比較性探討台灣與美國知識工作者與藍領員工的工作特徵、工作滿足與離職意圖

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摘要

本研究在探討台灣與美國知識工作者與藍領員工的人口特性、工作特徵、工作滿足、離職意圖及其變項間的關係。藉由對國際調查資料的分析，各國知識工作者的特性的探討是依其與同國藍領員工比較，及與他國知識工作者比較。結果有許多顯著發現，知識工作者發現具有較高學習與自主性特徵，並且在兩地發現變項間有相似的因果關係。此跨國研究應有助於對台灣地區與美國員工特性進一步了解，並可為台灣管理者面臨多樣化員工管理時的參考。

關鍵字：知識工作者、藍領員工、工作特徵、工作滿足、離職意圖

An exploratory comparative analysis of job characteristics, job satisfaction and intention to leave of knowledge workers and blue-collar workers between Taiwan and the U.S.

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Abstract

This study is to examine demographics, job characteristics, job satisfaction, intention to leave, and their causal relationships of knowledge workers and blue-collar workers between Taiwan and the United States. By analyzing data from an international survey, the characteristics of knowledge workers of each country were found by comparing with those of blue-collar workers of the same country and with those of knowledge workers of the other country. There are a lot of significant findings. Knowledge workers were high in learning and autonomy characteristics. A similar causal relationships among the variables was found between the countries.

Keywords: knowledge workers, blue-collar workers, job characteristics, job satisfaction, intention to leave
1. Introduction

The economy and society has been through a great change since “informational technology” and “internet” were applied to business operations and made numerous progresses in recent decades. It is said that every business organization should more or less apply the new technology to its business, otherwise the organization difficult to survive (DeNis, Hitt & Jackson, 2003; Gates, 1999; Dertouzos, 1997). The changes in economy and society are so extensive that the economy and society have been considered very different from the past. Some economists, sociologists or manager have given new names for the new economy and society, such as “Knowledge economy or society”, “Knowledge capitalism”, “Internet economy”, “Digital economy or society”, “Information economy or society” etc. (Stewart, 2002; Throw, 1999; Burton-jones, 1999; Gates, 1999). Knowledge economy is one of the most popular and meaningful name generally used to describe the basic nature of the new economy. Knowledge economy in general is referred to an economic system whose most important and competitive resource is “knowledge”. knowledge is very different from the competitive resources in the past economy, such as capital, natural resource, labor force, land etc. Knowledge was also distinguished from “information”, “data”, and “technology”. "Information" is obtained and organized from “data” and become meaningful and useful for being created and transformed into “knowledge”. Based on “knowledge”, “technology” and “wisdom” then are created or obtained (Burton-jones, 1999; Boisot, M.H., 1998). Why knowledge is considered as the most competitive resource basically is due to the reason that knowledge is the critical part in the transformation process from data to technology or wisdom (Boisot, M.H., 1998; Davenport & Laurence, 1998).

In a knowledge-based economy with business organizations emphasizing knowledge management, most workers or employees in business organizations become knowledge workers (Davenport & Laurence, 1998; Probst, Raub, Romhardt, 2000). Knowledge workers are referring to the workers whose jobs mainly deal with knowledge or information (Drucker, 1993, 1994, 1999; Cortada, 1998). Knowledge workers may be given a more restricted definitions. For example, knowledge worker may be only referred to those with completely new jobs working in high-tech companies and requiring using knowledge entirely. (DeNisi & Griffin, 2001), or they are considered only as those workers who use computer and internet most of their time (Gates, 1999). Most recent literature and research on knowledge work and workers generally proposed a more extensive and comparative definition of knowledge workers (Cortada, 1998; Drucker, 1994, 1999). Based on research on the historical development of economy and
workforce, some research have revealed that knowledge workers actually are not brand-new workers, but a type of workers who have existed for a long history and rapidly and immensely increase in recent time primarily due to the development of informational technology (Cortada, 1998; Drucker, 1994). Knowledge workers may be better considered as a new kind of white-collar workers because a great deal of white-collar has jobs mostly dealing with knowledge or information. In most research of Peter Drucker (Druckers, 1999, 1994, 1993), knowledge workers are defined as the new type of white-collar workers primarily to be distinguished with manual labors or blue-collar. This research will assume Drucker’s definition of knowledge workers.

Knowledge workers compared to manual labor are growing very fast in numbers. According to a recent study, knowledge workers accounted for about 70% of the growth of workers in the USA in 1960s, and 84% growth in 1970s. It was revealed that by the second half of 1980s, knowledge workers occupied 52 % of workforce (Cortada, 1998). In the future after more development of information technology, the majority of workers employed in organizations might be knowledge worker.

