Occupational stress and IT personnel in Singapore: factorial dimensions and differential effects

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Abstract

This study identifies key sources of stress among information technology (IT) personnel in Singapore. The relationships between the various sources of stress and IT personnel's personal characteristics such as gender and job tenure are also examined. Data were collected via a combination of mail survey and interviews. Survey data were collected from 257 IT personnel employed in an organization dealing with IT-related services and products. Factor analysis of survey data reveal six major dimensions of stress: work demands, relationships with others, career concerns, systems maintenance, role ambiguity and administrative tasks. Generally, both survey and interview data suggest that most of the factors which generate stress among IT personnel in Singapore are linked to various characteristics of IT personnel's work environment, particularly pressures associated with the job and organizational characteristics. Implications of the research findings are discussed. © 1999 Elsevier Science Ltd. All rights reserved.

Keywords: Information technology; Information technology personnel; Occupational stress; Systems maintenance

1. Introduction

Occupational stress represents a major problem for both individuals and organizations. Previous research has shown that stress has a negative impact on the health and safety of individuals (Rees, 1995; Westman & Dov, 1997). Costs associated with occupational stress in terms of work days lost, absenteeism, and health costs have significant implications for the organization. Job
stress has been examined in a wide variety of professional groups such as teachers, nurses, accountants, managers, and pilots. To date, little attention has been devoted to examining occupational stress among information technology (IT) personnel. The limited research which exists on this topic generally focused on IT personnel in the United States (Ivancevich, Napier & Wetherbe, 1983; Weiss, 1983). The paucity of research on stress among IT personnel is surprising in light of both anecdotal evidence from popular business magazines as well as empirical evidence from research examining the changing roles of IT personnel. Results of such research suggest that the role of IT personnel has become more complex and demanding, resulting in additional responsibilities for them. Rapid changes in technology have also resulted in significant changes in expectations of users and managers (Leong, 1994; Radding, 1992). Thus, we would expect such changes to pose additional challenges as well as generate considerable stress among IT personnel. Singapore is an ideal country in Asia to investigate stress among this group of professionals due to its heavy reliance on IT to develop the republic into a communication, business and economic centre for Asia and the Pacific Rim countries (Tan & Igbaria, 1994). In pursuit of its IT2000 plan which is aimed at turning Singapore into an intelligent island, the government is placing heavy emphasis on the use of IT to develop an advanced national information infrastructure. The government policy makers recognized the need to develop skilled IT manpower to help Singapore realize its national IT objectives (Teo & Lim, 1998).

IT personnel represent a dynamic workforce in a new and high growth industry of the future. The pool of IT professionals in Singapore has increased nearly 20-fold from 850 in 1980 to 15,800 in 1992, and this number is expected to grow over the years (NCB, 1993). Given the growing number of IT professionals in the workforce and the increasingly important role they undertake in Singapore’s effort to pursue its IT2000 plan, research focusing on what stresses IT professionals is warranted. In fact, with the increasing use of IT by both developing and industrialized countries, IT personnel constitute an important component of the workforce that can aid companies and government in leveraging IT to improve efficiency and compete effectively in the global markets. Thus, it is important for managers and organizations to understand the different types of stressors experienced by IT personnel in order to assist them in better managing stress experienced at the workplace.

One of the major problems which plagued the IT industry in Singapore is the high employee turnover rate of about 14.6% in 1992 among IT personnel (NCB, 1993). While this rate has decreased from 17.3% in 1988, it is still high compared to other industries in Singapore. Employee turnover presents a wide range of problems for organizations. Frequent displacement of skilled IT personnel may lead to escalating costs for organizations as new employees need to be recruited and trained, and may lead to low morale amongst those who remained in the organization (Loh, Sankar & Yeong, 1995).

As more and more organizations continue to rely on IT for their effectiveness and competitive advantage, the demand for skilled IT personnel will continue to increase. Against this context of manpower shortage and high-turnover rates therefore, this study seeks to examine occupational stress among IT personnel in Singapore. Specifically, this study examines various factors which may generate stress for IT personnel. The relationships between the various sources of stress and IT personnel’s personal characteristics, namely gender and tenure are also examined.

