

Relationships between Critical Factors Associated with Virtual Work and Virtual Worker's Organizational Identification

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ABSTRACT

By the progress of information technology and Internet, the virtual organization has become a trend, thus there are more and more virtual workers. The purpose of this research is to explore the relationships between critical factors associated with virtual work and virtual worker's organizational identification. Data was collected from 140 virtual workers, the results through LISREL analysis showed that clear evaluation criteria, adequate communication, which among three critical factors influencing works to be virtualized, was significant related to organizational identification. However, the third factor of work independence which was expected to negatively associate with organizational identification was not supported. Regarding to the moderating effect, the results show that adequate communication would not moderate the relationship between both the factors of clear evaluation criteria and work independence and organizational identification. On the other hand, virtual worker's age, position, and salary would have moderating effect on the relationship between work independence and organizational identification. When the virtual worker was older, on a higher position, and higher salary, then the work independence negatively effect on organizational identification would become weaker. Finally, we provided some implications of practice and discussed some suggestions for the future studies.

Keywords: virtual workers, organizational identification

I. INTRODUCTION

The emergence of Internet has created unprecedented business trends and effects. The resulting hot topics under discussion across industries include e-business, e-commerce, and the management challenge attributable to drastic change of operational method. As a matter of fact, virtual work is a product of e-business. E-business has drawn attention primarily due to the significant structural change of business competitiveness as a result of advanced information technology and communication network. Not only has the efficiency in production been substantially improved, cost has been reduced significantly, but

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business competitiveness is challenged rigorously by speed and globalization. Even though science and technology have led to the creation of virtual work, whether virtual work can continue its growth and generate benefits to organizations depends on if the traditional jobs can effectively adapt to virtual work (Raghuram, Garud, Wiesenfeld & Gupta, 2001). Therefore, why organizational staff is glad to accept virtualization of traditional jobs, and what the critical factors associated with virtual work are, have become the topics for in-depth discussion. Development of the corresponding management method, which should be different than the traditional one, is a compelling challenge to virtual organizations.

Virtual world broke the distance in time and space, but meanwhile reduced the opportunities for people to communicate face to face. When traveling in actual and virtual space, people are unable to recognize the boundary between the two. Hence, a critical issue to virtual organizations in theory and in practice is that the distance and decentralization caused by virtual work will undermine the link of employee and organization (Weisenfeld, Raghuram & Garud, 1999), which is mainly because that a virtual worker is usually isolated from his colleagues, supervisor, and counterparts in other organizations, feeling lonely and even pressure sometimes (Nilles, 1994; Dobrian, 1999;). In fact, virtual workers have unconventional opinions about their organizations. If organizations still mean something to virtual workers, it ought to be employees' self-conscience of being a part of an organization. An important dimension is organizational identification, that is, employees acknowledge their organizational association (Ashforth & Mael, 1989). In current information era, virtual organizations have shortened the visible distance to office through Internet. However, the distance between employees or between employee and organization has grown invisibly as a result. How to change employees' organizational awareness and further improve their organizational identification has become a profound management subject to virtual organizations.

Therefore, this research focuses on the factors associated with virtual work including work independence, clear evaluation criteria, and adequate communication, analyzes their correlation to virtual workers' organizational identification, and further studies whether adequate communication, individual characteristics (for example, age, profession, and annual salary) play a moderating

role in the correlation of work independence and clear evaluation criteria to organizational identification.

II. THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

1. Virtual Work

In as early as 1980s, Toffler mentioned the concept of electronic cottage in his book “The Third Wave”. Many enterprises followed the idea of virtual work and started to allow a selected group of employees to work remotely part time and finish some job tasks assigned at home (Kraut, 1989; Olason & Primps, 1984; Shamir & Salomon, 1985; Raghuram & Wiesenfeld, 2004). Virtual work in a true sense didn’t become popular until recently. Employees no longer need to physically present themselves at corporate headquarter in order to work. Instead, they can perform their professional jobs through Internet connection from remote home, car, or hotel (Raghuram, et al., 2001). As information technology advances and Internet matures in recent years, more and more corporate employees do not have their own fixed working space any more. The so-called virtual office and small office home office (SOHO) thus came into being.

Virtual work means that employees do not need to physically go to corporate headquarter to work but instead, perform their professional jobs through Internet connection from remote home, car, hotel, satellite office, or other places different than traditional central office (Raghuram et al., 2001; Wiesenfeld, Raghuram & Garud, 2001).

2. Organizational Identification

Organizational identification originates from social identity theory, according to which, self-concept is comprised of personal identity and social identity (Tajfel, 1971). Ashforth & Mael (1989) pointed out that organizational identification is a special type of social identity, meaning that organizational identification is the acknowledgement from the same organizational community. Turner (1987)

deemed identification as an approach for organizational members to define their relationships with the organization; therefore, identification is the social and psychological connection between employees and organization. Tajfel (1978) defined organizational identification as the acknowledgment of organization-member relationship and the added value and emotional attachment of the relationship meant to members.

Based on the above, organizational identification emphasizes that employees consider themselves a part of the organization and is intended to build relationships among members within the organization, which reflects greater need for affiliation (Glynn, 1998; Pratt, 1998). Relatively, employees with weaker sense of organizational affiliation show less need for affiliation. Ashforth & Mael (1989) supposed that organizational identification starts with individual self-categorization as a part of the organization, hence acknowledgement is an important factor for identification of individuals. Moreover, the acknowledgement factor of identification affects individuals consciously sharing their interests with the organization and communicates the degree that individuals are aware of themselves as a part of the organization.

Organizational identification is especially critical to organizational virtualization due to its ability to replace or compensate for the convenience of coordination and cooperation existing in traditional organizations lost in organizational virtualization. Employees can literally work anytime anywhere in a virtual organization, which makes the mechanism depending on immoderate supervisors for coordination and control rather difficult to function (DeSanctis & Monge, 1999). Organization identification provides organizations and scattered employees a psychological link and inspires organizational members to accomplish organizational objectives by improving interpersonal trust and cooperation (Kramer & Brewer, 1986). When employees consider themselves a member of the organization, they tend to show more affirmative cooperation and help reach organizational goals (Wiesenfeld et al., 2001). Many researches have shown that organizational identification is closely related to employees' devotion to meet organizational requirements and goals, organizational citizen behavior and cooperation behavior, as well as willingness to stay within the organization (Dutton, Duderich & Harquail, 1994; Kramer, 1993; Mael & Ashforth, 1995).

