Print ISSN: 2288-4637 / Online ISSN 2288-4645 doi:10.13106/jafeb.2021.vol8.no3.0605

# Employee Stress, Job Satisfaction, and Job Performance: A Comparison between High-technology and Traditional Industry in Taiwan

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Received: November 20, 2020 Revised: January 26, 2021 Accepted: February 03, 2021

# Abstract

The use of human resources determines the success of enterprises. This study applies the questionnaire design method to analyze the relationship between job stress, job satisfaction, and job performance, noting that few studies have comparatively examined these variables between industries, especially between high-tech and traditional industries. The proposed assessment model in this study can facilitate decision-makers' ability to make the optimal business decisions through their personnel systems, thereby improving employee satisfaction and increasing job performance. This study found that in the traditional and high-tech industries, some demographic variables have significant differences in the job stress, job satisfaction and job performance, but the demographic variables that can significantly affect the differences in these job's variables are differences between industries. This study acknowledges that job stress and performance have a significantly negative correlation, and traditional industries will have more stress factors than high-tech industries. In addition, support for traditional industries exist in job satisfaction and performance has a significantly positive correlation, but not in high-tech industries. Job stress for performance has a significantly negative correlation and performance, found some differences in this relationship and the respective industries characteristics.

Keywords: Job Satisfaction, Job Stress, Job Performance, Differences in Industrial Characteristics, Relationships Matrix

JEL Classification Code: M12, M16, M53, M54

# 1. Introduction

How to maintain competitive advantages in the global competitive environment is an important key to

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competitiveness, and the solution lies in the quality of human resources and management, meaning employees are the most important asset, and how to improve employees' job stress, job satisfaction, and enhance job performance has become an important subject for research (Astuti et al., 2020; Paais & Pattiruhu, 2020; Pancasila et al., 2020). Selye (1984) defined job stress as: "any external pressure from individual requirements that result in non-exclusive characteristics and physiological response". In order to understand job stress, we have to understand the reactions to work stress factors, meaning the pressure to meet the needs of producing a nonspecific physiological response, as determined by the stressors of joy, anger, sadness, and optimism.

Stress is the inherent psychological impact of external factors that go beyond simple surface pressure, meaning there are underlying factors. Robbins (2003) divided the potential sources of pressure into: 1) individual: family problems, economic problems, personal qualities. 2) Organizations: mission requirements, role requirements,

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interpersonal issues, organizational structure, leadership style. 3) The external environment: economic uncertainty, political uncertainty, and technological uncertainty. In order to confirm job stress factors, we must understand the impact of job stress when striving for improvements. For organizations, job stress has significant costs, including the replacement of unsuitable staff, employee education and training, sick pay, and death.

Adaramola (2012) discussed the issues of job stress, such as how it affects employees' abilities and productivity, and addressed ways to reduce job-related stress and increase productivity. Interventions in the employees of a private firm found that mental and emotional stress affected employees' performance and productivity. Khalatbari et al. (2013) found that burnout had significant positive correlation with job stress, but burnout was not associated with job motivation. Berdicchia and Masino (2019) found that employee's participation and autonomy increased job stress because of the increased behavior associated with job craft and increasingly challenging demands. In addition, studies have found the positive impact of participation on performance, meaning reduced role conflicts and role overloading.

Syed et al. (2020) believed that when firms have a high injustice level (procedural and distributive), job stress will worsen the employee's creativity, citizenship, and retaliatory behaviors, and such actions will place a burden on the firm's costs. Kim et al. (2020) took the United States and South Korea as an example, and explored the relationship between job control, working overtime, and stress from the crosscultural perspective, and found that job control had nothing to do with overtime in either country, but job control was closely related to job stress in South Korea. At the same time, they found different effects of job control on cultural overtime, and the importance of job control to employee stress was confirmed.

Farrell and Stamm (1988) consolidated the impacts of job stress on staff into three areas: 1) can affect the body's production; 2) will increase the psychological burden; 3) will result in behavioral changes. Job satisfaction is derived from the Hawthorne studies in 1927, and in 1932, Mayo, Roethlisberger, and Whitehead co-chaired the Hawthorne experiments, and reported that the emotional impact of workers' work behavior, as well as social workers and psychological factors, are the main factors of job satisfaction and productivity. Tarcan et al. (2017) studied the relationship between burnout and job satisfaction, and found that emotional exhaustion is an important predictive satisfaction factor.

Gorenak et al. (2020) found that employees felt the impact of improved organizational values, and such

improvements influenced their job satisfaction, meaning there was a positive relationship between organizational value innovation and satisfaction with working conditions. Wang, Wang, Zhang, and Ma (2020) found that, in workplaces within the IT industry, employee satisfaction had spillover effects, meaning it could significantly affect the performance of the work-related outcomes of both fulltime and part-time workers, and that part-time workers significantly exceeded their performance levels and job satisfaction; however, job satisfaction did not explain the difference in performance.