Results of this study have significant implications for organizations and individuals who intend to join the IT profession. By identifying and understanding factors at the workplace which would
cause stress for this group of professionals, organizations and government policy makers will be better able to design training, motivation and coping programs to help this group of employees alleviate their stress. In addition, findings of this research would provide those who intend to join the IT profession with a general picture of the demands or stressors which they may encounter on the job.

Conceptualization of stress usually emphasized the following elements: a state of arousal resulting from the presence of socioenvironmental demands that interfere with the ordinary ability of a person to adapt to a particular event or situation (Aneshensel, 1992; Lazarus, 1966). External circumstances that challenge or obstruct the individual’s ability to attain desired goals are labelled stressors; stress refers to internal arousal. A stressor may be a perceived or objective external factor, such as demand, constraint, or deprivation that bring about outcomes such as job dissatisfaction, performance decrements and negative work-related attitudes (Fenlason & Beehr, 1994).

2. Sample and procedure

Respondents for this study consisted of IT professionals employed in a large organization dealing with technology-related industrial products and services. The organization is a leading local IT supplier, providing a comprehensive range of products, solutions and services to a wide customer base in Singapore and the Asian–Pacific region.

The questionnaire was initially pretested with 10 IT professionals to elicit feedback regarding the clarity of instructions and questions in the instrument. Comments and suggestions obtained from the pretest served as a basis for fine-tuning items and the final presentation of the questionnaire.

Three-hundred and fifty questionnaire packages containing the cover letters, survey instruments and returned envelopes were given to the Human Resource manager to be distributed to IT professionals in the company. The Human Resource manager sent an electronic mail to respondents, explaining to them the purpose of the study and encouraging them to participate. One week after the initial distribution of the questionnaires, a reminder was sent to respondents through the electronic mail by the Human Resource manager. Of the 350 packages distributed, 260 were returned. Three questionnaires were not usable due to incomplete responses. A total of 257 surveys were included in the final analysis, thus constituting a usable response rate of about 73%.

Approximately one month after the initial survey administration, focus group interviews were conducted with five groups comprising 4–5 IT personnel in each group. In all, 24 IT personnel agreed to participate in the focus group discussions. The focus group interviews were conducted in the company’s premises. Each session lasted for an average of one and a half hours. The focus group interviews were aimed at supplementing the survey responses as well as obtaining information not directly elicited in the questionnaire. Respondents were also probed further about their responses to the survey.

3. Instrumentation

Items measuring the variables in this study were derived from an extensive review of the literature on occupational stress. Wherever possible, scales that operationalized constructs were
Sources of stress – Previous research on stress has been conducted using occupation specific instruments targeted at specific professions such as nurses, managers, accountants and teachers among others (Cooper, Sloan & Williams, 1988; Davidson & Cooper, 1983; Tung, 1980). To use these occupation specific scales for IT personnel would not be very appropriate. In developing the scale for IT personnel in this study, personal interviews were conducted with 15 IT personnel in the initial phase of the study to help us identify some of the common stressors they experienced in their work. Issues and concerns raised by the IT personnel interviewed were noted. These interviews formed the basis for the construction of the JSITS (Job Stress for IT Personnel Scale). In addition to the interviews, we also conducted an extensive review of the literature on occupational stress. Various scales used to measure occupational stress among members of other profession such as teachers, nurses and managers were reviewed. Based on our interviews and literature review, 74 items were developed to assess sources of stress in the present study. Items in the JSITS appeared to be a representative sampling of the types of stressful situations IT personnel experienced. Items were factor-analyzed to yield various dimensions of stress. Results of factor analyses will be discussed in a later section.

Other research variables in this study were adapted from previous research where psychometric properties have already been established. These variables include:

3.1. Job (dis)satisfaction

This variable was measured using the five-item general satisfaction scale adopted from the Job Diagnostic Survey (JDS) developed by Hackman and Oldham (1975). This scale was chosen because it has been extensively used in the organizational behaviour literature. Generally, the JDS has been found to have very good inter-item reliability with reported Cronbach alphas varying from 0.84 to 0.90. The items on this scale were ranged from (1) Disagree strongly to (7) Agree strongly. In this study, the Cronbach alpha of this scale was 0.70. Items were reverse scored to yield a job dissatisfaction variable.