The emotional element of feeling like a member of the organization plays a quite important role in creating a positive image of the organization or realizing a positive social identity (Tajfel, 1982). According to social identity theory, there are two channels to improve organizational identification (Pratt, 1998): (1) the need for self-categorization helps position individuals in the society; and (2) the need for self-enhancement represents the requirement for rewards for community membership. However, employees at virtual work tend to consider themselves more independent individuals who do not belong to any communities in the organization. In particular, when employees can work at any time from any where, the traditional control capacity of direct monitoring mechanism diminishes, in which case, organizational identification becomes more meaningful.

As members within the organization vary, their interpretation of organizational identification differs. When they have strong organizational identification, the properties they use to define the organization must reflect employees' personal characteristics. Therefore, organizations can learn employees' working behavior through the process of identification (Garbett, 1988). Employees' psychological attachment to the organization is an essential property of organizational identification. This kind of attachment may be affected by environmental changes (O'Reilly & Chatman, 1986). In other words, subjective and objective factors may influence organizational identification. For example, employees' individual stereotype and a third-party's comments on the organization will have impact on employees' organizational identification and performance. In general, an organization has distinctive, central, and enduring characteristics. When they categorize themselves into a group within the organization, employees' organizational identification increases. Many scholars have pointed out that external prestige will affect employees' organizational identification (Mael & Ashforth, 1992; Pratt, 1998; Smidts, Pruyn & Riel, 2001).

A strong sense of organizational identification impacts employees' behavior and performance. Employees with a strong sense of organizational identification will endeavor to maintain consistency between acknowledgement and behavior, keep close contact with the organization, make themselves recognized loyal members to the organization, and thus strengthen the cooperative atmosphere among colleagues and improve organizational performance (Wiesenfeld et al.,

2001). Ashforth & Mael (1989) believed that employees of higher degree of organizational identification tend to be more supportive to the organization. In agreement, Simon (1997) concluded that employees with a stronger sense of organizational identification are inclined to behavior consistent with organizational objectives. In overall development of organizational theories, virtual organization may be an emerging and inevitable organizational structure in the era of information.

3. Relationships between Critical Factors of Virtual Work and Organizational Identification

One characteristic of virtual organization is many scattered virtual workers in the organization. However, what factors cause employees to switch from traditional work pattern to virtual work pattern? In other words, in traditional organizations, what job type or feature make employees to adjust to virtual work? Judy & D'Ameco (1997) believed that telecommuting is applicable to three types of jobs, that is, routine information management, highly mobile activities, and highly professional tasks. The primary reason is that after these jobs or tasks are adapted to virtual work, information can be easily obtained through computer from home, car, or hotel, no difference to working on computer in office. Raghuram et al. (2001) summarized the motivations for virtual work into structural factor and relational factor.

All these researches explained the impact that either the job structural characteristics in traditional organizations or the relationship between employees and the organization has on the decision on adaptation to virtual work, however, the correlation of these factors and organizational identification is still to be explored. This research continues on with the work done by Raghuram et al. (2001), divides the factors affecting adaptation to virtual work into three categories of work independence, clear evaluation criteria, and adequate communication, and further studies the correlation between these critical factors of virtual work and organizational identification, which is intended to provide organizational virtualization a reference.

3.1 Work Independence

The new information technology by allowing increased modularity created the fundamental change in the technology of work (Garud & Kotha, 1994; Langlois, 1999). For instance, with advancement in technology, individuals can access corporate shared database through internal and external network at any time and exchange opinions on any subject with other colleagues anytime. Meanwhile, the application of Email and electronic communication tools (Caldwell & Koch, 2000) encouraged employees to work online with others. In this case, more work autonomy is required, which means that employees are able to finish the job independently, in other words, the job itself does not require too much coordination or report. Therefore, work independence will increase employees' confidence in standalone operation and have positive impact on psychological adaptation, in which case, employees tend to adjust their jobs to virtual work more easily (Raghuram et al., 2001).

As a matter of fact, another main reason for virtual workers to favor work independence is that most of the job tasks performed by virtual workers are highly skillful and professional and virtual workers usually prefer to accomplish on their own without any interference. In contrary, employees can hardly complete jobs autonomously in a busy office environment, under supervisor's monitoring, being interrupted by colleagues' conversations and customers' inquires by phone. DeSanctis, Staudenmeyer & Wong (1999) pointed out those virtual workers heavily relying on their colleagues may incur time pressure, loss control, and decrease individual productivity. Consequently, less independent tasks that require routine communications and coordination across functions are not appropriate for virtualization.

Since they work in an independent environment isolated from the company and other colleagues for a long time, virtual workers usually feel lonely and lack the sense of being an organizational member. In other words, the independent characteristic of the jobs conducted by virtual workers reduces their need for organizational attachment. Based on many researches, when individual need for organizational attachment is high, the probability of high organizational identification increases (Markus & Kitayama, 1991; Veroff & Veroff, 1980). On the other hand, when individual need for organizational attachment is low, the

acknowledgement of organizational membership is vague, and thus organizational identification is weak (Wiesenfeld et al., 2001). Based on the above, this research proposes the first hypothesis:

Hypothesis 1: The independence of virtual work will be negatively related to organizational identification.

3.2 Clear Evaluation Criteria

In any organization or corporations, clear evaluation criteria are an important incentive element. Employees can be fully motivated by well-defined objectives. In a virtual working environment, an employee has basically lost the opportunity of being evaluated by colleagues or management directly. Therefore, employee performance becomes a very important evaluation criterion. The employee must take initiatives to finish the job independently and maximize his performance. As a result, a set of clear evaluation criteria are especially important to virtual workers.

Kurland & Egan (1999) stated that in a virtual working environment, if management cannot monitor subordinates directly, clear evaluation criteria will help increase productivity. Moreover, from the perspective of program integrity, establishing clear evaluation criteria is necessity to both organizations and virtual workers (Raghuram et al., 2001). From the perspective of virtual workers, clear evaluation criteria can strengthen virtual workers' conscience of organizational support at work. As individuals become aware of social support to their work, they recognize their positive social relationship with others in workplace (Aspinwall & Taylor, 1992; Dorman & Zapf, 1999; Lim, 1997; Wanberg & Banas, 2000), which will provide virtual workers stronger organizational relational information (Wiesenfeld et al., 2001). In other words, when virtual workers feel that they are included in organizational members, they tend to believe that others consider them as members of the organization so they will do the same. Therefore, without regular contact with the organization or any other real indicator of recognition, job support may play a critical role in promoting and strengthening virtual workers' organizational identification, mitigating virtual workers' concerns and doubts, encouraging self-enhancement in organizational identification with stronger individual motivation for organizational identification (Wiesenfeld et al., 2001). Based on the above, the second hypothesis is proposed in this research.

Hypothesis 2: Clear evaluation criteria for virtual workers will be positively related to organizational identification.