By summarizing the above arguments, we identified the most likely factors to influence employees job satisfaction, and thus, propose three dimensions for exploration in this study: job content, working conditions, wages and benefits.

Han et al. (2020) explored the relationship between structures that affect employee performance, such as psychology (meaningfulness and job engagement), behavior (in-role performance), and empathy (job characteristics) in IT firms, and found that employees had a significant positive relationship between job participation, role seniority, and performance, and they attempted to link the relationship between job characteristics and in-role performance. Miao et al. (2020) found that firms with high job performance were positively related to job satisfaction and affective commitment by employees. Hung (2020) explored the relationship between employees' personality and job performance, and found that working hard and working smart certainly affected job performance, while conscientiousness, agreeableness, and open to experience through working hard affected performance. In addition, extraversion, conscientiousness, emotional stability, and openness to experience through working smart will affect job performance.

Khalatbari et al. (2013) found that job stress, job satisfaction, and job motivation are relevant. Bouckenooghe et al. (2013) also found that positive and negative activities influenced job performance. Chanda and Goyal (2020) considered that employee progress, community, and environment issues as important roles for an organization to achieve sustainable growth, and therefore, explored ways to improve employee satisfaction in the manufacturing industry. In order to improve job performance, this study used the Bayesian network approach to identify relationships at all levels of employee satisfaction, commitment, and job performance.

A study by Black and Gregersen (1997) also found that job satisfaction and job performance are related, especially when employees invest more, meaning job performance and job satisfaction become more relevant. Generally, job performance can be explained by the

performance of employees at work or their contribution to enhance the value of companies, and researchers have commonly assessed the work of employees to determine job performance. Wu (1986) proposed three alternative performance assessment measurements: performance assessments can be used for evaluation, as well as for selection and job assignments to help individuals and departments to understand their contribution to the target level, and provide information for engaging in performance evaluations, such as planning a working schedule, budgeting, and human resource planning. While previous literature explored the relationship between job stress, job satisfaction, and job performance (Chen & Silverthorne, 2008), they were limited to the financial sector (Wu, 2011), the government (Yozgat et al. 2013), and other services industries.

Taiwan is an export-oriented island economy, thus, the industrial structure is mainly focused on the development of high-tech industries at present; however, the work environments of science and technology industries are different from traditional industries, meaning they have longer working hours and a lot more work pressure.

In addition, Steyn and Vawda (2014) confirmed the significance of skill variety, task identity, task significance, autonomy, feedback, etc., as these factors can predict job satisfaction and stress, thus, the difference between traditional industries and technology industries regarding job characteristics may result in different degrees of job satisfaction and stress for employees. The focus of this study is on the manufacturing industry, and it investigates and analyzes the differences in traditional and technology industries.

This paper obtains the relevant data to understand employees' job performance under job stress, and conducts correlation analysis to determine job satisfaction and identify solutions. In order to measure job performance factors, this study divided job performance into efficiency, productivity, and effectiveness. As productivity and efficiency are very much alike, efficiency can be used to evaluate the results of staff performance; the difference is that productivity is used to calculate cost efficiency to a certain extent, meaning the smaller cost represents higher productivity, while effectiveness represents the value of efficiency and productivity. Tubre and Collins (2000) summarized job performance measurements, including Objective, Self-Rated, Supervisor rated, and Peer rated.

This study takes the electronics-generation industry and traditional industry for comparison, and its performance evaluation approach is to use the same pattern and case company, which is above the target level evaluation, and creates a way to measure job performance evaluation. Then, the work pressures and job satisfaction of employees is measured by a questionnaire survey to conduct job performance, work stress, and job performance analysis. Finally, this study conducted relationship matrix analysis, in order to compare the different industries in the face of job stress and employee job satisfaction according to job performance.

This paper conducted a questionnaire and analysis to understand how the employees of these two industries work under different pressures, and examined their lower job satisfaction according to the demonstrated job performance. Then, this study examined how different demographic variables affect job stress, job satisfaction, and job performance. Finally, through empirical analysis of the results, conclusions and recommendations are put forward, in order to effectively improve employee job performance and conditions, and determine the most suitable levels of job stress and job satisfaction.

# 2. Hypothesis and Methods

# **2.1. Definition Questionnaire**

The design of this questionnaire is divided into four parts: 1) Basic information including gender, education, age, seniority, position, and department. 2) Job satisfaction including job content, work environment, and salary and welfare. 3) Job stress including job content, work environment, and company. 4) Job performance including quality, efficiency, effectiveness, obedience, and civicmindedness.