Globalization is a new trend related to the development of information technology and knowledge economy. The extreme speed of transmission of information and knowledge makes globalization possible and fast. However, the trend of globalization also facilitates development of information technology and knowledge economy (Gates, 1999; Hill, 1998). A lot of companies have set up many branches or local organizations in many foreign countries for doing business globally. The globalization increased the market and productivity of business organizations because they utilized comparative advantage of each country. The success of global business requires managing business across countries effectively. Thus, cross-national management will be more important in a global business world.

In the new economy and society, there might have some new characteristics of knowledge workers required to know in order to improve management effectiveness. In a globalized economy and business world, cross-national management needs to be explored continuously and extensively. Under this background and with data from an international research project\(^*\), this research was planned to examine demographical

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\(^*\) An international research project proposed by Denki Rengo Research Group of Japan (Phase III, 1999), which was set up through Japan Electric, Electronic and Information Union. The research was intended to study quality of working and labor relations of business organizations in electric and electronic industry across countries, which included survey on job characteristics, job satisfaction, and turnover. This author is a member of the Taiwan research team which is one of the partners of countries of the international research group
characteristics, job characteristics, job satisfaction, and turnover of knowledge workers, and to explore the relationships among these previous variables through comparisons of that between knowledge workers and blue-collar workers, and between two countries, Taiwan and the USA.

2. Literature Review

1) Demographical characteristics of knowledge workers and blue-collar workers

Knowledge workers need a great deal of knowledge to work. The more knowledge they have, the better they do their job. In knowledge economy and society, most business organizations require hiring employees with sufficient knowledge who normally have high education degrees. In the advanced and competitive society or companies, there should have more knowledge workers with higher education degree. Drucker (1993) has pointed out that most knowledge required for knowledge work is very professional and specialized, which usually take years to learn from schools. Thus, comparing to blue-collar workers, knowledge workers are very likely to have higher educational degree and age.

2) Job characteristics of knowledge workers and blue-collar workers

The jobs for knowledge workers usually are more complicated and require a lot of knowledge and skills. The managers in current companies typically have wider span of control and give more delegation to subordinates (Brandt, 1994; Drucker, 1999). Thus, knowledge workers are probably greatly empowered and need less direction and control from their managers or supervisors comparing to blue-collar workers (Drucker, 2000). In other words, the knowledge workers might have more autonomy in their jobs.

Learning and autonomy have become the core management concepts as a new trend of management. Because the jobs for knowledge workers generally become complicated and competitive, the knowledge workers need to learn new knowledge and update skills continuously (Drucker, 1993; Davenport & Laurence, 1998). They may learn by doing their jobs or learn new knowledge or skills off the job. Continuous learning should be a new important job dimension required for the success of knowledge work (Muchinsky, 1997; Drucker, 1999). According to some new research on knowledge work or knowledge workers, in current competitive business, every knowledge worker has to keep learning new knowledge or skills, otherwise there will be trouble to stay in jobs (Drucker, 1999; Darr, Argote, & Epple, 1995; Horibe, 1999). Accordingly, learning and continuous learning would be a new and critical job
characteristics for knowledge worker.

In addition, due to the jobs for knowledge workers generally are more difficult and challenging than the jobs for the blue-collar workers, the jobs of knowledge workers probably are more important and have more influence on organizations. That is, their work results might be significant and have greater contributions to business organizations (Drucker, 1999; DeNisi & Griffin, 2001).

In job characteristics model (Hackman & Oldham, 1980), the core job dimensions include two job characteristics, autonomy and significance, of knowledge work. And, the learning characteristic of knowledge work is relevant to skill variety dimension. According to literature, the core job dimensions in the job characteristics model are considered to make workers feel job meaningful and responsible, and know the work results, consequently to help improve workers’ motivation, performance, satisfaction, absenteeism, and turnover (Hackman & Oldham, 1980). Thus, the job characteristics of knowledge workers are also very likely to lead the knowledge workers to have better psychological state, and then they are more satisfied with their jobs and have less intention to leave.

3) Job satisfaction of knowledge workers and blue-collar workers

It was found that white-collar workers are generally more satisfied than blue-collar workers (Weaver, 1980). Knowledge workers as a new type of white-collar workers might also have higher satisfaction than blue-collar workers.

International research has shown that work motivation and attitude were influenced by cultures and values in different countries or societies (Erez, 1997). Some cross-cultural researches have found that there are a lot of differences in cultural values among countries (Schwartz & Bilsky, 1987, 1990; Hofsted, 1991). Thus, some differences in job satisfaction between countries might exist due to different cultural values between countries. A difference in job satisfaction was found between Japanese and American employees (Lincoln, 1989). This difference may be related to the distinction in cultures and values exiting between Japan and the United States.