3.2. Job-induced tension

This variable was assessed with the scale developed by House and Rizzo (1972). This scale consists of seven items which measure respondents’ perceptions of pressures and frustrations stemming from their work. In the present study, the seven items yielded a Cronbach alpha of 0.89.

3.3. Quit intention

A three-item index developed by Cammann, Fichman, Jenkins and Klesh (1979) was used to assess quit intention. Examples of these items include “I frequently think of quitting my job” and “I will probably look for a new job the next year”. This scale yielded a Cronbach alpha of 0.71 in the present study.

Respondents were also asked to provide their demographic characteristics such as age, gender, marital status, and job tenure.
4. Results

4.1. Profile of respondents

Approximately 53% of respondents were male (N = 136) and 47% were female (N = 121). Of the 257 respondents, 61% were single (N = 157), 38% (N = 97) were married and 1% (N = 3) were divorced. Chinese constitute majority of the respondents, comprising about 95% (N = 244) of the sample. The remaining 5% were made up of the other ethnic groups, Indian (N = 8), Malay (N = 3) and Eurasian (N = 2). The mean age of respondents was 29 yr and the mean job tenure was 2.5 yr. Respondents reported an average of 48 h worked per week.

4.2. Sources of stress

In order to determine the key dimensions of stress, factor analyses were performed. Items with low factor loadings of below 0.40 were eliminated and subsequent factor analyses were carried out. The fifth analyses resulted in six interpretable factors which explained 57.3% of the variance. In order to ensure that items comprising each factor are internally consistent, reliability assessment was performed using Cronbach alpha. The Cronbach alpha for all the six dimensions showed that further omission of items would not lead to any significant improvement in reliability. The values of Cronbach alpha for all six dimensions of sources of stress are equal to or above the recommended value of 0.60 for exploratory research (Nunnally, 1978). Results of factor analyses are shown in Table 1.

Factor 1, explaining 29% of the variance, is labelled “Work demands”. Examples of items forming Factor 1 include “Taking my work home”, “Demands which work makes on my relationship with my family”, “Demands which my work makes on my private/social life”, and “Late nights, early morning hours and weekends needed to complete a project”. In general, this dimension comprises job demands which may create considerable stress and conflict on respondents’ spouse or family. Nieva (1984) suggests that the number of hours worked and the extent to which work is brought home varies across occupations. Some work has more “portable” aspects than others and job incumbents tend to bring these “portable” aspects of their unfinished work home. The work of an IT personnel is generally “portable” in nature. Woo (1989) noted that computer work is absorbing. IT personnel often encounter problems which require them to solve outside normal office hours. Bringing these problems home with them usually entail long hours of work outside the workplace, causing IT personnel to restrict their social lives, friendship and family ties. In fact, from our interviews, the majority of respondents reported that their social life was affected by the amount of work they have to accomplish.

From our interviews, IT personnel also reported that they felt guilty about neglecting their families as a result of their heavy workload. Several of the interviewees reported that their significant others did not understand why they had to work so hard. This lack of understanding coupled with demands from these significant others lead IT personnel to experience considerable stress.

