



An Empirical Study on the Effects of Creative Personality and Job Autonomy on Individual Innovation Performance of Knowledge Workers

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Abstract

Knowledge workers or “the creative class” are viewed as core to the competitiveness of a firm in a knowledge-based economy. The present study examines the effect of job autonomy on the creativity of knowledge workers, compared with the effects of creative personality. With the help of the moderated multiple regression modeling and based on the 267 samples, this paper studies the crucial influencing factors that affect individual innovative performance and how the job autonomy moderate the creative personalities and hope to do some contributions to the improvement of the individual innovative performance in Sci-Tech SMEs.

Key words: Creative personality; Job autonomy; Knowledge workers; Individual innovation performance; Moderated

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INTRODUCTION

Knowledge workers, or “the creative class” (Florida, 2005), are viewed as core to the competitiveness of a firm in a knowledge-based economy (Lepak & Snell, 2002; Hirst *et al.*, 2009). During modern creative activities, knowledge workers, the main actors of innovation, dissemination and application of knowledge, are the vital source of

renewing products, services and creative processes in an organization (Amabile, 1988). A basic task of human resource management is to enhance creative individuals and then to strengthen the organization’s innovation capacity and increase market competition advantages (Amabile, 1988, 1996; Oldham & Cummings, 1996; Zhou & Oldham, 2001; Hirst *et al.*, 2009; Dul *et al.*, 2011).

As employee creativity is crucial for organizational innovation and survival (Amabile, 1988, 1996; Oldham & Cummings, 1996), managers and scholars alike have sought to identify the ingredients that foster individual creativity (Breugh, 1985; Amabile, 1988; Wolfe, 1994; Oldham & Cummings, 1996; George & Zhou, 2001; Dul *et al.*, 2011; Song *et al.*, 2012). From the perspective of individual innovation, researchers study characteristics of individual innovation, including factors of individual innovation performance, how to select and cultivate creative workers, and realization mechanism of individual innovation performance (Oldham & Cummings, 1996; Mumford, 2000; Dul *et al.*, 2011). A number of studies have indicated that an employee’s creative performance depends partly on individual characteristics, such as domain-relevant knowledge, cognitive style (e.g., divergent thinking), and personality traits (Gough, 1979; Barron & Harrington, 1981; Feist, 1999; Mumford, 2000). To build toward a comprehensive understanding of the knowledge workers’ creative personality on innovation performance is limited.

From the organizational point of view, the design of jobs has long been considered an important contributor to employees’ creative performance at work (Hackman & Oldham, 1975; Amabile, 1988, 1996; Mumford, 2000). Specifically, the importance of autonomy as an organizational variable has been asserted by numerous writers (Feist, 1999; Mumford, 2000; Dul *et al.*, 2011). According to knowledge creation theory (Nonaka & Toyama, 2004), the level of autonomy in the workplace could determine the quality and frequency of innovative

thinking and creative challenges, which would ultimately be the cornerstone of organizational innovation in both levels of process and product. The level of task-related job autonomy is one of the determinants for knowledge workers' innovation performance and even for organizational long-term success.

Nowadays, China is engaged in being an innovative country, which indicates the significance of research on innovation performance of knowledge workers. This paper combines the two aspects of individual innovation and organization that both play an important role in individual innovation performance to examine how the organizational environment adjusts the individual innovation, with the aim of offering suggestions of improving knowledge workers' creativity.