4) Turnover of knowledge workers blue-collar workers

Knowledge workers are different from manual labor in their independence of production machines and instruments. Blue-collar workers depend on operating system of production of the organization. Knowledge workers contribute their knowledge and innovations created in their brains without relying on machines or instruments of
employers (Drucker, 1999). Therefore, turnover rate probably be higher for knowledge workers. Some research showed that, in the new economy, the turnover of knowledge worker appears relatively high comparing to past white-collar workers (Drucker, 1994; Zidle, 1998).

5) Relationships among job characteristic, job satisfaction and intention to leave

According to job characteristics model, there should have relationships among job characteristics, job satisfaction and turnover. In addition, based on general turnover theory, job satisfaction should be an antecedent of turnover (Mowday, Porte, & Steers, 1982). Thus, there might exist the relationships that job characteristic affects job satisfaction, and then job satisfaction influence on intention to leave and turnover. The hypothetical pattern expressed with a causal model shown as Figure 1 below. Based on job characteristics model, the core job dimensions affect job satisfaction and turnover through some psychological states. Because psychological states are very likely varied with different values and cultures in different countries, the relationship among job characteristic, job satisfaction and turnover might be different between countries.

6) Different cultures among Taiwan and the United States

The job characteristics model has been criticized for lacking of research on the influence of social and situational variables on factors in the model (Roberts & Glick, 1981). Job characteristics model is predicted to be modified by employee growth need strength. The employee growth need is likely to be varied between countries with different cultures. Achievement motivation has been shown different levels in various countries (Gallimore, 1981). Actually, growth need strength actually is very similar to achievement motivation in meaning. On the other hand, in cross-cultural research, it was revealed that Taiwan had a Chinese cultural background that was found to be different from American culture in collectivism and individualism, and Confucianism (Triandis, McCusker & Hui, 1990, Schwartz & Bilsky, 1990, Huang, 1994; Weber, 1951). And, in Hofstede’s research (1991), Taiwan has shown high degree of collectivism and the United States has shown high degree of individualism. Moreover, Schwartz and
Bilsky cross-cultural studies (1987, 1990) classified values with collectivism and individualism. It was shown collectivism emphasizes conformity and security value, while individualism emphasizes self-direction and achievement values. Thus, the difference in culture between The United States and Taiwan might influence employee’s achievement value and motivation, which is similar to employee growth need strength, and then probably modify the relationship between job dimension and personal and work outcomes in different countries.

Based on above review and analysis, it is very likely that the job characteristics, job satisfaction, and turnover of knowledge workers, and the relationships among theses variables might be different in The United States and Taiwan. However, there might also be some similarities in these variables and the relationships among them across countries due to common nature of knowledge workers.

7) Research hypotheses

According to above review and analysis, the research hypotheses can be listed more clearly as follows.

1) Knowledge workers will have higher education and salary, and more age than blue-collar workers across the two countries, Taiwan and the United States.

2) Knowledge workers will have higher job characteristics in autonomy, significance, and learning than blue-collar workers across the two countries.

3) Knowledge workers will have higher job satisfaction in five dimensions of satisfaction, and higher satisfaction in support for learning than blue-collar workers across the two countries.

4) Knowledge workers will have higher thinking of leaving (intention to leave) than blue-collar workers across the two countries.

5) There will be differences in the demographics, the job characteristics, the job satisfaction, and the thinking of leaving variables of knowledge workers between the two countries.

6) There will be the relationship across countries that types of workers will have different job characteristics, and then job characteristics will affect job satisfaction, and in turn job satisfaction will affect thinking of leaving.

7) There will be significant differences in the relationships among types of workers, job characteristics, job satisfaction, and thinking of leaving between the countries.
3. Method

This research is as a part of a large international research by Denki Rengo Research Group of Japan. This author is an associate member of that international research group. This author worked with Chang, C.* and Lin, C.* as a team to participate in the international research project. Chang is the team leader and is one of formal member of the international research group (Ishikawa, A., Mako, C. & Warhurst, C. 2006). This author and his associates in Taiwan surveyed the participants of Taiwan. An American research agency contracted through Nikkei research Inc. surveyed the participants of the United States in the US.

1) Participants

As to Taiwanese participants, about 480 questionnaires were given to two companies in Taiwan. About two hundreds and eighty questionnaires were given to employees of one of the

Company; two hundred questionnaires were given to employees of the other company. Consequently, 263(55%) valid questionnaires were obtained, 158(56%) and 95(48%) valid questionnaires respectively from each of the two companies. According to Drucker’s definitions of knowledge worker (Drucker, 1999; 1994), 63 of the 263 participants, who responded with jobs as engineer, technician, or manager, were classified as knowledge workers, and 110 of the participants who responded with jobs as blue collar were similarly classified as blue-collar workers. Those knowledge workers and blue-collar workers were finally selected for this research purpose.