Other items which loaded onto Factor 1 pertain to work overload as a result of resource inadequacy and time pressures. Examples of these items include “Staff shortage”, “Staff turnover rates”, “Unfair distribution of work assignments” and “Inadequate budget and finances to com-
<table>
<thead>
<tr>
<th>Factorial dimensions of stress and items</th>
<th>Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1: Work demands</strong></td>
<td></td>
</tr>
<tr>
<td>(Eigenvalue = 16.24, Var = 29%, Alpha = 0.91)</td>
<td></td>
</tr>
<tr>
<td>54. Taking my work home.</td>
<td>0.78</td>
</tr>
<tr>
<td>52. Demands which work makes on my relationship with my family.</td>
<td>0.78</td>
</tr>
<tr>
<td>53. Demands which work makes on my private/social life.</td>
<td>0.78</td>
</tr>
<tr>
<td>64. Late nights, early morning hours or weekends needed to complete a project.</td>
<td>0.64</td>
</tr>
<tr>
<td>55. My spouse's/family's attitude towards my work/career.</td>
<td>0.64</td>
</tr>
<tr>
<td>47. Inadequate budget and finances to complete my tasks.</td>
<td>0.55</td>
</tr>
<tr>
<td>69. Unfair distribution of work assignments.</td>
<td>0.52</td>
</tr>
<tr>
<td>45. Staff shortage.</td>
<td>0.52</td>
</tr>
<tr>
<td>4. Keeping up with new technology, techniques and ideas.</td>
<td>0.54</td>
</tr>
<tr>
<td>46. Staff turnover rates.</td>
<td>0.53</td>
</tr>
<tr>
<td>66. Having to perform tasks not in my job description.</td>
<td>0.48</td>
</tr>
<tr>
<td>58. Dealing with difficult people at work.</td>
<td>0.47</td>
</tr>
<tr>
<td>74. Working on unnecessary tasks/projects.</td>
<td></td>
</tr>
<tr>
<td>1. Work overload—Having far too much work to do.</td>
<td>0.44</td>
</tr>
<tr>
<td>72. Fear of not being able to complete projects on time.</td>
<td>0.43</td>
</tr>
<tr>
<td>3. Time pressures/deadlines.</td>
<td>0.40</td>
</tr>
</tbody>
</table>

| **Factor 2: Relationships with others** |          |
| (Eigenvalue = 4.39, Var = 7.8%, Alpha = 0.91) |          |
| 40. Relationship with my work colleagues. | 0.83     |
| 43. Relationship with subordinates.       | 0.82     |
| 41. Relationship with suppliers/vendors.  | 0.78     |
| 42. Relationship with customers/users.    | 0.76     |
| 39. Relationship with my immediate superior. |          |
| 44. Lack of social support by people at work. | 0.71     |
| 38. Communication and interaction with other user departments. | 0.57     |
| 68. Incompetent subordinates.             | 0.50     |

| **Factor 3: Career concerns** |          |
| (Eigenvalue = 4.0, Var = 7.0%, Alpha = 0.90) |          |
| 34. Danger of not getting anywhere in my career. | 0.88     |
| 36. Danger of my skills becoming redundant. | 0.85     |
| 35. Danger of being trapped in my present job. | 0.78     |
| 33. Danger of my skills becoming obsolete. | 0.75     |
| 31. Unclear career/promotion prospects. | 0.69     |
| 57. Being undervalued by my company. | 0.63     |
| 32. Inadequate training and development. | 0.62     |
| 73. Inadequate pay relative to the amount of work I am expected to complete. | 0.49     |

| **Factor 4: Systems maintenance** |          |
| (Eigenvalue = 2.6, Var = 4.7%, Alpha = 0.88) |          |
| 11. Computer frauds/loss of database integrity. | 0.73     |
| 6. Increasing dependence of company's operations on computers under your control. | 0.73     |
| 12. Increasing complexity of computer operations and management. | 0.71     |
| 10. Computer breakdown and disaster. | 0.66     |

(continued on next page)
plete my tasks”. Shortage of staff and high turnover are a reflection of the problem which IT industry in Singapore is currently experiencing. High turnover and staff shortage mean that IT personnel who remained with their companies need to take on extra tasks and work even longer hours, thus generating considerable stress for them.

The problems associated with high staff turnover rate are best reflected in the following comment made by one of our interviewees:

The turnover rate in my department is really high. Sometimes, jobs are passed over completely after staff has left. No documents left for the existing systems being maintained result in much time wasted searching for information so that work can be completed. I feel like quitting even though I have been with the organization for less than a year.

Factor 2 comprises items which deal with IT personnel’s relationships with others at work. This factor is labelled “Relationship with others” and accounts for 7.8% of the common variance. Items which loaded onto this factor include “Relationship with subordinates”, “Relationship with customers/users”, “Relationship with suppliers/vendors”, “Relationship with work colleagues”, “Lack of social support by people at work” and “Communication and interaction with other user departments”.

