (Pre-change Attitudes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>.02</td>
<td>.03</td>
<td>.17</td>
<td></td>
</tr>
<tr>
<td>Organizational Commitment</td>
<td>-.01</td>
<td>-.01</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>Intent to Turnover</td>
<td>-.09</td>
<td>-.23</td>
<td>-1.43</td>
<td></td>
</tr>
<tr>
<td>Role Ambiguity</td>
<td>-.05</td>
<td>-.23</td>
<td>-1.75</td>
<td></td>
</tr>
<tr>
<td>Role Conflict</td>
<td>.01</td>
<td>.05</td>
<td>.37</td>
<td>.13</td>
</tr>
<tr>
<td>Model R²</td>
<td>.31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model F</td>
<td>3.31**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Regression coefficients, t statistics, and significance levels are from the final block in the regression model.

n = 72
b – unstandardized beta coefficient
β – standardized beta
† p < .10
* p < .05
** p < .01
important to note that while HCA reactions were significantly lower than reactions of others in high involvement job categories, the mean HCA reactions to the technology changes were 3.27 indicating that these individuals were relatively neutral in regard to the technology changes. In conclusion, considering the impact of involvement in technology changes on reactions to those changes is important since user involvement and participation in technology decisions are considered of paramount importance in the successful adoption of new technology (Mirvis et al., 1991).

**Pre-Change Attitudes and Reactions to Technology Changes**

A primary objective of this research was to determine if employee attitudes prior to making technology changes were related to individuals’ reactions to the changes. Hypothesis 2 predicted that reactions to technological changes would be positively related to pre-change levels of job satisfaction and organizational commitment. The results of the hierarchical regression analysis for reactions to the technology changes, shown in Table 2, indicate that pre-change (T1) job satisfaction and pre-change (T1) organizational commitment were not significantly related, statistically, to reactions to technology changes.

Hypothesis 3 predicted that reactions to the technological changes would be negatively related to pre-change (T1) levels of intent to turnover and stress. The results of the hierarchical regression analysis for reactions to the technology changes indicate that pre-change (T1) role conflict was not significantly related, statistically, to reactions to the technology changes. Pre-change (T1) intent to turnover was moderately significant (β = -.23, p < .10). Pre-change (T1) role-related stress as measured by role ambiguity, as predicted, was negatively related to reactions to the technology changes.

Participants who reported that their roles were more ambiguous prior to the technology changes reacted more negatively to the technology changes. Participants who reported perceptions of lower role ambiguity prior to the technology changes, however, reacted more positively to the technology changes. This is not particularly surprising given existing research on role ambiguity. For example, in their seminal work on role ambiguity and role conflict, Rizzo et al. (1970) acknowledge that ambiguity in relation to employee roles can lead to deleterious outcomes such as heightened tension and lower self-confidence. These outcomes, in turn, can impede individual productivity and the achievement of organizational goals (Rizzo et al., 1970).

It is possible that individuals who reported higher role ambiguity also suffered lower self-confidence and, therefore, reacted more negatively because they did not see themselves as capable of implementing the technology changes. Additionally, Rizzo et al. (1970) also reported that role ambiguity was associated with lower levels of satisfaction. These findings are corroborated by the negative correlation between job satisfaction and role ambiguity observed in this research (r = -.46, p < .01). The dynamics of this relationship are further compounded by a positive correlation observed between role ambiguity and intent to turnover (r = .31, p < .01). It is possible that individuals’ perceptions of role ambiguity could have prompted lower levels of job satisfaction and higher levels of intent to turnover. While it is not known from this data whether role ambiguity preceded job satisfaction or intent to turnover, it appears that the combination of low job satisfaction coupled with high intent to turnover and role ambiguity may have been related to individuals reacting negatively to the technology changes.

**Implications and Conclusion**

**Involvement in Planning and Implementing Technological Changes**

Aligning organizational resources with operational strategies is crucial in the pursuit of success or survival (Dangayach & Deshmukh, 2001; Kotter, 1995; Meilich, 2005). Technology is recognized as one of the four key resources organizations utilize in the pursuit of success (David, 2005), and employee involvement in making requisite technology decisions is crucial in achieving alignment of these costly resources with operational strategies. The results of this study have important implications for the implementation of technology changes. Indeed, employee resistance often thwarts the successful implementation of technological changes (Garson, 1993). Allowing employees to become
involved in making decisions related to technology is important to the success, “especially when employee resistance is a recognized factor” (Garson, 1993: p. 250), since participation can promote a sense of ownership in the process. In fact, researchers agree that failing to include individuals in planning a technological change may impede the success of implementing technological change (Rosetti & DeZoort, 1989).

Leaders in organizations have a variety of options for facilitating employee involvement. For example, if technology changes are broad in scope, a cross-section of employees from different departments could be appointed to planning task forces to help guide the implementation process. If technological changes are being implemented in an organization covering a large geographic area, participation and involvement could be supported through the use of discussion boards, teleconferences, and even joint meetings in centralized locations. Regardless of the methodology chosen by leaders to solicit employee input, it is crucial that leaders demonstrate ongoing support for the technology changes throughout the implementation process.

While the value of allowing individuals to participate in planning technology changes has far reaching implications for most or all individuals in organizations, it is important to note that it is not always practical or possible to permit full involvement. Consequently, organizations should endeavor to focus involvement efforts on individuals who will experience the greatest impact of the technology changes.

The Effect of Pre-Change Attitudes on Reactions to Technology Changes

Another important conclusion, given the findings that pre-change role ambiguity was negatively related to reactions to technology changes, is that organizational efforts to identify the existence of role ambiguity prior to implementing technology changes could enhance the success of these implementation efforts. Based on this study, those who lead technology implementation must take time to interact with individuals to determine if there are salient reasons for individuals perceiving their roles as unclear or ambiguous. Perceptions of role ambiguity could be effectively addressed by making policies and job requirements clear to employees prior to making any changes. In addition, any anticipated modifications to these policies or job requirement associated with the technology changes could also be addressed prior to making the changes in an effort to enhance employee reactions to and acceptance of the technology changes.

In summary, the findings of this research make several important contributions to research related to the implementation of technology changes. First, and most importantly, the results of this study reinforce the value of allowing individuals to participate in planning the technology change process. Also, the results of this study reinforce the importance of considering employee attitudes in the context of technology changes, particularly prior to the changes given the impact these attitudes may have on individuals’ reactions to the technology changes.

References


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