# 2.2. Measurement Index

The measurements for defining job satisfaction, job stress, and job performance formulas are, as follows:

**Job Satisfaction Index:** 
$$PI_i = \frac{(uS_i - min)}{Rang}$$
,  
where  $0 \le PI_i \le +1$  (1)

In Eq. (1),  $PI_i$  is the job satisfaction, and  $uS_i$  is the mean of job satisfaction.

Job Stress Index: 
$$PP_i = \frac{-(uP_i - min)}{Rang}$$
,  
where  $-1 \le PP_i \le 0$  (2)

In Eq. (2),  $PP_i$  is the job stress levels, and  $uP_i$  is the mean of job stress.

Job Performance Index: 
$$PE_i = \frac{(uE_i - Me)}{(Me - 1)}$$
,  
where  $-1 \le PE_i \le +1$  (3)

In Eq. (3),  $PE_i$  is the superior performance rating, and  $uE_i$  is the mean of job performance.

In order to compare the relevance of demographic variables on job stress, job satisfaction, and job performance, this paper presents a job satisfaction, job stress, and job performance matrix; where the *X*-axis on the left is the job stress based on negative points, the *X*-axis on the right is job satisfaction based on positive points, and the *Y*-axis is job performance. As the *Y*-axis end is greater than zero, it means that the actual performance value is greater than the target performance value; as the lower end of the *Y*-axis is less than zero, it means that the actual performance value. Thus, the matrix is defined in four quadrants: I, II, III, IV.

Then, according the location of the coordinates of each point, this study uses the quartiles of the box plot to describe their statistical capacity, which are divided into two boxes with dotted lines. Box parts: the lower bound of the box is the  $25^{th}$  percentile (P25 or Q1), while the upper bound of the box is the 75<sup>th</sup> percentile (P75 or Q3); therefore, the Box Length is between P25 to P75, and this length is called the Inter-Quartile Range (IQR), while the dashed box in the middle of Q2, which is beyond the boundaries of the observations of this box, are called the outliers. The dotted line or *X* axis and *Y*-axis maximum and minimum values are observed, as shown in Figure 2.

Finally, the definitions of job satisfaction and job stress for the job performance of the four quadrants of the matrix include names, explanations, and suggestions. Zone I is called the "Strengthening Area", meaning incentives can make performance greater than the target, thus, recommendations in this area should provide more incentives. Zone II is called the "Negative Strengthening Area", meaning that pressure can make the performance greater than the target, thus, recommendations should provide appropriate pressure. Zone III is called the "Rebel Area", meaning that stress causes performance to be below the target, thus, recommendations should aim to reduce stress and provide appropriate incentives. Zone IV is called the "Spoiled Area", meaning that employees' performance is rewarded below the target, thus, recommendations should reduce incentives and provide appropriate pressure, as shown in Table 1.

#### 2.3. Hypothesis

The purpose of this study is to investigate the relationship between the job stress and job satisfaction, and its impact on job performance. Furthermore, this study used demographic variables, including gender, education, age, seniority, position, department, etc., in order to investigate the differences and correlations of different demographic variables on work stress, job satisfaction, and job performance. The research hypotheses in this study are:

*H*1: Demographic variables are significantly different for job stress.

*H2:* Demographic variables on job satisfaction have significant differences.

*H3:* Demographic variables for the degree of job performance are significantly different.

*H4:* Job satisfaction and job stress have significantly negative correlation.

*H5:* Job satisfaction for job performance has a significantly positive correlation.

*H6:* Job stress for job performance has a significantly negative correlation.

The research hypotheses chart is shown in Figure 1.



Figure 1: Research Hypotheses Chart



Figure 2: Job Satisfaction, Job Stress for Job Performance Matrix

Table 1: Job Satisfaction, Job Stress for Job Performance

Zone	Name	Explanation	Recommend
I	Strengthening Area	Reward enables performance greater than the target	Should give more incentives
П	Negative Strengthening	Performance greater than the target pressure	Appropriate pressure should be given
ш	Rebel Area	Pressure resulting from performance is below the target	Should reduce stress, and provide appropriate incentives
IV	Spoiled Area	Resulting performance is below the target award	Should reduce stress, and provide appropriate incentives

# 2.4. Statistical Analysis

This study used SPSS statistical software for data analysis, as follows:

1) Sample analysis: Sample statistics are the basic information descriptions of the sample, including the demographic variables of gender, education, age, seniority, position, divisional distribution, and percentage analysis, in order to understand the basic characteristics of the sample. 2) Analysis of Variance (ANOVA): The one-way analysis of variance was used to compare differences of the demographic variables, meaning whether there were significant differences in job stress, job satisfaction, and job performance. 3) Reliability analysis: This study used Cronbach's  $\alpha$  coefficients to ensure the internal consistency of each scale. If the  $\alpha$  value is between 0.35 and 0.7, it means that reliability is acceptable. If the  $\alpha$  value less than 0.35, it means that

reliability is too low. 4) Correlation Analysis: This study used Pearson's product difference correlation analysis to explore whether there is a significant linear relationship between job stress, job satisfaction, and job performance. 5) Matrix Analysis and the Box-Whisker Plot.