As to participants surveyed in the United States, according to information given by the Denki Rengo Research Group, four companies in different cities (Austin, TX; North Sioux, SD; Attleboro, MA; Mebane, NC) were given the survey. Totally, 253 valid questionnaires were obtained, including 23, 43, 152, and 35 questionnaires from each company respectively. Within the 253 participants, 49 knowledge workers and 115 blue-collar workers were selected for this research. The demographics of the selected participants of the two countries were listed as Table 1.

The gender ratio and age distribution of the participants for this research are very similar between the two countries’ groups. Male participants are about twice as many as
female participants (113:58 & 115:49). Over 90 percents of both groups of participants are with age in 20-39 and 40-59 ranges, and the average age of the two groups are 39.15 and 39.55 respectively. Educational levels of both groups’ participants are mostly high school or university degrees, but, American group includes a majority of participants with university degrees (101/62%) and Taiwanese group includes a majority of participants with high level (senior high) degrees (110/64%).

2) Measures

The questionnaire of this research is designed by the international research group. The questionnaire is originally written in English. It was translated into Chinese by back-translation method in order to survey in Taiwan. The questionnaire in English was surveyed in The United States. The original questionnaire was to study quality of working and labor relations, which included survey on job characteristics, job satisfaction, and turnover, contains 39 questions including 164 items in total. Thirteen questions including 17 items were selected for this research. The variables and their observed items are listed as follows.

1> Types of workers included only two types of employees in business organizations, knowledge workers and blue-collar workers. The participants responded with jobs as engineer, technician, or manager were classified as knowledge workers, and

Table 1. Demographics of the participants of Taiwan and the United States

<table>
<thead>
<tr>
<th>Demographical variables</th>
<th>Taiwan Participants</th>
<th>The U.S. Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Participants</td>
<td>173</td>
<td>164</td>
</tr>
<tr>
<td>Types of workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge workers</td>
<td>63</td>
<td>49</td>
</tr>
<tr>
<td>Blue-collar workers</td>
<td>110</td>
<td>115</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>113</td>
<td>115</td>
</tr>
<tr>
<td>Female</td>
<td>58</td>
<td>49</td>
</tr>
<tr>
<td>No response</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 20</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>20-39</td>
<td>84</td>
<td>80</td>
</tr>
<tr>
<td>40-59</td>
<td>84</td>
<td>75</td>
</tr>
<tr>
<td>60 and over</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>
those responded with jobs as blue collar were similarly classified as blue-collar workers.

2> Job characteristics variable includes three dimensions of job as three observed variables, autonomy, significance, and learning whose observed items listed as below. All items are measured with a 5 points likert-scale.

i) Autonomy: measured with one item as the following, “I have a certain amount of control of what I do at work”,

ii) Significance: measured with one item, “Mistakes in my work could have serious consequences”

iii) Learning: measured with two items as the following, “I can learn new things in my work”, “My work needs a constant updating of my professional knowledge”.

3> Job satisfaction is measured not only by five traditional dimensions of job satisfaction, “Pay and fringe benefits”, “promotion opportunities”, “Relationship with your boss”, “Relationship with your co-workers”, “The extent of which your work is interesting”, but also by a new dimension of job satisfaction that might be called ‘satisfaction in support for learning’ which includes two items, satisfactions for “Training and retraining”, and for “Business information provided by management” respectively. This new dimension of job satisfaction is relevant to the new job characteristics of learning of knowledge work.

4> Turnover is only focused on thinking of leaving in this research, it was measured with one item, “Do you sometimes think of leaving the present company?”
3) Data analysis

The data analysis first focused on the descriptive statistics of research variables, and then ANOVA was used to examine the difference in demographical variables, job characteristics, job satisfaction, and turnover between knowledge workers and blue-collar workers, and between Taiwan participants and the United States participants. Afterward, the hypothetical relationships among the above variables were examined with LISREL analysis (Joreskog, & Sorbom, 2001). Based on the nature of knowledge worker, theory of job characteristics model and research of turnover, a full LISREL model with latent variables primarily as Figure 1 was constructed by including an additional latent variable, types of workers, and including observed variables for each latent variable respectively. The LISREL model for each of the two countries was first examined separately because of the evident differences in cultures between the countries.

4. Results

1) Descriptive statistics of research variables

Table 2 showed the descriptive statistics. The “learning characteristics” (LEA) variables for the United States country participants had coefficient alpha .52. Because alpha usually underestimates reliability and because the variable only measured with two items, generally it was considered acceptable.

The results of the investigation on differences in demography, job characteristics, job satisfaction, and turnover between knowledge workers and blue-collar workers, and between Taiwan participants and the United States participants were shown as Table 3 and Table 4. As
expected, there were significant differences between knowledge workers and blue-collar workers in age, education level, salary level, learning and autonomy consistently for both countries participants. It contradicted to the hypotheses that no significance differences were found in “significance” and “thinking of leaving” between two types of workers for both countries. Differences in satisfaction in the “five dimensions of satisfaction” (SIF), and “satisfaction in support for learning” (SSL) between the two types of workers were significant only for the United States participants. As to the comparison between Taiwanese and American knowledge workers, there were significant differences in seven of all the nine studied variables in Table 4 except age and “thinking of leaving” (TOL) variables.