3.3 Adequate Communication

In virtual organizations, as the contact with supervisors and colleagues is reduced, the development and establishment of communication channel become a requisite factor to work virtualization (Cascio, 2000). Virtual workers are usually considered a remote and isolated group in an organization because they do not show up in the organization often, which prevents them from career advancement (Watad & DiSanzo, 2000). Hence, channel hierarchy should be replaced with horizontal relationships such as multilateral communication among members. Meanwhile, some communications may be built on more relational bases of which both parties can seek a relational basis to establish a close relationship to prevent the sense of isolation as well as develop and maintain mutual trust. Through smooth organizational communication channels of telephone, email, or electronic video, organizations may make efforts to build good social relationships with virtual workers to make up for deficiency in face-to-face communication.

Raghuram et al. (2001) found that when they have sufficient channels to communicate with the organization, virtual workers seem to be able to connect themselves to the organization and be inspired for better performance. In other words, an organization establishes smooth communication channels, provides virtual workers with adequate information so that virtual workers can have adequate communication with the organization, which will help virtual workers reckon themselves as part of the organization and thus increase organizational identification. Smidts, Pruyn & Riel (2001) also pointed out from the perspective of social categorization and self categorization that it will enhance employees' knowledge of the organization's characteristics distinct from other organizations and recognition of their own positioning in the organization, and thus increase employees' awareness of the organization's charisma and strengthen the correlation with the pride in working for the organization, if the organization often provides adequate information including the organization's vision, objectives, and future development plan. The more satisfied the employees are with the organization, the higher the probability that organizational identification will occur

(Dutton et al., 1994). Based on the above, the third hypothesis in this research is proposed.

Hypothesis 3: Adequate communication information that virtual workers can obtain from the organization will be positively related to their organizational identification.

4. Moderating Effect of Adequate Communication on Work Independence or Clear Evaluation Criteria and Organizational Identification

Adequate communication can not only directly affect virtual workers' organizational identification, but also be a moderating factor to the degree of organizational identification when virtual workers are exposed to work independence and clear evaluation criteria. Virtual workers appreciate work independence because it avoids interference by other people or tasks at work so they favor work virtualization. However, the resulting isolation from the organization on a regular basis causes disconnection to the organization and weak organizational identification. Adequate communication with the organization provides sufficient organizational information, encourages members' agreement on organizational objectives, and increases the interdependence among members (Liang, Shuanglian, 1984). Therefore, adequate communication seems to be able to make up for the shortfall of virtual work and increase the organizational identification of virtual workers. On the other hand, clear evaluation criteria can enhance the organizational identification of virtual workers, primarily because clear evaluation criteria can make virtual workers feel the support from the organization. By the same token, adequate communication enables virtual workers to sense organizational support. Hence, adequate communication may strengthen the relationship between clear evaluation criteria and organizational identification. Based on the above, the fourth hypothesis in this research is proposed.

Hypothesis 4-1: Adequate communication will moderate the relationship between work independence and organizational identification, with the relationship being weaker in organization having higher adequate communication.

Hypothesis 4-2: Adequate communication will moderate the relationship between clear evaluation criteria and organizational identification, with the relationship being stronger in organization having higher adequate communication.

5. Moderating Effect of Individual Factors on Work Independence or Clear Evaluation Criteria and Organizational Identification

5.1 Moderating Effect of Age

The age of a virtual worker can be a moderating factor to work independence or clear evaluation criteria and organizational identification. From the standpoint of life cycle, older employees tend to select a career of their dream and an organization that they feel comfortable with, and maintain their relationship with the organization in a long run. They have devoted most of their time to the organization and career, so they are more concerned with their existing relationship with the organization (Raghuram et al., 2001). In addition, older employees may face the pressure from mortgage, education fund, and pension fund, which make them desire a stable and secure job and a good relationship with the organization, which in turn helps increase their organizational identification. On the other hand, older employees are less likely to try new things and thus not as familiar as younger virtual workers with the applications of information technology (e.g. Internet, email etc.). They rely on the assistance of colleagues, supervisors, and the organization more heavily, resulting in less work independence. In a contrary, younger employees are more concerned with immoderate benefits and rewards, thus hope to have clear evaluation criteria in place to maintain their work independence and individual performance. Based on the above, the fifth hypothesis in this research is proposed.

Hypothesis 5-1: Age will moderate the relationship between work independence and organizational identification, with the relationship being weaker in order virtual workers.

Hypothesis 5-2: Age will moderate the relationship between clear evaluation criteria and organizational identification, with the relationship being stronger in younger virtual workers.

5.2 Moderating Effect of Job Position

Schein (1970) developed the theory of psychological contract in his work “organizational psychology”, which states that mutual expectations exists between the organization and the employee when hiring decision is made. The organization provides job, salary, and position etc. to exchange for the employee’s professional knowledge, capability, and loyalty etc. The exchange creates an intangible psychological contract. The ranking of the position affects members’ organizational identification. A higher position gives greater power and independence, earns more respect and reward, and thus produces more psychological satisfaction. Consequently, in an organization, employees at higher ranks demonstrate stronger organizational identification than those at lower ranks. Employees at lower ranks are more concerned with whether the evaluation mechanism is fair because it directly relates to potential opportunity for promotion. Therefore, job position may have a moderating effect on work independence or clear evaluation criteria and organizational identification of virtual work. Based on the above, the sixth hypothesis in this research is proposed.

Hypothesis 6-1: Job position will moderate the relationship between work independence and organizational identification, with the relationship being weaker in virtual workers at higher ranks.

Hypothesis 6-2: Job position will moderate the relationship between clear evaluation criteria and organizational identification, with the relationship being stronger in virtual workers at lower ranks.

5.3 Moderating Effect of Salary

Inducements-contributions theory divides individual motivations into inducement and contribution. The greater the inducements provided by the

organization, the greater the commitment and contributions made by organizational members. The rewards for contributions include internal and external rewards. Internal rewards refer to self-dignity or self-achievement whereas external rewards are represented by position, salary or public recognition etc. Many researches agreed that increase in external rewards will improve members' attachment to the organization. In particular, salary raise will increase members' satisfaction with the organization (March & Simon, 1958; Porter & Lawler, 1968). The salary structure that pays the same work differently creates dissatisfaction among employees. Employees with lower pay are more concerned with whether the corporate evaluation mechanism has publicized clear criteria. Therefore, salary may have a moderating effect on work independence or clear evaluation criteria and organizational identification of virtual work. Based on the above, the seventh hypothesis in this research is proposed.

Hypothesis 7-1: Salary will moderate the relationship between work independence and organizational identification, with the relationship being weaker in virtual workers having higher pay.

Hypothesis 7-2: Salary will moderate the relationship between clear evaluation criteria and organizational identification, with the relationship being stronger in virtual workers having lower pay.