# 3. Empirical Results

This questionnaire is designed for application to traditional and high-tech industries. Each of the two industries were issued 40 copies, for a total of 80 copies. Among them, the traditional industry returned 33 copies, while the high-tech industry returned 34 copies, for a total of 67 copies. This study deleted incomplete questionnaires: three copies from the traditional industry, and four copies from the high-tech industry, in order to obtain a total of 60 valid questionnaires, for an effective rate of 75%. The focus of the empirical results obtained are as follows:

# 3.1. Factors and Reliability Analysis

Regarding job satisfaction and job stress, this paper used the factor analysis method for the extraction of factors. First, factor analysis carried out KMO and Bartlett testing, followed by principal component analysis, in order to capture the factors with eigenvalues greater than 1, and the Kaiser maximum variance method to determine the orthogonal transition axis.

# 3.1.1. Traditional Industry

Job Satisfaction: Job satisfaction scales were conducted with KMO and Bartlett testing, a KMO value = 0.648 > 0.6is suitable for factor analysis and significant, as a *p*-value =  $0.000 < \alpha = 0.01$  means that information is very suitable for factor analysis. After factor analysis, the factor loadings of each factor are more than 0.5, meaning the cumulative explained variance reached the required level, and each item can be categorized into the four Q factors of "Company Policies", "Job Content", "Working Environment", and "Wages and Benefits". Then, Cronbach's  $\alpha$  coefficient is a measurement of the factors regarding the internal consistency of the case, the resulting Cronbach's  $\alpha$  coefficients in this study are 0.884, work content is 0.884, the working environment is 0.853, wages and benefits is 0.786, and the overall reliability is 0.908, meaning the data has sufficient reliability.

Job Stress: KMO and Bartlett's testing obtained a KMO value = 0.619 > 0.6, which is significant, since a *p*-value =  $0.000 < \alpha = 0.01$  means that the information is very suitable for factor analysis. After factor analysis, the factor loadings of each factor are more than 0.5, thus, the cumulative explained variance reached level requirements, and each item can be classified into three question factors, namely "Company Policies", "Job Content", and "Work Environment". Job stress analysis obtained the factor analysis of three factors, followed by Cronbach's  $\alpha$  coefficient, which is a measure of the internal consistency of each factor, and the resulting Cronbach's  $\alpha$  coefficient of corporate system is 0.934, work content is 0.872, the working environment is 0.716, and the overall degree is 0.896, which means that the data has sufficient reliability.

#### 3.1.2. High-Technology Industry

*Job Satisfaction:* Job satisfaction was conducted by KMO and Bartlett's testing, and the KMO value = 0.798 > 0.6 is applicable and significance, as the *p*-value =  $0.000 < \alpha = 0.01$ , meaning that the information is very suitable for factor analysis. After factor analysis, as the factor loadings of each factor were more than 0.5, the cumulative explained variance reached level requirements, and each item can be classified into three question factors, namely "Work

Content", "Wages and Benefits", and "Work Environment". Job satisfaction conducted factor analysis on three factors to determine the Cronbach's  $\alpha$  coefficient, which is a measure of the internal consistency of each factor case, and the resulting Cronbach's  $\alpha$  coefficients of work content is 0.968, wages and benefits is 0.964, the working environment is 0.970, and the overall reliability is 0.976, thus, the data has sufficient reliability.

*Job Stress:* According to KMO and Bartlett's testing, the KMO value = 0.735 > 0.6, which is suitable for factor analysis and significance, since the *p*-value =  $0.000 < \alpha = 0.01$ , meaning that the information is very suitable for factor analysis. Then, after factor analysis, the factor loadings of each factor was more than 0.5, the cumulative explained variance reached level requirements, and each item can be classified into three factors, namely "Company Policies", "Working Environment", and "Job Content". Job stress by factor analysis includes three factors for Cronbach's  $\alpha$  coefficient, which is a measure of the internal consistency of each factor, and the resulting Cronbach's  $\alpha$  coefficient of the company's system is 0.970, work content is 0.942, the working environment is 0.902, and the overall reliability is 0.958, which means that the data has sufficient reliability.