2) LISREL analysis of the hypothetical relationships among variables

The correlations matrix among types of workers, job characteristics, job satisfaction, and thinking of leaving for the two countries participants were listed as Tables 5. The hypothetical full LISREL models constructed before was estimated firstly with the correlations matrix of each country. However, unlike expected, the full model cannot be estimated for either of the two country participants. After examining with measurement model of job characteristic, the squared multiple correlations (SMC) of

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Table 2. Descriptive statistics of the research variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Taiwan Participants</th>
<th>The United States Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td>39.15</td>
<td>8.15</td>
</tr>
<tr>
<td>Education level</td>
<td>5.43</td>
<td>.71</td>
</tr>
<tr>
<td>Salary level</td>
<td>2.49</td>
<td>.78</td>
</tr>
<tr>
<td>Learning</td>
<td>4.46</td>
<td>2.39</td>
</tr>
<tr>
<td>Autonomy</td>
<td>1.67</td>
<td>.91</td>
</tr>
<tr>
<td>Significance</td>
<td>2.67</td>
<td>1.31</td>
</tr>
<tr>
<td>FDS</td>
<td>15.22</td>
<td>3.29</td>
</tr>
<tr>
<td>SSL</td>
<td>5.85</td>
<td>1.57</td>
</tr>
<tr>
<td>TOL</td>
<td>2.70</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Note. M=Mean, D=Standard Deviation,, α= Coefficient, FDS=Five Dimensions of Satisfaction, SSL=Satisfaction in Support for learning, TOL=Thinking of Leaving
“significance” and “autonomy” variables were revealed as .13 and .12 respectively. The SMC were very low as a lower bound for the reliability. The coefficient of the composite variable of job characteristics was computed and obtained values with .47 and .37 separately for each country’s participants. The reliability is not good for LISREL model analysis (Joreskog & Sorbom, 1989; Bollen, 1989).

### Table 3. Comparisons of knowledge worker and blue-collar worker in the research

**Variables in the two countries**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Taiwan Participants</th>
<th>The United States Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knowledge worker</td>
<td>Blue-collar worker</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>S.D.</td>
</tr>
<tr>
<td>Age</td>
<td>40.85</td>
<td>7.4</td>
</tr>
<tr>
<td>Education level</td>
<td>3.31</td>
<td>.59</td>
</tr>
<tr>
<td>Salary level</td>
<td>2.73</td>
<td>.87</td>
</tr>
<tr>
<td>Learning (LC)</td>
<td>5.38</td>
<td>2.07</td>
</tr>
<tr>
<td>Autonomy</td>
<td>2.59</td>
<td>1.19</td>
</tr>
<tr>
<td>Significance</td>
<td>2.65</td>
<td>1.35</td>
</tr>
<tr>
<td>FDS</td>
<td>15.34</td>
<td>2.42</td>
</tr>
<tr>
<td>SSL</td>
<td>5.92</td>
<td>1.30</td>
</tr>
<tr>
<td>TOL</td>
<td>2.53</td>
<td>.97</td>
</tr>
</tbody>
</table>

Note. M=Mean, SD=Standard Deviation, *p < .05, **p < .001, FDS=Five Dimensions of Satisfaction, SSL=Satisfaction in Support for learning, TOL=Thinking of Leaving
Table 4. Comparisons of knowledge worker in the research variables between the two countries

<table>
<thead>
<tr>
<th>Variables</th>
<th>Taiwan Knowledge worker</th>
<th>The US Knowledge worker</th>
<th>F value</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>S.D.</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td>40.85</td>
<td>7.4</td>
<td>38.3</td>
</tr>
<tr>
<td>Education level</td>
<td>3.31</td>
<td>.59</td>
<td>3.67</td>
</tr>
<tr>
<td>Salary level</td>
<td>2.73</td>
<td>.87</td>
<td>3.89</td>
</tr>
<tr>
<td>Learning</td>
<td>5.38</td>
<td>2.07</td>
<td>7.29</td>
</tr>
<tr>
<td>Autonomy</td>
<td>2.59</td>
<td>1.19</td>
<td>3.44</td>
</tr>
<tr>
<td>Significance</td>
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<td>1.35</td>
<td>3.31</td>
</tr>
<tr>
<td>FDS</td>
<td>15.34</td>
<td>2.42</td>
<td>21.38</td>
</tr>
<tr>
<td>SSL</td>
<td>5.92</td>
<td>1.30</td>
<td>7.96</td>
</tr>
<tr>
<td>TOL</td>
<td>2.53</td>
<td>.97</td>
<td>2.37</td>
</tr>
</tbody>
</table>