III. RESEARCH METHODOLOGY

1. Research Structure

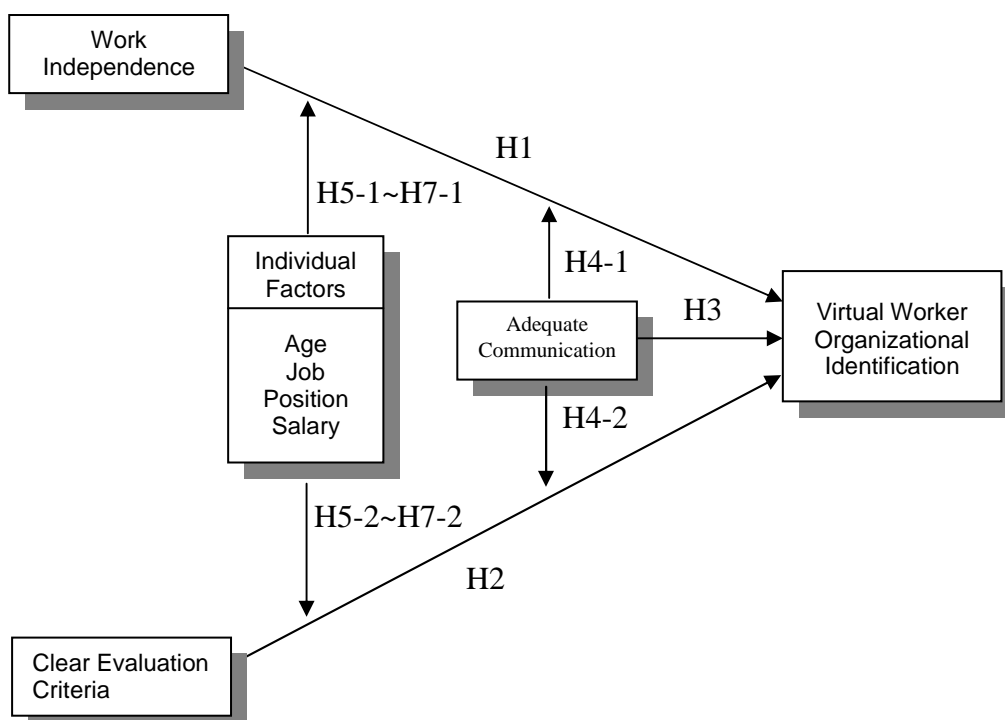


Figure 1. Research Structure

Based on the above mentioned literatures, This research focuses on the factors associated with virtual work including work independence, clear evaluation criteria, and adequate communication, analyzes their correlation to virtual workers' organizational identification, and further studies whether adequate communication, individual characteristics (for example, age, profession, and annual salary) play a moderating role in the correlation of work independence and clear evaluation criteria to organizational identification. As a result, the research framework for this study is as shown in Figure 1:

2. Operational Definition and Measurement

2.1 Organizational Identification

2.1.1 Operational Definition:

Organizational identification refers to the process of integrating individual interests with organizational internal and external interests. Organizational identification is built on these interests.

2.1.2 Measurement:

The organizational identification questionnaire (OIQ) designed by Cheney (1982) is adopted in this research. In order to reduce the burden of questionnaire recipients, a total of 12 question items out of 25 in the scale are used and modified in wording based on the subject of this research. Likert 7-point scale is employed for measurement. People under survey answer questions with various degree of personal agreement. Points ranging from 1 to 7 are given to degrees from

“completely disagree” to “completely agree”. A higher score in total indicates stronger organizational identification of virtual workers.

2.2 Work Independence

2.2.1 Operational Definition:

Work independence means that employees have greater autonomy at work and the job itself does not require too much coordination or reporting but instead can be accomplished independently.

2.2.2 Measurement:

A total of six question items are developed on the basis of the operational definition of work independence by referring to the scale built by Raghuram, Garud, Wiesenfeld & Gupta (2001). Likert 7-point scale is employed for measurement. Points ranging from 1 to 7 are given to degrees from “completely disagree” to “completely agree”. A higher score in total indicates a higher degree of work independence, and vice versa.

2.3 Clear Evaluation Criteria

2.3.1 Operational Definition:

Clear evaluation criteria means that employees are aware of the objectivity in the evaluation criteria that can be easily used to measure and quantify their performance clearly.

2.3.2 Measurement:

A total of five question items are developed on the basis of the operational definition of clear evaluation criteria by referring to the scale built by Raghuram, Garud, Wiesenfeld & Gupta (2001). Likert 7-point scale is employed for measurement. Points ranging from 1 to 7 are given to degrees from “completely disagree” to “completely agree”. A higher score in total indicates a higher degree of clarity in evaluation criteria, and vice versa.

2.4 Adequate Communication

2.4.1 Operational Definition:

Adequate communication means that employees are aware that the organization can provide adequate information and build efficient communication channels, that is, employees are aware of the degree of efficiency in organizational internal and external communications.

2.4.2 Measurement:

A total of twelve question items are developed on the basis of the operational definition of adequate communication by referring to the Organizational Communication Questionnaire (OIQ) built by Roberts & O'Reilly (1974), and the Communication Satisfaction Inventory (CSI) built by Li, Yuandun & Cai, Wenyuan (1998). Likert 7-point scale is employed for measurement. Points ranging from 1 to 7 are given to degrees from "completely disagree" to "completely agree". A higher score for communication indicates a higher degree of agreement on the item, and vice versa.

3. Research Target

This research defines virtual workers in a wide sense as employees who do not need to go to work in office every day but perform professional jobs through internet connection from remote home, client site, car, hotel, satellite office center, or any places other than traditional central office, or employees who work in virtual organizations. SOHO is not included because it is not hired by any organization or corporation nor recognized as a member of any organization. In such a case, organizational identification does not exist. Hence, SOHO falls out of the scope of this research. This research targets the foreign industries and professions that exhibit satisfactory results from implementing virtual work or have the potential for virtual work, for instance, information technology, finance and insurance, management consulting, research institutions, and CPA firms. Related domestic literature and information are collected. Questionnaires are sent out to the companies who have adopted virtual work found online. The period of

investigation was from 2003-2004. A total of 140 questionnaires out of 250 sent are collected, representing 56% rate of return.

4. Reliability and Validity

Cronbach's α reliability test is conducted on all the question items on different dimensions in the questionnaire. The test by item-to-total shows that Cronbach's α coefficient on every dimension is higher than 0.7. Linear structural relationship model (LISREL) is applied to confirmatory factor analysis (CFA). The goodness of fit index for all variable dimensions in this research is greater than 0.9, indicating great goodness-of-fit of the model as a whole. The adjusted goodness of fit index (AGFI) falls between 0.87 and 0.96 exceeding the goodness of fit criterion of 0.8 proposed by Bagozzi & Yi (1988). The composite reliability (CR) falls between 0.76-0.93. Therefore, this scale shows high consistency. The absolute values of t-statistics for items measured on various dimensions are all above 2, implying that this scale has high convergent validity.