1. THEORETICAL BACKGROUND AND REVIEW OF RELEVANT LITERATURE

Creativity, as expressed and brought to life through organizations, plays a significant role in society (Amabile, 1988, 1996; Oldham & Cummings, 1996; George & Zhou, 2001; WANG & CHENG, 2010). Knowledge workers, proposed by Peter Drucker (1999), are workers who work primarily with information or one who develops and uses knowledge in the workplace. As the dependence is transformed from natural resources to knowledge resources, knowledge workers become more essential in the knowledge-based economy. Knowledge workers are the source of original and potentially useful ideas and solutions for a firm's renewal of products, service, and processes (Amabile, 1988; George & Zhou, 2001; McLean, 2005). As noted earlier, a large body of literature has focused on determining a set of personal characteristics and attributes associated with creative achievement (Barron & Harrington, 1981; Martindale, 1989; Oldham & Cummings, 1996; Davis, 2009), and demonstrated that a stable set of core personal characteristics, including broad interests, attraction to complexity, intuition, aesthetic sensitivity, toleration of ambiguity, and self-confidence, relate positively and consistently to measures of creative performance across a variety of domains (Gough, 1979; Barron & Harrington, 1981; Martindale, 1989; Janssen & Yperen, 2004; McLean, 2005). Meanwhile, people's creativity depends not only on their personal characteristics, but on their work environment (Woodman *et al.*, 1993; Amabile, 1996; George & Zhou, 2001). Several case and empirical studies show that task-related job autonomy provides work-related emotional encouragement, which leads to more engagement of employees (Morgeson *et al.*, 2005; Wang & Cheng, 2010). With regard to the importance of knowledge worker's creativity on the organization performance, as well as the current research deficiency on the interaction of these two levels, a multi-level study is in need.

1.1 Creative Personality

An employee's creative performance partly depends on his/her characteristics, such as domain-relevant knowledge, cognitive style (e.g., divergent thinking), and personality traits. Several theoretical perspectives suggest that to fully understand creativity, it is necessary to consider individuals' personality (Woodman *et al.*, 1993; Amabile, 1996). Numerous studies relate an individual's personality traits such as self-confidence, ambiguity and broad interests to creativity (Gough, 1979; Barron & Harrington, 1981; Feist, 1999). For example, a confident worker with broad interests is likely to approach problems without senses of hesitation or failures, and then recognize various information to come up with novel ideas (Barron & Harrington, 1981; Martindale, 1989). Thus, individuals with creative personalities show higher creativity than individuals whose personalities are not creative.

Many scholars have developed measures in order to attempt to assess these personal characteristics reliably. One of the most widely used and respected of these measures is Gough's Creative Personality Scale (CPS) (Gough, 1979). Based on Adjective Check List (ACL), Gough (1979) explored the original CPS, which is a list containing 18 adjectives positively related to creativity and 12 negatively related to creativity. As a formative index, CPS is considered a reliable and valid measure of creative personality (Oldham & Cummings, 1996; Batey & Furnham, 2008). To simplify data collection, most research adapts a common within of less adjectives by a selection (Unsworth *et al.*, 2000; Madjar *et al.*, 2002; Zhou, 2003).

As the main role of innovation activities, knowledge workers with creative personality could conduct original tasks and look for new experiences to generate creative thoughts, which is useful to enhance creative performance. Unfortunately, few previous empirical studies have taken simultaneously the effects of creative personality into consideration to assess knowledge workers' innovation performance.

1.2 Job Autonomy

Much of the contemporary research concerns with the effects of organizational conditions and practices on creativity (Amabile, 1979; Amabile *et al.*, 1986; Zhou, 1998). For example, Amabile (1998) emphasized on the importance of how to promote employees' intrinsic motivation during innovation activities and explored the stimulating effect of organizational supports on individual creativity. Further, task-related job autonomy would be critical for the innovation process and activities (Hackman & Oldham, 1975; Wang & Cheng, 2010; Song *et al.*, 2012).

Job autonomy refers to the employees' self-rule and independence in conducting their tasks in terms of process, decision making, and time management (Hackman & Oldham, 1976, 1980). According to the social exchange theory (Bateman & Organ, 1983), task-related job autonomy provides work-related emotional

encouragement, which leads to more engagement of employees (Morgeson *et al.*, 2005; Wang & Cheng, 2010). For the reason that most knowledge workers engage in creative work with higher independence and strong self-motivations, they are prone to ask for the requirements of job autonomy strongly (Hackman & Oldham, 1975; Beehr & Drexler, 1986; Man & Lam, 2003; Wang & Cheng, 2010). These characteristics embedded in knowledge workers suggest organizations to focus on job autonomy which can maximize the effective practices of new concept development and innovation (Vicari & Troilo, 2000) in order to contribute to creative performance of knowledge workers. In contrast, when supervisors are controlling, the reduction in employees' intrinsic motivation is then expected to stifle individuals' creativity combining with lower creative performance (Oldham & Cummings, 1996). An empirical study, therefore, aiming at investigating the job autonomy to explain the knowledge workers' creativity is of significance.