Note. M=Mean, SD=Standard Deviation, *p < .05, **p< .001, FDS=Five Dimensions of Satisfaction, SSL=Satisfaction in support for learning, TOL=Thinking of Leaving

Table 5. Correlation matrices of the observed variables of the United States participants and Taiwan participants

<table>
<thead>
<tr>
<th>Types of workers</th>
<th>Learning</th>
<th>.379**</th>
<th>.153</th>
<th>.259**</th>
<th>.239**</th>
<th>.213**</th>
<th>-.087</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>.292**</td>
<td>1.000</td>
<td>.287**</td>
<td>.163*</td>
<td>.326**</td>
<td>.206**</td>
<td>-.216**</td>
</tr>
<tr>
<td>Significance</td>
<td>-.011</td>
<td>.297**</td>
<td>1.000</td>
<td>.010</td>
<td>.003</td>
<td>-.110</td>
<td>.057</td>
</tr>
<tr>
<td>Autonomy</td>
<td>.195*</td>
<td>.291**</td>
<td>.125</td>
<td>1.000</td>
<td>.291**</td>
<td>.263**</td>
<td>-.088</td>
</tr>
<tr>
<td>FDS</td>
<td>.028</td>
<td>.214**</td>
<td>.247**</td>
<td>.084</td>
<td>1.000</td>
<td>.521**</td>
<td>-.474**</td>
</tr>
<tr>
<td>SSL</td>
<td>.033</td>
<td>.224**</td>
<td>.090</td>
<td>.067</td>
<td>.770**</td>
<td>1.000</td>
<td>-.400**</td>
</tr>
<tr>
<td>TOL</td>
<td>-.118</td>
<td>-.012</td>
<td>.205**</td>
<td>-.120</td>
<td>-.197*</td>
<td>-.200**</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Note. Correlation coefficients in upper triangle are of the US participants, those in lower triangle are of Taiwan participants. *p < .05, **p< .01
FDS=Five Dimensions of Satisfaction, SSL=Satisfaction in support for learning, TOL=Thinking of Leaving

According to literature review, the most important and distinctive job characteristics
of knowledge workers should be the “learning characteristics” (LC). And, the reliability of LC is also acceptable. So, the LC instead of a general concept of job characteristic was used for further analysis. The LC should be more specifically in revealing the essential attribute of knowledge work. On the other hand, the “satisfaction in support for learning” (SSL) is specifically relevant to the learning characteristics of knowledge work. And, one of the traditional five dimensions of job satisfaction is about satisfaction of work itself. This dimension and the satisfaction in support for learning (SSL) are distinctive from the other four dimensions of job satisfaction, including pay, promotion, supervisor and colleague. The satisfaction for interesting of work itself and satisfaction in support for learning in job can be considered as reward intrinsically in job unlike that reward of the other four dimensions which are considered as reward extrinsically existing off job (Katz, & Van Maanen, 1977). Therefore, the dimension of satisfaction for work itself and the satisfaction in support for learning (SSL) were integrated as “Intrinsic Job Satisfaction” (IJS) variables for further analysis. Consequently, a causal model consisting of four observed variables, types of workers, learning characteristics, intrinsic job satisfaction, and thinking of leaving was finally constructed particularly for a better estimation and analysis. The correlations matrix used for analysis of this causal model was shown as Table 6.

As expected, the causal model for Taiwan subject was estimated with a high index of fit (D.F.=3, $\chi^2=3.22$, $p=.36$, GFI=.99, AGFI=.97, RMR=.036) shown as Figure 2. However, the model for American subject showed quite fit but not so well (D.F.=3, $\chi^2=8.50$, $p=.037$,
Table 6. Correlation matrices of the observed variables of the two countries for the path analysis model

<table>
<thead>
<tr>
<th>Types of workers</th>
<th>Learning</th>
<th>IJS</th>
<th>TOL</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of workers</td>
<td>1.000</td>
<td>.379</td>
<td>.288</td>
<td>-.087</td>
</tr>
<tr>
<td>Learning (LC)</td>
<td>.292**</td>
<td>1.000</td>
<td>.314</td>
<td>-.216</td>
</tr>
<tr>
<td>IJS</td>
<td>.095</td>
<td>.306**</td>
<td>1.000</td>
<td>-.479</td>
</tr>
<tr>
<td>TOL</td>
<td>-.118</td>
<td>-.012</td>
<td>-.225**</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Note. Correlation coefficients in upper triangle are of the US participants, those in lower triangle are of Taiwan participants.; **p< .01; IJS=Intrinsic Job Satisfaction, TOL=Thinking of Leaving. Coefficient α of Learning and IJS for both countries are also listed in respective position.