## 3.2. Analysis of the Demographic Variables

The demographic variables are analyzed by the one-way ANOVA analysis, and the results are discussed as follows:

## 3.2.1. Traditional Industry

Job Stress (H1): (1) Company Policies: Regarding the demographic variables of "Corporate System": different departments have significantly different demographics; the job stress of the financial management, health management, personnel department is significantly higher than other departments. According to our analysis, when the same workload is spread among fewer people the pay needs to be increased, thus, there is pressure on the company policies to be changed. (2) Work: Gender and age have significant differences in the demographic variables of "Job Content". Regarding gender, more males than females experience job stress, because men usually have to put in more physical effort at work. In terms of age, those up to 25 years of age had significantly greater work pressure, those up to 56 years of age had significantly lower job stress, while those middle aged had even less stress, which suggests that young people nowadays are more prone to work under pressure. (3) Work Environment: Regarding the demographic variables of "Work Environment", the demographic variables were not significantly different in this part of the work environment. The only obvious groups with higher stress were less than 25 years of age and less than five years seniority, which is possibly due to being new in the environment, thus, the work environment has higher job stress.

Job Satisfaction (H2): (1) Company Policies: Different demographic variables on "Company Policies" factors, the differences in results are as: business and quality control departments satisfaction is significantly higher, while the finance and personnel departments satisfaction is significantly lower. (2) Work: Different demographic variables on "Job Content" factors, the differences in results are as: business and quality control department satisfaction is significantly higher, while the financial department, production authorities, property management department, manufacturing department as evident in the content of the work, satisfaction in this factor is significantly low. (3). Work Environment: Different demographic variables in "Work Environment" factors, the variance analysis results: there are significant differences in different qualifications, respondent's specialist qualifications as part of job satisfaction in the work environment factors, significantly higher than satisfaction. Junior educated respondents in this part of the satisfaction is high, indicating a low level of education required for the work environment is not so high. For traditional industry, the college students are more likely to pay attention to the work environment. (4) Compensation: Different demographic variables in the "Salary and Benefits" factors, the differences in results are as following: departments have significant differences based on the sex of the employees, men, for example are significantly more satisfied then woman as far as pay and benefits are concerned. The department's part: for financial, production management and personnel departments are significantly less satisfied with their wages and benefits, among which is significantly lower for production management department. The survey found fewer production management departments, so the proportion of heavier work per share, but the same pay and benefits with other departments, and financial management and personnel departments also have the same problem.

*Job Performance (H3):* Different demographic variables on "Job Performance" factors, the variance analysis results: job performance for each demographic variable does not have significant differences. However, we can see in case of seniority in job roles, job performance is gradually increased according to seniority, showing higher seniority of the respondents, the resulting job performance is also relatively high.

# 3.2.2. High-Technology Industry

Job Stress (H1): (1) Company Policies: Regarding the demographic variables of "Company Policies", while there are no significant differences, the manager's job stress is slightly higher than that of the operator. (2). Work Environment: Regarding the demographic variables of "Work Environment": While the men's stress index was higher than women's, it did not exceed the median value of 3, which means that the high-tech industry generally has low job stress in the working environment. Job stress will increase with decreasing seniority, which means that lower seniority employees are less able to adapt to the working environment, while the more experienced employees are better adapted to the environment, and the pressure in their working environment is close to 1. (3) Work Contents: Regarding the demographic variables of "Job Content": There are significantly different age and position differences, meaning respondents aged from 26–35 and 36–45 have lower job stress, as compared to other options. This survey found that multi-class management respondents aged 26–35 and 36–45 had a higher job stress index than any other high positions.

Job Satisfaction (H2): (1) Work: Regarding the demographic variables of "Job Content": As the electronic contents of the majority of the works in the OEM hightechnology industry are similar, and the satisfaction of the respondents is generally within three or more intermediate values, we can see that high-tech industry employees are fairly satisfied with their work content, and in their business, financial management, and personnel departments in particular. (2). Compensation: Regarding the demographic variables of "Salary and Benefits": There are significant differences among different respondents in education level, the employee of education level of junior high school has a significantly lower satisfaction, which possibly represents the state of today's workplaces on the high-technology industry, as the remuneration packages of education level of junior high school respondents are also compared to other education levels much lower. (3) Work Environment: Regarding the demographic variables of "Work Environment": There are no significant differences. Satisfaction averaged three points or more, which shows that the respondents are fairly satisfied with their work environment.

Job Performance (H3): Regarding the demographic variables of "Job Performance": There are significant differences in qualifications for university; high school based job performance has significantly higher stress than junior specialists. This paper argues that higher educated respondents are more competent, thus, their job performance is significantly higher.

## 3.3. Correlation Analysis

This paper explored various correlation analyses, and the results are, as follows:

## 3.3.1. Traditional Industry

#### Job Satisfaction and Job Stress

In the traditional industry, job satisfaction and job stress have significantly negative correlation means that when satisfaction is higher, the stress is lower, and when the stress is higher, then the job satisfaction is lower, this summarizes its conclusions, which is shown in Table 2 below:

(1) There is a significantly negative correlation between satisfaction with company policies and the stress incurred by company policies (H4). (2) Satisfaction with company policies and the stress from the work environment show a significantly negative correlation (H4). (3) Satisfaction with job content and the stress from job content show a significantly negative correlation (H4). (4) Satisfaction with the work environment and the stress from job content show a significantly negative correlation (H4). (5) Job satisfaction in relation to compensation and benefits, and the stress from job content show a significantly negative correlation (H4). (5) Job satisfaction in relation to compensation and benefits, and the stress from job content show a significantly negative correlation (H4).