As an essential part of organizational climate, job autonomy, including process autonomy, work and content selection autonomy, and decision-making autonomy, can not only impose a direct effect on individuals' innovation performance, but also play mediating and moderating roles in ensuring psychological safety and emotional encouragement for team/group members, initiating more creative activities in the workplace (Dunbar, 1995, 1997; West, 2003; Song *et al.*, 2012). Consequently, it is necessary to consider the variable of job autonomy into the research of knowledge workers' creative performance.

1.3 Individual Innovation Performance

Innovativeness is the most important forward-looking predictor of an individual's creativity, and organizational innovation and survival can be benefited by recruiting and selecting creative talents. Appropriate measures of innovation performance should provide the right indicators (Birchall *et al.*, 2004), and innovation performance of individuals must capture the right factors and relate workers' innovative activities to their success in workplace.

Researchers define performance differently for their diverse study areas. Stoma (1980) defined performance as the degree of achievement of organizational objectives, and Morhman (1989) reported that performance is the final results of taking some actions to realize achievements in a certain degree.

The innovative performance has been studied quite extensively and for a long period of time (Hagedoorn & Cloudt, 2003). According to Amabile (1988), innovation performance consists of products, concepts and processes with features of novelty and originality, to meet the organizational developments; and Oldham and Cummings (1996) made a re-interpretation of innovation performance emphasising on products or creative ideas that reflect the different individual levels, i.e. their rate of introduction

of new products, new process systems or new devices. We consider creative performance to be the production of ideas, products or procedures that are novel or original and potentially useful or practical (Amabile, 1996; Sternberg & Lubart, 1996).

1.4 Summary of Literature Review

The literature review above reveals that creativity is the cornerstone for organizational performance improvement through knowledge workers' creation practices. Knowledge workers' innovation performance, the basis for the organizational long-term creativity and change process, could be influenced by their creative personality and job-autonomy in the workplace.

2. CONCEPTUAL MODEL AND HYPOTHESES

The study will integrate the two aspects of individual's and organization's factors, because both play an important role in individual innovation performance, and integrate them into a multilevel theoretical framework. In this way, it can be examined how the organizational environment adjusts the individual innovation, with the aim of providing practical suggestions on improving knowledge workers' creativity. The independent variables are creative personality and job autonomy, and the dependent variable is knowledge workers' innovation performance. Based on the above, the following Figure 1 shows a conceptual model that visualizes the constructs and relationships of the research. The model's unit of analysis is the individual knowledge worker.

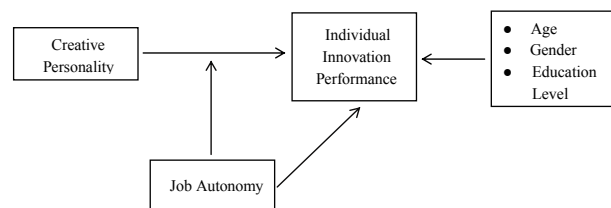


Figure 1
Proposed Model for the Research

2.1 Impact of Creative Personality on Individual Innovation Performance

Several studies provide general support for the argument that individuals with more creative personalities exhibit higher creativity than individuals with less creative personalities (Feist, 1999; Madjar *et al.*, 2002; Oldham & Cummings, 1996; Unsworth, Brown, & McGuire, 2000; Zhou, 2003). With creative personality, knowledge workers have a wide range of interests, firm belief and self-confidence which enable them to have keen insight into the new information, and to find a new way to solve problems. In light of the arguments above, we propose the following direct relationship between knowledge workers' creative personality and creative performance:

Hypothesis 1: The higher a knowledge worker's creative personality, the higher his/her creative performance.

