# Work stress and job performance in the hi-tech industry: a closer view for vocational education

**Hsiow-Ling Hsieh, Liang-Chih Huang & Kuo-Jen Su**

I-Shou University
Kaohsiung, Taiwan

ABSTRACT: The purpose of the present study is to investigate the relationship of work stress and job performance among hi-tech employees and discuss its relevance to vocational education. The authors targeted the top 1,000 companies in the hi-tech industry from the electron, semiconductor, information and communications fields in Taiwan. The study results indicate that the mean value of perceived work stress was lower than average, and that the variables of gender, age, education, department, position and workplace accounted for the differences in work stress levels. It was also found that the mean value of self-reported job performance was higher than median, and that the variables, such as age, department, position, marriage, workplace and salary, influenced employees' different job performance levels. Furthermore, there was a significant negative correlation between work stress and job performance. It was found that job performance could be predicted by work stress levels; however, an appropriate level of work stress could also promote employees' job performance. After gathering the major findings and inferring conclusions in the article, the authors provide some suggestions that can promote vocational education.

## INTRODUCTION

In recent years, the forms of Taiwan's industry have moved from labour-intensive to capital-and-skill oriented. According to Year 2000 statistics for Taiwan, the total production of hi-tech industry in 1999 was US$65.9 billion: one and an half times greater than what it was ten years ago [1]. This amount covered 59.1% of its total export, indicating that the hi-tech industry would have the greatest potential in developing the Taiwanese workforce. Although the hi-tech industry has a shortened product cycle, the market environment has changed very fast compared to other products.

Most hi-tech employees endure high levels of work stress, which may be derived from work, non-work and/or personal factors [2]. There are always two kinds of reaction to work stress: positive or negative [3]. Adequate work stress can inspire employees' potential and increase their performance; however, excessive work stress will directly influence job performance and business [4]. According to Tseng, hi-tech employees feel much more work stress than those in traditional industries [5]. This illustrates the importance of the study, especially in view of vocational education.

## LITERATURE REVIEW

### The Definition of Work Stress and the Theoretical Models

Seley is the first researcher to analyse stress via scientific methods. Although he tried to conceptualise the definition of stress, many later researchers held other views [6]. Ivancevich and Matteson summarised and sorted the definitions of stress into three categories: stimulus, reaction and stimulus-reaction [7]. Likewise, many researchers have had different perspectives on work stress, most of them exploring it from the relationship between the work environment and the worker [8-11]. Stress refers to workers not being able to adapt to work and,

therefore, involves some biological and psychological reaction. The reason might come from the work environment or that the work does fit the worker's ability.

Many researchers studying work stress have developed various models so far. Although some differences exist, most theories are based on the process of real work stress reaction and its outcome. Prominent models include:

- Process model of work stress: McGrath constructed organisational stress through a four phased, closed-cycle process [12]. The first phase is just like the objective circumstance in the social environment model. When an individual encounters something happening, he/she will sense its existence by the process of cognitive appraisal and then choose an adequate reaction by a process of decision making. Once a reaction is decided upon, it is expressed by the process of performance. Through individual behaviour, he/she may change from the original state. Negative behaviour implies that stress is being experienced.
- Demand-control model: According to Karasek, the demand-control model can effectively anticipate job performance. He proposed that when individuals are under high work-demand and low work-control, some biological and psychological problems will occur. When individuals are under high work-demand and high work-control, they display more positive job performance levels [13].
- Person-environment fit model: The person-environment fit model is based on the concept of interactive viewpoint, and emphasises the interaction between person and environment, focusing on their fitness. According to the model, Kristof found work stress came from different values between the employee and the organisation. When one takes personal performance as their own value, and group performance as the organisational value, it can evoke work stress [14].

The Theory of Job Performance and Its Related Literature

Campbell declaimed that job performance can be easily defined as *all behaviours in work*. He further pointed out that these behaviours should make some contribution to organisational goals. Additionally, he divided performance into efficiency, production and effectiveness. Efficiency can evaluate the outcome of an employee's work behaviours. Production is usually used to determine the cost of efficiency. Effectiveness stands for the value of efficiency and production [15].

Most researchers have not clearly defined the relationship between stressor and job performance, usually making general predictions. Recently, Jex proposed a basic model to present the process of a stressor upon performance, which clearly defined their relationship. There are three dimensions in this model: stressor, antecedents of performance and performance [4]. Jex urged that most stressors could indirectly affect job performance through antecedents of performance, which are influenced mainly by inner personal motivation. The result of a stressor working on performance is not only negative, but also makes a difference because of different personal abilities, thinking styles, personalities and value systems [4].