IV. DATA ANALYSIS AND RESULTS

1. Sample Structural Analysis

Sample data show: among people under survey, male 59 (42.14%), female 81 (57.86%); in terms of education, four-year college graduates 55 (39.29%), followed by two-year college graduates, postgraduates and above, high school graduates and below; in terms of marital status, single 80 (57.14%), followed by married with kids and married without kids; in terms of job position, individual contributors 107 (76.43%) and supervisors 33 (23.57%); in terms of age, the majority of 74 people representing 52.86% are less than 30 years old; in terms of salary, the majority of 56 people representing 40% earn between 310k and 500k; in terms of years of service, 66 people representing 47.14% have been in service for 1 to 2 years.

2. Correlation Analysis

Table 1 shows the mean, standard deviation, and correlation coefficient of the variables under study in this research. Except for work independence, all the other dimensions show significant correlation with organizational identification.

Table 1. correlation matrix

variables	1	2	3	4
Work Independence	(0.79)			
Clear Evaluation Criteria	0.41*	(0.79)		
Adequate Communication	0.30*	0.51*	(0.88)	
Organizational Identification	0.14	0.44*	0.50*	(0.93)
Mean	5.02	5.49	5.29	5.58
Standardized Deviation	1.08	0.90	0.75	0.82

Note: 1.* $p < 0.05$ 2. () is Cronbach's α

3. Hypotheses Testing

3.1 Impact of Work Virtualization's Critical Factors on Organizational Identification

In order to further understand the correlation between organizational identification and the critical factors of work virtualization including work independence, clear evaluation criteria, and adequate communication, hierarchical multiple regression analysis is applied in this research. Model 1 assumes individual properties to be independent variable, and Model 2 adds the predicting variables of work virtualization's critical factors. According to the results from Model 1 as shown in Table 2: Education ($\beta = -0.26^{***}$, $p < 0.01$) has a significant negative relationship with organizational identification, that is, the higher the education, the lower the organizational identification. Job position ($\beta = 0.27^{***}$, $p < 0.01$) shows a significant positive relationship with organizational identification, that is, management have higher organizational identification than individual contributors. Years of service ($\beta = -0.18^*$, $p < 0.1$) exhibits significant negative correlation with organizational identification, that is, the longer the years of service, the lower the organizational identification. According to the regression analysis results from Model 2: Work independence ($\beta = -0.08$) is negatively correlated to

organizational identification but has not reached the level of significance $\alpha = 0.1$, hence, Hypothesis 1 is rejected. Clear evaluation criteria ($\beta=0.22^{**}$, $p<0.05$) and adequate communication ($\beta=0.42^{***}$, $p<0.01$) both have significant direct impact on organizational identification, which means that the clearer the performance evaluation of virtual workers is, the more capable the company is to provide virtual workers with adequate information and efficient communication channel, which will help enhance the organizational identification of virtual workers. Hypothesis 2 and 3 cannot be rejected.

3.2 Moderating Effect of Adequate Communication on Work Independence or Clear Evaluation Criteria and Organizational Identification

In Table 2, the primary effect and the correlation item in Model 3 both produce variance inflation factor (VIF) far exceeding 10 (VIF values are between 43.87 and 160.23), implying serious multicollinearity. Therefore, this research centers the variables by replacing each value with the difference between it and the mean in regression analysis to reduce multicollinearity (edited & translated by Liu, Yingxing, 1997).

From Model 3 in Table 2, work independence in primary effect ($\beta=-0.04$) is negatively correlated to organizational identification but has not reached the level of significance. Nor has the correlation item reached the level of significance $\alpha = 0.1$. Therefore, adequate communication does not have any moderating effect between work independence and organizational identification. Hypothesis 4-1 is rejected. Clear evaluation criteria ($\beta=0.24^{**}$, $p<0.05$) shows significant positive correlation with the primary effect of organizational identification. However, the correlation item has not reached the level of significance $\alpha=0.1$. Therefore, adequate communication does not have any moderating effect between clear evaluation criteria and organizational identification. Hypothesis 4-2 is rejected.

3.3 Moderating Effect of Personal Characteristics on Work Independence or Clear Evaluation and Organizational Identification

3.3.1 Moderating Effect of Age

As shown in the analysis results of Model 4 in Table 2, the relationship between work independence in primary effect and organizational identification changes from originally negative but not significant ($\beta=-0.08$) to significant negative ($\beta=-0.25^{**}$, $p<0.05$), while the correlation item shows a significant positive relationship (work independence * age $\beta=0.23^{**}$, $p<0.05$). Therefore, the age of virtual workers has a moderating effect on the negative correlation between work independence and organizational identification. Figure 2 illustrates that when the age of virtual worker was relatively high, work independence was positively related to organizational identification. In contrast, when the age of virtual worker was relatively low, the relationship become negative. Based on the result of analysis, Hypothesis 5-1 cannot be rejected. In addition, the primary effect between clear evaluation criteria and organizational identification shows a significant positive relationship ($\beta=0.23^{**}$, $p<0.05$) whereas the correlation item does not reach the level of significance $\alpha=0.1$ (Clear Evaluation Criteria * Age $\beta=-0.008$). Therefore, the age of virtual workers doesn't have any significant moderating effect on clear evaluation criteria and organizational identification. Hypothesis 5-2 is rejected based on this confirmatory analysis result.

3.3.2 Moderating Effect of Job Position

In Model 5 shown in Table 2, the relationship between work independence in primary effect and organizational identification changes from originally negative but not significant ($\beta=-0.08$) to significant negative ($\beta=-0.17^{**}$, $p<0.1$) while the correlation item shows a significant positive relationship (work independence * job position $\beta=0.19^{**}$, $p<0.05$). Therefore, job position has a moderating effect on the negative correlation between work independence and organizational identification. Figure 3, indicating that when the job position of virtual worker was relatively high, work independence was positively related to organizational identification. In contrast, when the job position of virtual worker was relatively low, the relationship was minimized. Based on the result of analysis, Hypothesis 6-1 cannot be rejected. In addition, the primary effect between clear evaluation criteria and organizational identification shows a significant positive relationship ($\beta=0.26^{**}$, $p<0.01$) whereas the correlation item does not reach the level of significance $\alpha=0.1$ (Clear Evaluation Criteria * Job Position $\beta=-0.08$). Therefore,

job position doesn't have any significant moderating effect on clear evaluation criteria and organizational identification. Hypothesis 6-2 is rejected based on this confirmatory analysis result.