2.2 Impact of Job Autonomy on Individual Innovation Performance

Along with many research, task-related job autonomy plays a critical role in increasing the level of innovation practices (Breaugh, 1985; Song *et al.*, 2012). In turn, this would promote organizational long-term success (Beehr & Drexler, 1986; Man & Lam, 2003; Wang & Cheng, 2010). Increased autonomy will allow employees more chances for creation with a more flexible work process for conducting tasks through the task-related responsibility to define their roles and process to perform the tasks (Troyer *et al.*, 2000; Song *et al.*, 2012). On the basis of the above arguments, we formulate the following relationship on the effect of the job autonomy on creativity:

Hypothesis 2: The higher a knowledge worker's job autonomy, the higher his/her creative performance.

2.3 Moderated Effect of Job Autonomy on Individual Creative Performance

Effects on individual innovation performance aside, task-related job autonomy can guide the relation between creative personality and creativity performance, which is moderated effect. Woodman *et al.* (1993) propose that organizational environment pose an interaction effect in empirical studies, whereas only few empirical studies concentrate on interactions between creative personality and the organizational climate (Oldham & Cummings, 1996; George & Zhou, 2001; Madjar *et al.*, 2002; Zhou, 2003). For example, Song *et al.* (2012) propose that task-related job autonomy was evaluated as a moderating construct to explain the creativity in the school context. However, it is still an untouched area that job autonomy has a moderated effect between creative personality and knowledge workers' innovation performance. We formulate the following hypotheses on interaction effects:

Hypothesis 3: The effect of creative personality on creative performance depends on job autonomy, such that a high creative personality benefits more from a higher level of job autonomy than a low creative personality.

3. METHOD

3.1 Participants and Data

This study employs a questionnaire survey method for testing the hypotheses and data were obtained from managers and engineers of enterprises. We collaborate with a service center of small and medium-sized enterprises (SMEs) in order to improve the response rate and ensure the quality and reliability of the questionnaire. All the participants are the trainees attending Innovation Management Courses held by the service center. 300 questionnaires were distributed in two months and a total of 295 questionnaires were returned (98.33 percent). We excluded questionnaires with missing data for the main

study variables, resulting in 267 questionnaires (90.5 percent) that were usable for the final analysis. The mean age of the participants was 34.6, 79 percent were male, and 68.3 percent were engineers.

3.2 Questionnaire Design

3.2.1 Independent Variables

In this paper, independent variables draw on creative personality and job autonomy. As to the creative personality, the approach of Unsworth *et al.* (2000) will be followed to maintain the formative index and to simplify data collection by selecting 16 positive adjectives as a measure of innovation personality (capable, clever, confident, egotistical, humorous, informal, individualistic, insightful, intelligent, wide interests, inventive, original, reflective, resourceful, self-confident, and unconventional). The respondents were asked to mark which of these adjectives best describes them. The total number of selected adjectives is considered as the measure of an individual's creative personality (a maximum of 16). Common test methods for assessing construct reliability don't apply, since the item scores of a formative index do not need to correlate (Rossiter, 2002).

Furthermore, a job autonomy scale can be used to measure the level of knowledge workers' job autonomy (Breaugh, 1985). Three items measured the autonomy levels of the work process, work practices, and general process opportunities in creative activities. Along with science & technology-related terminology modification, the original version of instruments was modified for the research purpose based on researchers' and panel experts' specialized insight and experienced knowledge. One of the sample items states, "My job is such that I can decide when to do particular work activities." We assessed the job autonomy by asking respondents with a 7-point Likert-type item (rated 1, "strongly disagree," to 7, "strongly agree"). To ensure the validity of data, respondents could use "don't know" confronting measured variables difficult to answer. The mean data of all the dimensions, then, can be the measurement.

3.2.2 Dependent Variables

As the dependent variable in this study, individual innovation performance was assessed using three items adapted from Dual *et al.* (2011). And this dependent variable could be, according to Zhou *et al.* (2008), could be measured by self-perceived creativity. For the reason that employees perceive that they produce new and potentially useful ideas and they are themselves are best suited to report creativity for the awareness of the subtle things they do in their jobs, it is more reliable to use self-perceived creativity in measuring than external measurement.