Schuler believed that work stress places some negative influence, no matter if it is on the person or organisation. It can decease production, lower quality and undermine creativity [16]. Yet, if stress could be managed, a worker's potential would be aroused, thereby increasing job performance [17]. However, Hendrix et al found no direct relationship between work stress and job performance [18].

METHODOLOGY

Subjects

The present study targeted the hi-tech industry in Taiwan. The top 1,000 companies in the electron, semiconductor, information and communications fields were selected as the research population.

Instrument

A self-designed questionnaire was utilised as the research instrument, which was revised from Chen, Chan, and Liao [19-21]. After a pilot study was carried out, an item analysis was set. A principal components analysis was used to test the construct validity. For internal reliability, Cronbach's α ranged from 0.60 to 0.89, showing a significantly high reliability.

Procedure and Statistical Methods

Adopting a stratified random sampling method for the study, 2,000 questionnaires were sent out divided proportionally according to the number of individual companies compared to the entire hi-tech industry. According to this ratio, there were 840 copies sent to electron companies, 720 copies to those in communications and information, and 440 copies to semiconductor companies. There were 447 respondents.

The collected data was statistically analysed by *SPSS for Windows* software. The statistical methods included descriptive statistics, t-test, ANOVA, Pearson correlation and multiple regression.

RESULTS AND DISCUSSION

Analysis of Work Stress

The work stress that hi-tech employees felt differed because of different personal attributes. This includes the following study results:

- Female employees felt more work stress from the organisational climate and staff development than their male counterparts;
- Employees with college educational background or working in administrational department encountered more stress from work responsibility and welfare than those working in other departments;
- Those who were unmarried and in an administrative management position carried a greater workload than others.
- Respondents who worked in southern Taiwan felt more stress from *job responsibility and welfare* and *excess workload* than those who worked in northern Taiwan (F=3.70; F=3.83, $p<0.05$).

On the whole, hi-tech employees' work stress levels seemed to be moderate (M=2.17). The highest work stress came from *job responsibility* (M=2.69), followed by *physical reaction* (M=2.26).

Analysis of Job Performance

It was found that hi-tech employees' job performance was impacted by certain personal attributes, including age (F=5.18, $p<0.01$), department (F=2.38, $p<0.05$), position (F=3.17, $p<0.05$), martial status (t=4.50, $p<0.05$), workplace (F=5.17, $p<0.01$) and salary (F=3.64, $p<0.05$).

Job performance was found to be higher than average (M=3.86), representing the perception that most employers contributed to better job performance. Regarding self-evaluated job performance, the dimension of active coordination was found to be the highest (M=4.02), followed by job enthusiasm, job familiarisation, job quality, and job efficiency, respectively.

Correlation between Work Stress and Job Performance

There was a significantly negative relationship found between work stress and job performance (R=-1.72, $p<0.001$). Only work responsibility and welfare presented a positive relation with every dimension in job performance, especially job responsibility and job familiarisation (R=0.96, $p<0.05$). Judging from this, work responsibility can be explained as stimulator and motivator.

Moreover, it should be noted that, according to the matrix in Table 1, the columns of *Organisational Climate and Staff Development* and *Mental Reaction* presented strongly negative connections with all dimensions of job performance.

The three kinds of work stress reactions indicate that all of the dimensions of job performance have a significantly negative relation with mental reaction. However, some elements of behavioural reaction significantly attained a negative relationship. This implies that employees tend to carry out mental reactions, apart from physical and behavioural reactions, in their job performance.

Table 1: The correlation between work stress and job performance.

| | Organisatnl climate & staff developmt | Job responsblty & welfare | Job environmt & adaptation | Job overloading | Role conflict & vagueness | Mental reaction | Behavioural reaction | Physical reaction | Overall work stress |
|---|---|---|---|---|---|---|---|---|---|
| Job familiarisation | -0.136** | 0.096* | -0.128** | -0.068 | -0.088 | -0.173*** | -0.016 | -0.059 | -0.114* |
| Job quality | -0.142** | 0.072 | -0.097* | -0.097* | -0.113* | -0.177*** | -0.041 | -0.116* | -0.138** |
| Active learning | -0.193*** | 0.059 | -0.081 | -0.079 | -0.110* | -0.180*** | -0.027 | -0.074 | -0.141** |
| Active coordination | -0.146** | 0.093 | -0.084 | -0.064 | -0.101* | -0.130** | -0.023 | -0.077 | -0.107* |
| Job enthusiasm | -0.262*** | 0.064 | -0.132** | -0.073 | -0.114* | -0.188*** | -0.004 | -0.121* | -0.179*** |
| Job efficiency | -0.143** | 0.000 | -0.059 | -0.177*** | -0.113* | -0.209*** | -0.015 | -0.108* | -0.161** |
| Overall job performance | -0.209*** | 0.078 | -0.119*** | -0.114* | -0.130** | -0.216*** | -0.033* | -0.113* | -0.172*** |