GFI=.97, AGFI=.92, RMR=.058). Based on the value of the modification index and the former research results of ANOVA, there seems a significant coefficient existing between TOW (types of workers) and IJS (intrinsic job satisfaction). Therefore, a new causal model with a freed path from TOW to IJS for American participants was estimated. The new model was estimated with a high index of fit (D.F.=2, $\chi^2$=2.35, p=.31, GFI=.99, AGFI=.96, RMR=.026) shown as Figure 3.

There are similar pattern of variable relationships among learning characteristics, intrinsic job satisfaction, and thinking of leaving between the two countries. However, there is a very large difference in the coefficients existing between IJS (intrinsic job satisfaction) and TOL (Thinking of Leaving) across countries (-.48 vs. -.22). A multiple-sample analysis then was used to examine the equality of the coefficients across the two countries participants. The multiple-sample analysis of LISREL was estimated with constraint equality of all the coefficients and then with constraint equality of only the coefficient between learning characteristics and intrinsic job satisfaction. There appeared better fit indices for the multi-sample model with constraint equality of only the coefficient between learning characteristics and intrinsic job satisfaction. In addition, it was found that a significant difference exists between the two multi-sample models($\Delta$D.F.=2, $\Delta\chi^2$=6.15, p<.05). Therefore, it is supported for the multi-sample model with constraint equality of the coefficient between learning characteristics and intrinsic
job satisfaction and with no constraint of the coefficient between intrinsic job satisfaction and thinking of leaving. The global fit indices (D.F.=2, $\chi^2=1.66$, NCP=0, RMSEA=0, NFI=.98, CFI=1.00) and groups fit indices (Taiwan’s group: $\chi^2=1.01$, SRMA=.027, GFI=1.00) of the multiple sample model are shown as Figure 4.

**Figure 2. Path analysis model for Taiwan participants**
- TOW=Types of workers, LC=Learning characteristics, IJS=Intrinsic job satisfaction, TOL=Thinking of leaving
- * $t > 2$ or $t < -2$, N=173
- D.F.=3, $\chi^2=3.22$, p=.36, GFI=.99, AGFI=.97, RMR=.036

**Figure 3. Path analysis model for The United States participants**
- TOW=Types of workers, LCJ=Learning characteristics, IJS=Intrinsic job satisfaction, TOL=Thinking of leaving
- * $t > 2$ or $t < -2$, N=164
- D.F.=2, $\chi^2=2.35$, p=.31, GFI=.99, AGFI=.96, RMR=.026

**Figure 4. Multi-sample analysis model for Taiwan participants and the United States participants**
- LC=Learning characteristics, IJS=Intrinsic job satisfaction, TOL=Thinking of leaving
- * $t > 2$ or $t < -2$, .31* similar across countries, -.22* for Taiwanese, -.48* for the U.S.,
N1=173(Taiwanese), N2=164(American)

- The global fit indices: D.F.=2, χ²=1.66, NCP=0, RMSEA=0, NFI=.98, CFI=1.00
- The groups fit indices: Taiwan’s group: χ²=.65, SRMA=.023, GFI=1;
  the U.S.’s group: χ²=1.01, SRMA=.027, GFI=1.00

5. Discussion

Based on research on nature of knowledge worker, theory of job characteristics model and employee turnover, the hypothetical characteristics and the relationships among the characteristics of knowledge workers were proposed. These hypothetical characteristics and relationships were examined through comparisons of the characteristics and the relationships between different types of workers and between different countries by using data from an international survey.

1) Interpretations and discussion for findings of the hypothetical characteristics of knowledge workers and blue-collar workers

It was as expected that knowledge workers in both countries had higher age, educational level, and get higher pay than their blue-collar workers respectively. These demographic characteristics might be very general so that they existed across countries. However, theses basic characteristics should be examined in more different countries in the future.

In comparison of both countries’ knowledge workers, American knowledge workers revealed higher education and pay. This may be related to the different levels of development in economy. The United States as developed country is one of the most advanced country in knowledge economy, and Taiwan as a developing country is not as advanced as The United States. In a more advanced level of knowledge economy, the economy generally requires employees with higher education and with higher pay given.

Both countries’ knowledge workers as expected showed more learning and autonomy characteristics in their jobs than their blue-collar workers respectively. Learning organization or organizational learning as new theory or concepts of organizations developed mainly by Peter Senge have been widely accepted and applied in business today (Senge, 1990). Many organizations have put much emphasis on learning and continuous learning by means of all the organizational employees learning together. The organizations need to hire many knowledge workers because they are critical for business survival and success. So, it is very likely that the learning characteristic was found more in knowledge work. As to autonomy, self-managed teams, empowerment and organization flattening all become tendencies of management,
which generally emphasize autonomy and expect employees to be more autonomous in their jobs (Manz, & Sims, 1993; Drucker, 1999). The autonomy characteristics found more in knowledge work is consistent with the development of business today.