#### Job Satisfaction for Job Performance

In Part A of Table 3, the satisfaction for job performance has a positive correlation in the traditional industry, which shows that the satisfaction of company policies has a significantly positive correlation with job performance (H5); enhancing satisfaction with the company's system will effectively improve job performance. Satisfaction factor 2 (job content), factor 3 (work environment), and factor 4 (compensation and benefits), for job performance have weak positive correlation, respectively.

#### Job Stress for Job Performance

In Part B of Table 3, the job stress for job performance has a negative correlation in the traditional industry, show that the stress of company policies (job content) for job performance has a significantly negative correlation (H6), that is, when employees of the company have more institutional pressure, it will reduce job performance. The stress factor 3 (work environment) for job performance show a weak negative correlation.

# 3.3.2. High-Technology Industry

#### Job Satisfaction and Job Stress

The job satisfaction and job stress have significant negative correlation in the high-technology industry. It can be seen that, when satisfaction is higher, job stress is lower, and when the job stress is higher, the satisfaction is lower. In particular, satisfaction with compensation and benefits, stress of work environment, and stress of work content has more significant negative correlation. Table 4 shows that:

(1) Satisfaction with compensation and benefits and stress of work environment show a significantly negative correlation (H4). (2) Satisfaction with compensation and benefits and stress of job content show a significantly negative correlation pressure (H4). (3) In the high-tech industry, job satisfaction with job content (factor 1), compensation and benefits (factor 2) and work environment (factor 3), and job stress with company policies (factor 1), work environment (factor 2) and job content (factor 3) have negative correlation, respectively.

Table 2: The Correlation Analysis of Job Satisfaction and Job Stress on the Traditional Industry

Job Stress Satisfaction	Factor 1 Company Policies	Factor 2 Job Content	Factor 3 Work Environment
Factor 1: Company Policies	-0.380*	0.031	-0.609**
Factor 2: Job Content	0.143	-0.390*	-0.006
Factor 3: Work Environment	-0.130	-0.366*	-0.120
Factor 4: Compensation and Benefits	-0.308	-0.440*	0.071

Note: \*\* and \* represent significance at the 1% and 5% levels.

Table 3: The Correlation Analysis of Job Satisfaction (Stress) for Job Performance on the Traditional Industry

Part A. Satisfaction v.s. Performance		Part B. Stress v.s. Performance	
Factor in Satisfaction	Job performance	Factor in Stress	Job performance
Factor 1: Company Policies	0.534**	Factor 1: Company Policies	-0.386*
Factor 2: Job Content	0.279	Factor 2: Job Content	-0.229*
Factor 3: Work Environment	0.190	Factor 3: Work Environment	-0.023
Factor 4: Compensation and Benefits	0.033	_	_

Note: \*\* and \* represent significance at the 1% and 5% levels.

Job Stress Job Satisfaction	Factor 1 Company Policies	Factor 2 Work Environment	Factor 3 Job Content
Factor 1: Job Content	-0.200	-0.280	-0.173
Factor 2: Compensation and Benefits	-0.141	-0.433*	-0.371*
Factor 3: Work Environment	-0.128	-0.165	-0.166

Table 4: The Correlation Analysis of Job Satisfaction and Job Stress on the High-Technology Industry

Note: \*\* and \* represent significance at the 1% and 5% levels.

Table 5: The Correlation Analysis of Job Satisfaction (Stress) for Job Performance on the High-Technology Industry

Part A. Satisfaction v.s. Performance		Part B. Stress v.s. Performance	
Factor in Satisfaction	Job performance	Factor in Stress	Job performance
Factor 1: Job Content	0.252	Factor 1: Company Policies	-0.347*
Factor 2: Compensation and Benefits	0.086	Factor 2: Work Environment	0.058
Factor 3: Work Environment	0.104	Factor 3: Job Content	0.204

Note: \*\* and \* represent significance at the 1% and 5% levels.



Figure 3: Matrix of the Traditional Industry

# Job Satisfaction for Job Performance

As shown in Part A of Table 5, job satisfaction for job performance are positively correlated in the high-technology industry, but not significantly correlated. According to our investigation, as there is high demand for machine operators in the high-tech industry, it is difficult to effectively enhance job performance.