*$p < 0.05$   **$p < 0.01$   ***$p < 0.001$

Major Predictors of Job Performance

Table 2 shows there to be a high prediction of job performance prevalent in work stress. It shows that mental reaction, organisational climate and staff development, job responsibility and welfare, and mental reaction provide the key reasons. Indeed, three of them could account for a variation of 11.9%.

Table 2: Multiple regression of work stress to overall job performance.

| | R | $R^2$ | β | $\Delta R^2$ |
|---|---|---|---|---|
| Organisational climate and staff development | 0.216 | 0.047 | -0.243 | 0.047*** |
| Job responsibility and welfare | 0.293 | 0.086 | 0.277 | 0.039*** |
| Mental reaction | 0.345 | 0.119 | -0.213 | 0.033*** |

***$p < 0.001$

These results indicate that if hi-tech employees responded with less mental reaction, then they would experience less stress from the organisational climate and staff development. Likewise, if they felt more stress from job responsibility and welfare, then greater job performance would be exhibited.

SUGGESTIONS

Major Findings

In this study, the researchers examined the relationship between work stress and job performance. The findings of this study are compelling and a number of conclusions may be drawn as detailed below.

Differences exist with regard to hi-tech employees' experience and work stress reactions due to personal attributes, like gender, education, department, position, marriage and workplace. The perceived work stress is under average.

Significant differences were detected coming from personal attributes, including age, department, position, marriage, workplace and salary in judging hi-tech employees' job performance. In general, their job performance has a trend to a middle-high degree.

Significant relations were found to exist between work stress and job performance. These included organisational climate and staff development, job environment and adaptation, work overloading, role conflict and vagueness, mental reaction, behavioural reaction, physical reaction and overall job performance, which all had negative relations.

The work stress of employees can impact strongly and adversely on overall job performance. Mental reaction, organisational climate and staff development, job responsibility and welfare reckoned for most of the reasons behind this, accounting for an 11.9% variation.

CONCLUSION

Other than the previous major findings, the authors of this study determined other inferences from the perspective of vocational education.

Gender Role

The impact of a hi-tech employee's gender significantly varied with regard to organisational climate and staff development, physical reaction, mental reaction and behavioural reaction.

In this study, the authors found that work stress levels were higher for females than for males. This outcome may imply different role identification through socialisation processes [7]. It also influences personal experiences of work stress.

Education and Self-Fulfilment

Work stress was found to be higher for the college/university category than for the middle school category. Robbins noted that people with higher education tend to have higher salaries and demands for job performance [22]. However, too much work stress will lead to a decline in job performance.

The authors would like to remind those people with higher educational backgrounds that they should anticipate such factors and keep work stress levels and job performance in balance.

Inter-Role Conflict and Support

Married employees are significantly different from singles with regard to organisational climate and staff development. One reason for this is that it is considered difficult to keep a proper balance between family commitments and a vocational career [23].

Furthermore, the work performance of married employees tends to be higher than for unmarried employees. This result

may be generated by the support gained for work from married families. Instead of laying emphasis on marital status, the authors infer that inter-role conflicts and family support really do matter.

Recommendations

Based on the major findings and conclusions mentioned above, the following recommendations are provided.

Since the stress from job responsibility and welfare is highest for employees, business enterprises should pay more attention to welfare. Moreover, organisations should empower staff with the responsibility to lower work stress levels. Also, hi-tech employees should treat stress as motivator, directing stress into positive job performance.

According to the study, females gained a greater sense of work stress from the organisational climate and staff development. As such, female employees should put more effort into regulating work stress. Furthermore, companies should encourage their female employees and reduce their sense of work stress.

Hi-tech employees should learn to face stress and manage it effectively. Correct stress management should start from improved health and good intrapersonal relationships. An individual needs to maintain good level of personal health, and be able to express emotions and relax.

In summary, learning how to manage stress is an urgent issue that needs to be seriously considered not only for hi-tech employees, but also for on-the-job education.

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