However, the “significance” characteristics in jobs was not found significant for both countries’ knowledge workers. This may be due to the production system in modern manufactory generally becoming more integrated for efficiency (Murphy & Cleveland, 1995). Thus, every blue-collar worker in the interdependent jobs tends to have more significance characteristics in their jobs than before.

As predicted, the job satisfaction of American knowledge workers was higher than that of blue-collar workers. But, Taiwanese knowledge workers had job satisfaction not different from their blue-collar workers. The difference between countries may be related to some cultural factors. Taiwanese put more emphasis on collectivism, and Americans emphasize individualism. Collectivism emphasizes group’s goals and values, however job satisfaction is a measure individual attitude toward job. In addition, individualists’ behaviors tend to be more regulated by personal attitude, but, collectivists’ behaviors tend to be more regulated by in-group norm (Trandis, McCusker & Hui, 1990). Besides the collectivism, there is also Confucianism in Taiwan. Taiwanese knowledge workers with higher education level tend to have more understanding on Confucianism, and they are likely to follow Confucianism which stresses to repress desires and emotions in order to control behaviors for obeying social norms or proprieties (Weber, 1951). Therefore, Taiwanese with Confucianism and Collectivism probably consider their individual satisfaction less important and gave low rating in job satisfaction comparing to American with individualism. The cultural factors described above may be so great that even comparing to knowledge workers of Taiwan, American blue-workers showed more job satisfaction. In addition, in a cross-country research on work attitude between Japan and the United States (Lincoln, 1989), it was also found that American employees appeared to have significant higher satisfaction than Japanese employees. It may be due to similar cultural factor because Japan and Taiwan are both collectivistic countries with Confucianism influences (Hofsted, 1980; Triandis & Bhawuk, 1997).

Finally, contradictory to hypothesis, there were no significant differences in “thinking of Leaving” (TOL) between types of workers and between countries. However, it was found that there were indirect effects on thinking of leaving through intrinsic job satisfaction (IJS) and learning characteristics (LC). The indirect effects and other pattern relationships of characteristics of knowledge workers are discussed in the following section.
2) Interpretation and discussion for findings of pattern relationships among types of worker, job characteristics, attitudes, and behaviors

The pattern of the two causal models for Taiwan participants and American participants respectively are basically similar. The similar paths between the two countries models reveal that there are consistent pattern relationships among types of workers, learning characteristics, intrinsic job satisfaction, and thinking of leaving. The pattern of this relationship can be interpreted as that the knowledge workers have more learning job characteristics than blue-collar workers, and more learning job characteristics make them more satisfy with work itself including job learning, and finally because of more satisfaction for work itself, they decrease thinking of leaving their organizations.

Two differences were found between the two causal models of the countries. Firstly, the path connecting intrinsic job satisfaction (IJS) to thinking of leaving (TOL) although is significant in both models, the path coefficient for American participants is significantly higher than that for Taiwanese participants. This implies that intrinsic job satisfaction (IJS) had greater negative effect on thinking of leaving (TOL) for American Knowledge workers. This is probably also related to differences in collectivism and individualism and the influence of Confucianism on Taiwan. Taiwanese with collectivism and Confucianism tend to put less emphasis on satisfaction and put more emphasis on controlling behavior to follow group or organizational goals and norms than American with individualism. Therefore, American workers who emphasizing individualists are likely to expressed their thinking of leaving if they had low satisfaction. Yet, Taiwanese workers emphasizing collectivism and Confucianism likely restrained their thinking of leaving even if they had low satisfaction.

The other difference is that one additional path, from types of workers to intrinsic job satisfaction, was included in the model for American. This implies that besides indirect effect on intrinsic job satisfaction through learning characteristics, there is significant relationship between types of workers and intrinsic job satisfaction for American participants. However, for Taiwanese participants, types of workers had no direct relationships with intrinsic job satisfaction but only had indirect effect through learning characteristic of jobs. Thus, no matter if there is higher learning characteristic for American knowledge workers, they tend to have higher intrinsic job satisfaction. In the former comparison of both countries’ knowledge workers, American knowledge workers have revealed higher education and pay. And, the differences in collectivism, individualism, and Confucianism between the countries also have been pointed out. It
was very likely due to these factors that in America the different types of workers had different intrinsic job satisfaction.

3) Limitation of this research and suggestions for future research

This research was based on parts of measures of an international survey. The observed items of most research variable were quite less, so that the results of this research may not have sufficient stability. Future research may use measurements with more items and higher reliabilities in order to test with a full model of LISREL including both measurement model and causal model. Hence, more accurate estimation may be obtained.
REFERENCES