3.3.3 Moderating Effect of Salary

In Model 6 shown in Table 2, the relationship between work independence in primary effect and organizational identification changes from originally negative but not significant ($\beta=-0.08$) to significant negative ($\beta=-0.25^{**}$, $p<0.05$) while the correlation item shows a significant positive relationship (work independence * salary $\beta=0.24^{**}$, $p<0.05$). Therefore, salary has a moderating effect on the negative correlation between work independence and organizational identification. Figure 4, showing that when the salary of virtual worker was relatively high, work independence was positively related to organizational identification. In contrast, when the salary of virtual worker was relatively low, the relationship become negative. Based on the result of analysis, Hypothesis 7-1 cannot be rejected. In addition, the primary effect between clear evaluation criteria and organizational identification shows a significant positive relationship ($\beta=0.27^{**}$, $p<0.05$) whereas the correlation item does not reach the level of significance $\alpha=0.1$ (Clear Evaluation Criteria * Salary $\beta=-0.06$). Therefore, salary doesn't have any significant moderating effect on clear evaluation criteria and organizational identification. Hypothesis 7-2 is rejected based on this confirmatory analysis result.

Table 2. Hierarchical Regression Analysis

Dependent Variables	Organizational Identification								
	Model 1			Model 2			Model 3		
Independent Variables	β	t	VIF	β	t	VIF	β	t	VIF
Step 1									
Gender (1=Male)	-.02	-.197	1.03	-.01	-.14	1.07	-.02	-.26	1.11
Age	-.14	-1.17	2.31	-.09	-.84	2.44	-.09	-.80	2.46
Education	-.26 ^{***}	-2.9 ^{***}	1.28	-.23 ^{***}	-2.98 ^{***}	1.31	-.23 ^{***}	-2.94 ^{***}	1.31
Job Position (1=supervisor)	.27 ^{***}	2.93 ^{***}	1.30	.19 ^{**}	2.51 ^{**}	1.32	.20 ^{**}	2.5 ^{**}	1.33
Salary	.06	.614	1.61	.18 ^{**}	2.03 ^{**}	1.71	.18 ^{**}	1.98 ^{**}	1.72
Work Experience	-.18 [*]	-1.68 [*]	1.68	-.20 ^{**}	-2.27 ^{**}	1.72	-.19 ^{**}	-2.11 ^{**}	1.76

Marital Status (1=married)	.15	1.36	1.96	.13	1.38	2.01	.12	1.28	2.04
Step 2									
WI				-.08	-1.01	1.29	-.04	-.32	2.62
CEC				.22**	2.59**	1.60	.24**	2.11**	2.74
AC				.42***	5.08***	1.50	.43***	5.11***	1.52
Step 3(i)									
WIxAC							-.061	-.60	2.27
CECxAC							-.037	-.38	2.09
R ²	0.139			0.416			0.419		
Adj R ²	0.093			0.370			0.364		
ΔR^2				0.277***			0.003		
F	3.046***			9.180***			7.632***		

Note: CEC means clear evaluation criteria; WI means work independence; AC means adequate communicate.

Table 2. Hierarchical Regression Analysis (Continued)

Dependent Variables Independent Variables	Organizational Identification								
	Model 4			Model 5			Model 6		
Step 1	β	t	VIF	β	t	VIF	β	t	VIF
Gender (1=Male)	-.01	-.17	1.08	-.001	-.012	1.08	-.002	-.029	1.08
Age	-.10	-1.0	2.45	-.095	-.907	2.45	-.085	-.814	2.47
Education	-.22***	-2.92***	1.31	-.25***	-3.26***	1.34	-.22***	-2.87***	1.31
Job Position (1=supervisor)	.20***	2.64***	1.32	.19**	2.42**	1.33	.20**	2.60**	1.34
Salary	.18**	2.04**	1.74	.19**	2.17**	1.72	.16*	1.87*	1.72
Work Experience	-.19**	-2.13**	1.73	-.21**	-2.36**	1.72	-.18**	-2.06**	1.75
Marital Status (1=married)	.14	1.53	2.03	.14	1.42	2.02	.13	1.39	2.01
Step 2									
WI	-.25**	-2.26**	2.66	-.17*	-1.92*	1.73	-.25**	-2.30**	2.72
CEC	.23**	2.09**	2.81	.26***	2.63***	2.11	.27**	2.37**	2.87
AC	.41***	5.08***	1.51	.41***	4.90***	1.55	.41***	4.99***	1.54
Step 3(ii)									
Wl \times age	.23**	2.14**	2.63						
CEC \times age	-.008	-.078	2.47						
Step 3(iii)									
Wl \times JOB-Position				.19**	2.07**	1.83			
CEC \times Job-Position				-.077	-.859	1.80			
Step 3(iv)									
Wl \times salary							.24**	2.18**	2.67
CEC \times salary							-.059	-.565	2.44
R ²	0.439			0.435			0.437		
Adj R ²	0.386			0.382			0.384		
Δ R ²	0.024*			0.019			0.021*		
F	8.295***			8.145***			8.222***		