Interview results generally suggest that IT personnel experienced stress arising from lack of support from their work colleagues and supervisors as reflected in the following comments:

Not having enough support from supervisor is really a problem for me. I have no one to turn to when I encounter difficulties in my work.
My immediate superior is not competent and does not understand the nature of my work. Often, I am blamed for things which are beyond my control.

Sometimes, it is very difficult to work with people who are uncooperative. In IT, teamwork is important. Working with such people often prevents work from progressing.

Factor 3 comprises items that deal with IT personnel’s concern with their career prospects and advancement. This factor is labelled “Career concerns” and accounts for 7% of the variance. This stress dimension combines items which explicitly relate to lack of career or promotion prospects such as “Danger of my skills becoming redundant”, “Danger of my skills becoming obsolete”, “Danger of being trapped in my present job”, and “Inadequate training and development”.

That the item “being undervalued” loads on Factor 3 is probably best explained by IT personnel’s belief that their efforts are not recognized and they do not earn as much as they should. In fact, results from our interviews reveal that being undervalued and being paid less than one’s worth are commonly cited sources of stress among IT personnel. One system analyst interviewed by us made the following remark:

My peers in other professions are being paid more than me. I am actually thinking of changing jobs, or even career, to get higher pay and better fringe benefits.

Such findings are consistent with the results of a survey conducted by Wee (1994) which show that IT professionals perceive that they are paid less than they are worth. Such sentiment is commonly echoed by IT personnel in our study who complained that they are “overworked and underpaid”.

Another item which loads on Factor 3 is inadequate or poor quality of training and management development. IT personnel may view inadequate training opportunity as a source of stress as it reflects a lack of concern on the part of the organization or employer to assist them in their professional development and career advancement. In our interviews, we discover that the majority of IT personnel express a desire to upgrade themselves professionally through advanced training and lament that such development opportunities are absent in their present organization. In fact, a lack of professional development has been found to be a major factor for employee turnover in the IT industry in Singapore.

Factor 4 accounts for 4.7% of the variance and is labelled “Systems maintenance”. This factor grouping combines those stressors whose source might be identified as originating from IT personnel’s responsibility in maintaining IT systems in the organization. Items in this dimension include “Increasing dependence of company’s operations on computers under your control”, “Increasing demands for more and better systems”, “Having to maintain a large number of old systems”, “Computer breakdown and disaster” and “Computer frauds/database integrity”.

An interesting finding which pertains to stress arising from systems maintenance is reflected in the following comments made by several of our interviewees whose job responsibility involves the maintenance of legacy or old systems:

The major stress I felt is the lack of opportunity to keep current, not the mere fast pace of technological advancement as my job requires me to maintain old legacy systems. I do not have the opportunity to keep abreast of the latest in the field as I deal only with old systems.
Systems maintenance and providing support to an old, undocumented system is a difficult task. I would rather be involved in the development and maintenance of new application systems.

Our findings seem to suggest that much of the stress arising from systems maintenance involved the maintenance of old legacy systems. In fact, interviews with several IT managers revealed that new IT personnel who are responsible solely for the maintenance of such systems often feel that they are handicapped as they are not able to acquire skills pertaining to the latest developments in the IT field. These IT personnel often suffer from low morale because their lack of experience with new developments in information technology may limit their occupational mobility as such new skills are in great demand.

Factor 5 represents “Role ambiguity” and explains 4.5% of the common variance. Items which load onto this dimension include “Lack of clarity about my roles and responsibilities”, “Lack of clarity about objectives and priorities in my work”, “Frequent changes in objectives and priorities” and “Conflicting job and task demands”.

IT personnel occupy a boundary spanning role in that often, they have to deal with many different parties and fulfill the needs and expectations of customers, users, clients and different departments. Demands and expectations from different parties may conflict with each other, thus generating considerable stress for IT personnel. In our interviews with respondents in this study, one major complaint reported was that IT personnel’s bosses usually promised clients more than the company can actually deliver. Often, IT personnel have to end up trying their utmost to deliver what their bosses had promised to the clients. IT personnel reported that often, their bosses are more concerned in satisfying clients and customers at the expense of employees in the company.