#### Job Stress for Job Performance

In Part B of Table 5, the high-technology industry is related to job stress for performance analysis, and the stress of company policies (factor 1) shows significantly negative correlation with performance (H6), which means that there is high stress due to company policies, thus, job performance

may be significantly reduced. But examining the differences in work environment-induced stress (factor 2) and work content (factor 3), the two factors and job performance have weak positive correlation, which means an increase in job stress will result in an improved job performance.

## 3.4. Matrix Analysis

#### 3.4.1. Traditional Industry

Figure 3 shows the matrix of the traditional industry, the *X*-axis on the right is job satisfaction, the *X*-axis on the left is the job stress, and the *Y*-axis is job performance.

We can see that a large portion of the placement is in Zone I "Strengthen Area" and Zone II "Negative Strengthen Area". A small number of sample points were located at the junction of Zone II and Zone III, and at the junction of Zone I and Zone IV. The characteristics of these sample points are employees in the financial and personnel departments, respectively. Although their performance is significantly lower, it is acceptable to company standards, and thus, is not seen as negative. Job stress is significantly lower in the finance department, thus, it should decrease its incentives and increase appropriate stress; the personnel department satisfaction is low, thus, it should appropriately reduce stress and provide appropriate incentives.

### 3.4.2. High-Technology Industry

Figure 4 shows the matrix of the high-technology industry, the X-axis on the right is job satisfaction, the X-axis on the left is the job stress, and the Y-axis is job performance. As can be seen from the figure, the placement of a large portion is in Zone I "Strengthening" and Zone II "Negatively Strengthened". A small number of sample points were located at the junction of Zone II and Zone III, and at the junction of Zone I and Zone IV. The characteristics of these sample points are employees with junior college education level and in the material departments, respectively.

Although they have significantly lower performance, it reached the minimum acceptable standard of the enterprise,

thus, it is not seen as negative. Performances of the financial department and business department are the highest, thus, they should decrease incentives, and provide appropriate stress. Personnel satisfaction is low in the finance department, thus, it should appropriately reduce stress, and provide appropriate incentives.

## 3.4.3. Comparison to the Matrix for Two Industries

Comparison of the two matrices of the traditional industry and high-technology industry show that, satisfaction aspects in the traditional industry (0.48) are less than the high-technology industry (0.63), but the performance aspects in the traditional industry (0.435) are more than the high-technology industry (0.400), and the stress areas in traditional industries (-0.5725) are more than the high-technology industry (-0.4025). In summary, the results show that, if traditional industries have high stress, they have high job performance. While the high-technology industry had high levels of satisfaction, it did not have high job performance.

In the distribution of sample points, the distribution of traditional industries in the sample points is more concentrated than in the high-technology industry. The distribution of sample points in the high-technology industry is more scattered and irregular, while the traditional industry has less outlier. It can be inferred that the traditional industry has more consistent job satisfaction and job stress perceptions, and its job performance also showed higher than the average level.



Figure 4: Matrix of the High-Technology Industry



**Figure 5:** The Box-Whisker Plot on the Traditional Industry (Left Fig: Strengthening Area; Right Fig: Negative Strengthening Area)

## 3.5. Analysis of the Box Plot

# 3.5.1. Traditional Industry

The left box plot in Figure 5 is the "Strengthening Area" of the traditional industry,  $Q_1$  and  $Q_2$ , using the box on the upper and lower boundaries, respectively. The box in the middle of the dotted line is the median  $Q_{2}$ , and the dotted line is the minimum to the maximum distance. The upper and lower boundaries are plus and minus 1.5 times the length of the box, if the observed value exceeds this boundary, it is called an outlier. The aspects of job performance are:  $Q_1 = 0.363, Q_2 = 0.435, Q_3 = 0.435, X = Q_3 - Q_1 = 0.206,$  $Q_3 + X = 0.706$ ,  $Q_1 - X = 0.156$ , and beyond this observation is the outliers: age over 56 years old (0.75), more than 21 years seniority (0.75), the business department (0.75), the financial department (0), and the personnel department (0). Aspects of job satisfaction:  $Q_1 = 0.4594$ ,  $Q_2 = 0.48$ ,  $Q_3 = 0.5675, X = Q_3 - Q_1 = 0.108, Q_1 X = 0.676, Q_1 - X$ = 0.351, and the outliers beyond this limit are business units (0.775), financial department (0.38), and the personnel department (0.37).