Note : *p<0.1 **p<0.05 ***p<0.01

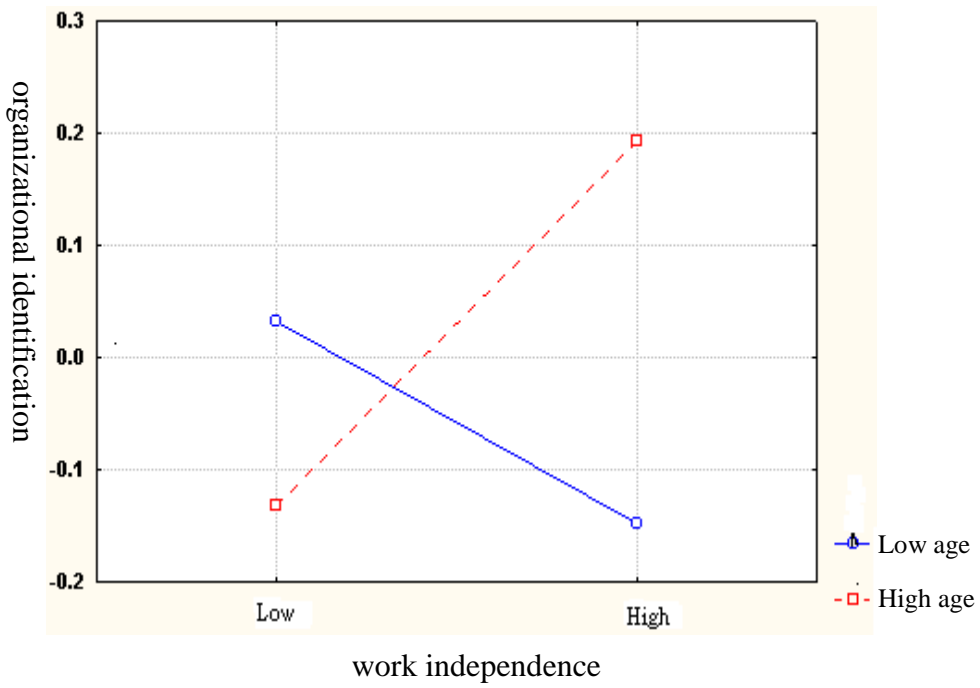


Figure 2. The Moderating Effect of Age

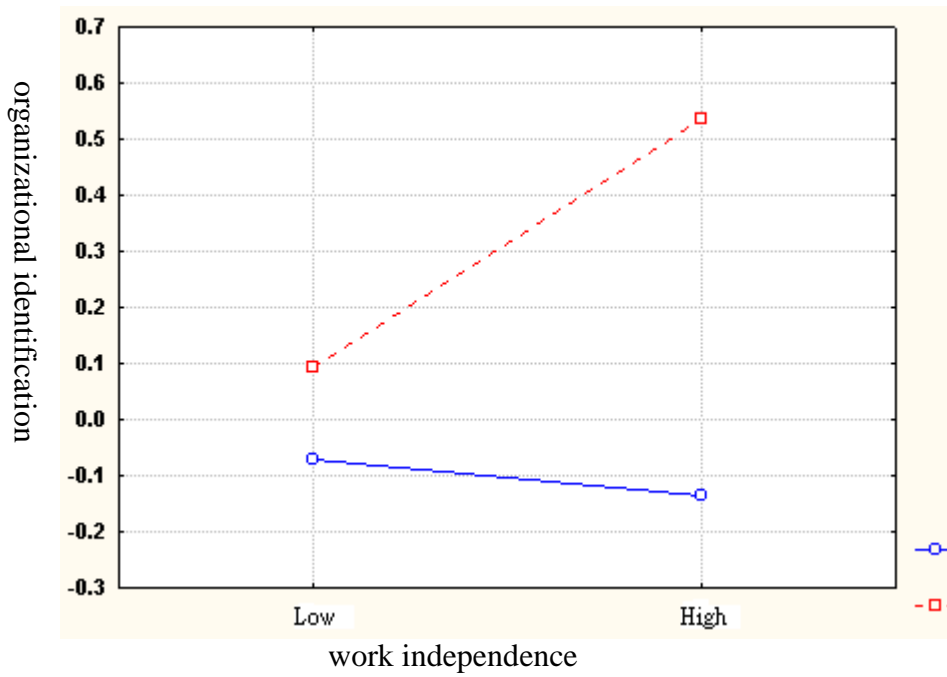


Figure 3. The Moderating Effect of Job Position

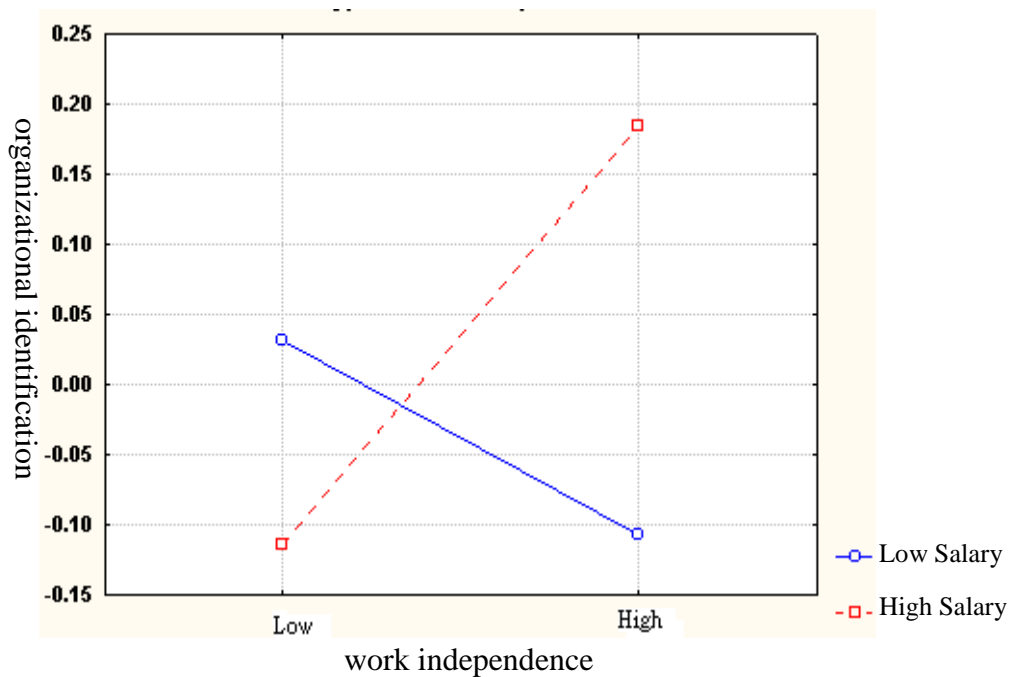


Figure 4. The Moderating Effect of Salary

V. CONCLUSIONS AND MANAGERIAL IMPLICATION

1. Conclusions

The primary research conclusions and findings are illustrated as follows: First, with regard to the relationships of the critical factors associated with virtual work and organizational identification, work independence is negatively related to organizational identification but not at a significant level. Both clear evaluation criteria and adequate communication have a direct relationship to organizational identification. The empirical analysis results from this research show that clear evaluation criteria has a significant direct relationship with organizational identification, which indicates that organizations should avoid any apparent favoritism in treating employees, especially in promotion and performance evaluation where reasonable and objective standards should be established to

reflect fair, truthful, and public principles. Adequate communication shows a significant direct relationship to organizational identification, which indicates that adequate communication can increase the organizational centripetal force of employees and help employees share common knowledge of organizational goals. Any obstacles to communication can reduce employees' organizational identification, thus must be removed in order to increase employees' organizational identification. In addition, work independence is negatively correlated to organizational identification but not at a significant level. The authors of this paper suspects that such a result may be attributable to the fact that the implementation of virtual work in Taiwan is still at its beginning stage, away from completion, and many virtual workers are actually low level virtual workers (meaning that they stay in office more than two days a week) (Wiesenfeld, Raghuram & Garud, 1999) who remain frequent contact with organizations, in which case, low level virtual workers do not feel isolated but instead consider themselves a part of the organization. Therefore, work independence does not reduce organizational identification.