Finally Factor 6, accounting for 4.3% of the variance, represents stress pertaining to “Administrative tasks”. Items which loaded onto this dimension include “Attending meetings” “Writing memos, letters and reports” and “Attending to administrative tasks”.

IT personnel interviewed commented that they have to complete a considerable amount of administrative tasks while at the same time respond to users’ requests and other urgent tasks.

5. Differential effects

Previous research on occupational stress suggest that stress experienced by individuals may vary with the individual’s personal characteristics (Aneshensel, 1992; Ivancevich et al., 1983; Jick & Mitz, 1985). In this study, two personal characteristics are examined: gender and job tenure.

5.1. Gender

Existing research on gender differences in occupational stress has generally been predicated upon data collected from samples in the West (Beatty, 1996; Davidson & Cooper, 1983; Martocchio & O’Leary, 1989; McDonald & Korabik, 1991). These studies have generally yielded equivocal findings. In a meta-analytic review of studies on gender differences in work stress, Martocchio and O’Leary (1989) found no significant difference in occupational stress between men and women.
McDonald and Korabik (1991) on the other hand, found that women reported being subjected to different types of stress than did men. These authors found that female managers were more likely than their male colleagues to report stress arising from work/home interface, discrimination, and gender-based barriers in the workplace and problems in managing subordinates.

Based on their study on occupational stress among human resource (HR) professionals, Nelson, Quick & Hitt (1990) noted that female HR professionals reported significantly more stress as a result of organizational politics than their male counterparts. In their influential work on stress, Davidson and Cooper (1983) found that generally, women managers experienced significantly more pressure and reported a greater number of stress manifestations than their male counterparts. Generally, woman managers reported stress arising from the work, home/social and individual arenas. In contrast, Tung’s (1980) study on occupational stress among male and female educational administrators suggested that women experienced significantly lower levels of self-perceived occupational stress than men.

In a study of managerial and professional women, Beatty (1996) found that contrary to initial expectations, findings of the study suggest that managerial and professional women experienced increased health and well-being from attaining higher levels of occupational status. These women did not exhibit high levels of anxiety and depression as a result of work stress.

In order to determine if gender differences in occupational stress exist among IT professionals in our study, t-tests were performed. Results of t-tests are presented in Table 2. Table 2 shows that generally, female IT personnel have higher mean scores than their male counterparts on the following stress dimensions: work demands, relationships with others, systems maintenance, role ambiguity, and administrative tasks. However, only the differences in the mean scores for work demands, systems maintenance and role ambiguity between female and male IT personnel were statistically significant.

Work demands deal with the spill-over of work demands on the respondents’ relationships with their families and on the respondents’ social life. That female IT personnel reported significantly higher mean scores than their male counterparts on this stress dimension is hardly surprising given

<table>
<thead>
<tr>
<th>Variables</th>
<th>Male (N = 136)</th>
<th>Female (N = 121)</th>
<th>T-test</th>
<th>Significant level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Work demands</td>
<td>3.96 (0.85)</td>
<td>4.19 (0.73)</td>
<td>−2.27</td>
<td>0.01</td>
</tr>
<tr>
<td>2. Relationships with others</td>
<td>3.22 (1.10)</td>
<td>3.37 (0.92)</td>
<td>−1.20</td>
<td>0.11</td>
</tr>
<tr>
<td>3. Career concerns</td>
<td>4.39 (0.86)</td>
<td>4.31 (0.98)</td>
<td>0.69</td>
<td>0.24</td>
</tr>
<tr>
<td>4. Systems maintenance</td>
<td>3.86 (0.88)</td>
<td>4.03 (0.80)</td>
<td>−1.64</td>
<td>0.05</td>
</tr>
<tr>
<td>5. Role ambiguity</td>
<td>3.78 (0.95)</td>
<td>4.06 (0.82)</td>
<td>−2.53</td>
<td>0.01</td>
</tr>
<tr>
<td>6. Administrative tasks</td>
<td>3.25 (1.08)</td>
<td>3.27 (0.96)</td>
<td>−0.16</td>
<td>0.45</td>
</tr>
<tr>
<td>7. Job dissatisfaction</td>
<td>3.78 (1.05)</td>
<td>4.07 (0.82)</td>
<td>−2.46</td>
<td>0.08</td>
</tr>
<tr>
<td>8. Job-induced tension</td>
<td>3.86 (1.34)</td>
<td>4.27 (1.21)</td>
<td>−2.57</td>
<td>0.05</td>
</tr>
<tr>
<td>9. Intention to quit</td>
<td>4.03 (1.24)</td>
<td>4.21 (1.18)</td>
<td>−1.21</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Standard deviations are shown in parentheses.
that in Singapore, women often have to bear the responsibilities for home-making and child-rearing (Yuen & Lim, 1992). Thus, having to bring work home and working long hours may generate stress for women more often than men.