Beyond the limits of the above outliers are: business, financial, general affairs personnel, and other three departments, including the business department, which has high satisfaction and high performance, and is therefore not included in our scope of improvement. The finance department and the personnel department have significantly lower job performance and satisfaction, and thus, should be given appropriate incentives. The right side of Figure 5 is the "Negative Strengthen Area" box plot of the traditional industry, in which the aspects of job performance are:  $Q_1 = 0.3625$ ,  $Q_2 = 0.435$ ,  $Q_3 = 0.435$ ,  $X = Q_3 - Q_1 = 0.206$ ,  $Q_3 + X = 0.706$ ,  $Q_1 - X = 0.156$ , and outliers are beyond this limit, aged 56 years (0.75), more than 21 years (0.75), the business department (0.75), the financial department (0), and the personnel department (0). In the job stress:  $Q_1 = -0.6088$ ,  $Q_2 = -0.5725$ ,  $Q_3 = -0.5006$ ,  $X = Q_3 - Q_1 = 0.108$ ,  $Q_3 + X = -0.393$ ,  $Q_1 - X = -0.717$ , outliers beyond this limit are aged 56 years old (-0.305).

Based on the above conclusions, beyond the limits of the outlier is aged 56 years or more, which have low-stress and high performance, and therefore, are not included in our improvements.

#### 3.5.2. High-Technology Industry

The "Dotted Area" in the left box plot of Figure 6 shows the aspects of job performance in the high-technology industry:  $Q_1 = 0.3$ ,  $Q_2 = 0.4$ ,  $Q_3 = 0.5$ ,  $X = Q_3 - Q_1 = 0.2$ ,  $Q_3 + X = 0.7 Q_1 - X = 0.1$ , while the outliers beyond this limit are: college degree (0), materials department (0), the business department (1), and the finance department (1). In terms of job satisfaction:  $Q_1 = 0.5675$ ,  $Q_2 = 0.63$ ,  $Q_3 = 0.67$ ,  $X = Q_3 - Q_1 = 0.1025$ ,  $Q_3 + X = 0.7725$ ,  $Q_1 - X = 0.465$ , and the outliers beyond this limit are aged 56 years old and above (0.345), 11 to 15 years seniority (0.8325), and the business department (0.87).





(Left Fig: Strengthening Area; Right Fig: Negative Strengthening Area)

Based on the above conclusions, beyond the limits of the outliers is the business department, which has high satisfaction and high performance, and therefore, is not included in the scope of our improvements.

The right side of the box plot in Figure 6 shows the "Negative Strengthen Zone" of the job performance of the high-technology industry:  $Q_1 = 0.3$ ,  $Q_2 = 0.4$ ,  $Q_3 = 0.5$ ,  $X = Q_3 - Q_1 = 0.2$ ,  $Q_3 + X = 0.7 Q_1 - X = 0.1$ , while the outliers are: college educated (0), materials department (0), the business department (1), and the financial department (1). The job stress levels are:  $Q_1 = -0.6088$ ,  $Q_2 = -0.5725$ ,  $Q_3 = -0.5006$ ,  $X = Q_3 - Q_1 = 0.108$ ,  $Q_3 + X = -0.2825$ ,  $Q_1 - X = -0.530$ , while the outliers beyond this limit are aged 46-55 years old (-0.1175), with 11-15 years seniority (-0.185), more than 21 years (-0.555), the business department (-0.5825), and the personnel department (-0.555).

Based on the above conclusions, beyond the limits of the outliers are the business department, which has high-stress and high-performance, and therefore, it is appropriate to reduce stress.

# 4. Conclusions

This study explored the relationship between job satisfaction, job stress, job performance, and demographic variables in two industries. The results indicate that in traditional industry areas: job satisfaction and demographic variables have some significant differences in job satisfaction, while job stress has significant negative correlation between job satisfaction and job performance, which shows they are significantly related. In the high-technology industry: job satisfaction and demographic variables have some significant differences in job satisfaction, and job stress has significant negative correlation between job satisfaction and job performance, and while they are positively related, there is no significant correlation. This study created and analyzed a matrix for two kinds of industrial employees regarding the correlations between job stress, job satisfaction, and job performance. Most of the coordinate points of the two industries fall in "Strengthening Area" and "Negative strengthen Area", and only a small part of the coordinate points fall in the "Strengthening Area", "Spoiled Area", "Negative Strengthen Area", and "Rebel Area" zones. In the comparison matrix, this study identified the outlier box plots to determine which outliers need to be strengthened to improve job satisfaction and job performance, and which are outliers to reduce work pressure to improve job performance. The proposed assessment model allows decision makers to effectively monitor and assess the relationship between demographic variables, job satisfaction, job stress, and job performance. Further optimization can be worked out through the personnel system to improve employees' job performance.

As job satisfaction and job performance showed significant positive correlation in the traditional industry, while job stress and job performance showed significant negative correlation, it is recommended that the traditional industry can enhance job satisfaction and reduced pressure to achieve higher job performance. Regarding the hightechnology industry, job satisfaction and job performance did not show significant positive correlation with job stress, when the stress of the work environment and work content increases, it will lead to improved job performance. This study recommends that the high-technology industry can increase the stress of job content to improve job performance. As the high-technology industry consists of automated operation, it is difficult to effectively enhance job performance; however, the sub-standard performance of the outliers can be improved.

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