Second, Adequate communication does not have a moderating effect on the relationship of work independence or clear evaluation criteria and organizational identification. Empirical analysis results prove that adequate communication does not have a moderating effect on the relationship of work independence or clear evaluation criteria and organizational identification. Based on Hypothesis 1 that work independence will not reduce virtual workers' organizational identification, and clear evaluation criteria has a significant direct relationship to organizational identification, the conclusion can be drawn that adequate communication can not produce any moderating effect on the relationship of work independence or clear evaluation criteria and organizational identification.

Finally, Individual characteristics (for example, age, job position, and annual salary) have a moderating effect on the relationship between work independence and organizational identification but not on the relationship between clear evaluation criteria and organizational identification. Empirical results prove that the age, job position, and annual salary of virtual workers have a moderating effect on the relationship of work independence and organizational identification, and the older and senior virtual workers who are paid more are less negatively

related to organizational identification than the younger and junior virtual workers who are paid less. The result supports the hypothesis in this research. Older workers devote more to the organization and are rewarded with higher pay; hence, they show a higher degree of organizational identification. In contrast, younger workers devote less to the organization, are usually positioned at a lower level, have a disadvantage in seniority, and are rewarded less by the organization, so they are less sensitive to their job grade and show a lower degree of organizational identification. However, the age, profession, and annual salary of virtual workers have an insignificant effect on the correlation between clear evaluation criteria and organizational identification, which indicates that clear performance evaluation criteria is equally important to old or young, senior or junior virtual workers regardless of their compensation in promoting organizational identification.

Recent advances in information technologies provide more and more virtual works in many organizations. A lot of researchers thus show interesting in studying this topic. One hand, many researchers are concerned to facilitate employee adjustment to virtual work for the purpose to increase work effectiveness and cost deduction in organizations. For example, Raghuram et al. (2001) has made an evidence that structural factors (i.e., work independence and evaluation criteria) and relational factors (i.e., trust and organizational connectedness) as predictors of adjustment to virtual work. On the other hand, such spatial dispersion of virtual work, however, weakens the ties that bind organizations and their members. Organizational identification, which reflects how individuals define the self with respect to their organization, thus become another critical issue in this field. For instance, Wiesenfeld et al. (2001) explored organizational identification among virtual workers from the viewpoint of the role of need for affiliation and perceived work-based social support. In another study, Wiesenfeld et al. (1999) analysis different communication patterns (i.e., face-to-face, electronic, phone, document) as determinants of organizational identification in a virtual organization.

Following previous studies focusing organizational identification, this research explored the influential factors of organizational identification. However, different from previous, this paper combined predictors of virtual work and organizational identification explored the relationship between those predictors and organizational identification and try to understand if it faced the dilemma of work

virtualized or organizational identification reduced. From the result of this study, the dilemma didn't seem to exist. It shows that while the predictors of clear evaluation criteria and adequate communication were positively related to organizational identification, the expectance of negative relationship between work independence and organizational identification were not supported.

2. Managerial Implication

As information technology advances rapidly, organizations shrink the structure and increase productivity in order to reduce costs, virtual work has become a more and more important working mode. The physical distance between virtual workers and the organization seems shortened due to technology advancement and Internet development. However, since virtual workers do not need to show up in office often, being far away from supervisor's monitoring and colleagues' watching as a matter of fact increases the intangible distance between virtual workers and the organization. Under such a circumstance, maintaining the relationship between virtual workers and the organization relies on the strength of organizational identification by virtual workers. How to manage virtual work and virtual workers is a big challenge to management.

In a virtual working environment, supervisors must adjust management style and psychology because the traditional management method of watching employees in person does not work any more. Therefore, the establishment of clear evaluation criteria (including performance criteria and implementation criteria) will be a critical element. The goal-oriented management methods based on goal achievement rate and task accomplishment time, for example, goal management, result management, and project management etc., are appropriate performance evaluation measures. In order to avoid errors at work, supervisors can require employees email job reports on a daily basis or periodically. In terms of management psychology, traditional order and authority must be converted to communication, coordination, and trust; the old role of monitor must be converted to a new role of supporter and consultant. Therefore, management must learn new communication techniques like email, voicemail, and video conferencing etc. to prevent employees from feeling lonely or isolated from the community. This is

consistent with the results from the research done by Wiesenfeld etc. (1999), which pointed out that electronic communication plays a very important role in organizational identification by employees who spend most of their time outside office. In order to increase the organizational identification of virtual workers, management must design a set of clear evaluation criteria and establish adequate communication channels allowing virtual workers to obtain adequate organizational information, maintain their relationship with the organization, and increase their organizational identification. Furthermore, management should adopt different management methods specific to different individual characteristics. How to strengthen the organizational identification by younger virtual workers at lower ranks paid less is a challenge to management intelligence.

3. Research Limitation and Suggestions for Future Research

This research defines virtual workers in a wide sense as employees who do not need to go to work in office every day but perform professional jobs through internet connection from remote home, client site, car, hotel, satellite office center, or any places other than traditional central office, or employees who work in virtual organizations. This definition is referred from Wiesenfeld et al.(2001). According to the definition, the scope of this research is not includes SOHO. The research target exclude SOHO should be regard as a limitation of this research.

Based on the limitation of research target and the findings from empirical results, there are topics worth further exploration and research. Some recommendations are made in this research for future reference by subsequent researches:

Of the critical factors affecting work virtualization, this research analyzed only work independence, clear evaluation criteria, and adequate communication. Some other factors such as trust, social support, and personalities provide different perspectives in studying their correlation with organizational identification.

From the viewpoint of communication, further analysis can be conducted on the content and channel of communication in order to improve the efficiency of communication.

This research explored correlations horizontally. Whether consistent conclusions can be drawn from vertical research based on follow-up with virtual workers for a period of time is an interesting subject for further discussion.

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影響工作虛擬化關鍵因素與虛擬工作者組織認同關係之研究

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摘要

隨著資訊科技與網際網路的發達，企業組織朝向虛擬化已形成趨勢，也形成愈來愈多的虛擬工作者。本研究主要目的在探討影響工作虛擬化的關鍵因素，及其對虛擬工作者之組織認同的影響。問卷調查資料蒐集自 140 位虛擬工作者，經 LISREL 分析結果顯示，三項影響工作虛擬化關鍵因素中，清楚的績效評估指標與充分溝通等二因素對虛擬工作者的組織認同有顯著影響，但工作自主性的負向影響預期則未獲實證資料的支持。同時，充分溝通分別對工作自主性及清楚的績效評估指標與組織認同關係間的干擾效果也未獲支持。然而，不同虛擬工作者的年齡、工作職位、薪資待遇等卻對工作自主性與組織認同間的關係具有干擾作用，當虛擬工作者為年長、高職位與高薪資所得時，工作自主性對組織認同的負向影響將明顯相對較低。最後本研究針對研究結果提出一些實務管理意涵與未來研究建議的討論。

關鍵詞彙：虛擬工作者，組織認同

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