Previous studies on gender differences in job stress generally suggest that women who are employed in male-dominated profession generally feel a need to prove themselves and set higher standards for themselves (Jick & Mitz, 1985; Martocchio & O’Leary, 1989). In line with such findings, it is plausible that female IT personnel reported significantly higher mean scores on stress arising from systems maintenance compared to their male counterparts because they feel a greater pressure to achieve and to prove that they are knowledgeable and competent in a profession which is generally male-dominated.

Extant research also suggest that women are socialized to appraise stressful and uncertain events in a less confident manner than men (Jick & Mitz, 1985; Martocchio & O’Leary, 1989). As such, it is plausible that female IT personnel reported significantly higher mean scores than male IT personnel on stress pertaining to role ambiguity because they appraise uncertain and conflicting job situations less confidently than men. Comments obtained from focus-group interview sessions seem to support this. One of the female IT personnel remarked:

I do not like it when I don’t have enough information to complete my work. I also feel very stressed especially when I received different instructions from different people regarding what to do. I feel that generally, I am not given enough guidance on how to do my work.

Female IT personnel also reported higher mean scores on job dissatisfaction, job-induced tension and intention to quit. Results of $t$-test however, suggested that only the mean differences for men and women on job-induced tension were statistically significant.

5.2. Job tenure

Job tenure is the length of time an individual has worked in a specific position in an organization. Tenure on the job can have a significant impact on individual’s job attitudes. When an individual has been on the job for a long time, his/her investments in the job and organization (sunk costs) may be greater than someone who has been on the job for a shorter period. Intuitively, a person with longer job tenure would also often be in a higher position and would draw a higher level of income because of his/her seniority. It is plausible that IT personnel with longer job tenure may experience stress arising from different sources compared to their more junior counterparts. To investigate if significant differences in occupational stress exist for IT personnel with different lengths of job tenure, respondents with differing length of job tenure were divided into three groups, namely 0–2 yr; 2–5 yr and those with job tenure of more than 5 yr. One-way ANOVA procedures were then performed on the three groups. Results of ANOVA procedures suggest that higher stress due to career concerns is reported as the length of job tenure decreases. To determine which two groups were significantly different in their mean score differences, post-hoc analyses were conducted using Scheffe procedures.

Findings of Scheffe procedures suggest that the mean score differences on the stress dimension pertaining to career concerns are significant between IT personnel in the 0–2 yr (mean = 4.44) and > 5 yr (mean = 3.87) groups; and between the 2–5 yr (mean = 4.40) and > 5 yr (mean = 3.87) groups. One possible explanation for the higher mean scores on stress arising from career concerns
reported by IT personnel in the less senior tenure group is that being rather new on the job, these individuals are more likely to be concerned with their promotion prospects and career advancement in the organization. Those in the > 5 yr group reported the lowest mean score on stress arising from career concerns because they may be already career plateaued i.e., reached a point in their career where further promotion is unlikely or may be at a stage where their careers have peaked and chances for further vertical mobility may be diminished. In addition, IT professionals in the > 5 yr tenure group may have acquired enough work experience and skills which would make them very employable should they want to leave their present organization.

6. Discussion and implications

The objectives of this study were to examine factors at the workplace which generate stress among IT personnel in Singapore and the relationships between these stress dimensions and IT personnel's personal characteristics, namely gender and job tenure. Six main factors emerge as potential sources of stress: work demands, relationships with others, career concerns, systems maintenance, role ambiguity and administrative tasks. The results of our study are instructive in that they seem to suggest that most of the factors which generate stress among IT personnel in Singapore are linked to various characteristics of IT personnel's work environment, particularly pressures associated with the job and organizational characteristics. These findings have several implications for management.

To the extent that concerns with the lack of career progress and professional development emerged as a major factor in generating stress for IT personnel as suggested by our findings, organizations may want to reevaluate their human resource policies and help individuals especially those in the less tenure group to chart their career paths within the organizations. To help IT personnel progress in their career and develop professionally, organizations can provide development programmes and intensive training to enhance the skills and ability of these individuals.

Findings of this study suggest that female IT personnel reported significantly higher mean scores on the following stress dimensions: work demands, system maintenance and role ambiguity compared to their male counterparts. To assist female IT personnel cope with such demands, organizations need to focus on building a conducive and supportive climate, particularly the support of an immediate supervisor as antidote for stress. Having a mentor to turn to in times of need and who can provide them with feedback and advice may increase the confidence of female IT personnel and help them deal with stress better.

Over the last decade, the IT field has changed dramatically as a result of increasing use of IT in organizations, social and economic pressures and major corporate transformation. Associated with these structural and economic transformations are changes in aspects of the IT personnel's work environment such as increasing users' expectations and demands resulting from increasing cross-functionality of IT jobs. The boundaries of IT personnel's job become more fluid and they are expected to undertake ever-expanding work responsibilities. As organizations continue to leverage IT to compete in the global markets, the job of an IT personnel will inevitably become increasingly more complex and more challenging. In view of this, organizations
can assist IT personnel cope with their ever expanding work roles by hiring more IT staff to
relieve problems associated with labour shortages, providing supervisory support to IT staff
and increasing their awareness regarding the increasing cross-functionality of their job
descriptions. Clarification of responsibilities, relationships and communication of task ob-
jectives are crucial in helping IT personnel cope with their expanding work roles and alleviating
work stress.

Among some of the major problems experienced by the IT industry in Singapore in recent
years are difficulties in recruitment and increasing volume of turnover among IT personnel.
While the local government has taken various steps to increase the number of IT professionals
entering the labour market as previously discussed, staff shortage and turnover remain a
pressing problem that organizations have to deal with. IT professionals usually leave their jobs
for better career advancement, more lucrative pay and better personal growth and development.
In an era where there is an increasing demand for IT personnel as organizations continue to exploit
IT to enhance their competitive advantage, it is crucial that organizations recognize that both male
and female IT personnel constitute important human resources. As such, steps should be
taken to assist these employees, especially the women in their professional development and
career achievements as well as help them to better coordinate their family and work
responsibilities.

7. Limitations and future research direction

Several limitations are inherent in the present study. First, this study’s exploratory nature
and narrow focus on only one organization necessarily limits its conclusions. Attempts to
generalize from the present results, which describe only findings from IT personnel in one
single company must be cautious. However, Chatman and Jehn (1994) noted that firms in
similar industry generally do not develop distinctive cultural patterns because they face
similar environmental constraints and pressures. In dealing with these environmental constraints,
organizations within a similar industry usually adopt similar structures and practices which
enable them to survive. In line with Chatman and Jehn’s arguments, it is plausible that the
cultural patterns within the organization involved in this study do not deviate significantly
from other leading IT supplier firms in Singapore since these organizations generally have
to deal with similar demand conditions, competitive situations and government policies.
Nevertheless, we do acknowledge that management style differentials may exist which may
set one IT organization apart from another. Thus, to extend the generalizability and lend
further corroboration to the findings of the present study, future research could perhaps
focus on the effects of stress among IT personnel from both IT supplier and IT user companies in
Singapore.

Second, the cross-sectional nature of this study makes it difficult to draw causal inferences about
the relationships among the variables. One avenue for future research is to replicate the study using
a longitudinal methodology. However, the use of focus-group sessions to elicit qualitative data to
substantiate the quantitative data collected from the survey helps to lend support to our survey
results.
Third, future studies can expand the scope of this study by including other factors which may potentially affect the stress experience of IT professionals. For instance, individual characteristics such as locus of control, Type A personality and achievement motivation of the individuals may be included in future attempts to address this topic.

References