3.2.3 Control variables

We included age and gender as control variables in our analysis. Research has shown that there is a nonlinear relationship between age and creativity ("age curve"); therefore, we included linear and quadratic age in our

analysis. Control variables, on the base of several studies from Hirst (2011), used in the analyses consisted of age, gender and education. To be specific, 0=male, 1=female, education level codes are 1-5 which represent under senior high school, senior high school and technical school, technical secondary school, bachelor, and master and above respectively, age uses actual values.

3.2.4 Controlling for Common Method Bias

In our survey study, like in many other studies, the data for the independent and dependent variables come from a single source (the knowledge workers). Therefore, there is a risk for common method bias since respondents may have guesses our hypotheses and may have responded accordingly. We took several measures reported in the literature to control for common method bias. First, in our questionnaire we separated the independent and dependent variables (Podsakoff, MacKenzie, Lee, & Podaskoff, 2003). Second, we explicitly emphasized that there were

no right or wrong answers, and third, we guaranteed anonymity (Podsakoff *et al.*, 2003; Rogelberg, Allen, Shanock, Scott, & Shuffler, 2010).

Given the consideration of reducing multicollinearity, we mean centered the scores for age and for the independent variables.

4. EMPIRICAL ANALYSIS

This paper analyzes the data through Moderated Multiple Regression in SAS 9.20. First of all, we conduct a statistical description on all the sample data, including the reliability Cronbach α , mean, standard deviation and correlation coefficient of each variable. The result indicates that all the host variables including creative personality and job autonomy, are positively correlated to individual innovative performance in significant level (The detailed results see Table 1).

Table 1
Descriptive Statistics of Samples

Variables	Cronbach α	Mean	Standard Deviation	1	2	3	4	5	6
1 Innovation Performance		4.79	1.05	1.00					
2 Age		35.6	12.8	0.19*	1.00				
3 Gender		0.21	0.39	0.14	0.09	1.00			
4 Education	0.89	3.46	1.02	0.13*	0.27**	0.16	1.00		
5 Creative Personality		5.34	2.77	0.27**	0.21*	0.14	0.13*	1.00	
6 Job Autonomy		5.08	0.81	0.21**	0.15	0.07	0.21	0.22	1.00

Note: * $P < 0.05$, ** $P < 0.01$, $N = 267$

We, then, test all the hypotheses by adopting Moderated Multiple Regression. First, only the control variables are included into the regression model (Model 1, M1 for short). Second, we incorporate the host variables (creative personality and job autonomy) into the regression model (Model 2, M2). Then the moderating effect is considered into the model (Model 3, M3). See Table 2.

Table 2
Results of Moderated Multiple Regression Analysis

	Model 1	Model 2	Model 3
Age	-0.15**	-0.14**	-0.10**
Education	0.29*	0.18**	0.17**
Gender	0.18	0.15	0.15
Creative Personality		0.35**	0.23**
Job Autonomy		0.24**	0.19**
Creative Personality $\times$ Job Autonomy			0.08**
ΔR^2		4.6%	5.1%
Partial F value	4.35**	8.47**	2.69*
R^2	16.5%	21.3%	25.9%
Adjusted R^2	8.4%	18.9%	24.7%
F Value	4.33**	7.34**	5.98**

* $P < 0.05$, ** $P < 0.01$, $N = 267$, Standardized Regression Coefficient

The results from Model 1 shows that, among those control variables, age and education have some relationship with knowledge workers' innovative performance, namely, the younger the knowledge workers are, and the higher education they possess, the better innovative performance they will achieve. Gender, however, doesn't share a significant relationship with the knowledge workers' innovative performance.

The main effect tested by Model 2 presents that, creative personality shows a significant relation with innovative performance, thereby verifying H1: "Creative personality has a positive influence on innovative performance."; H2: "The higher a knowledge worker's job autonomy, the higher his/her creative performance." is verified, due to the significant relation between job autonomy and innovative performance.

The moderated effect from Model 3 demonstrates that, moderated by job autonomy, the relation between creative personality and individual innovative performance gets strengthened. Thus, H3: "The effect of creative personality on creative performance depends on job autonomy, such that a high creative personality benefits more from a higher level of job autonomy than a low creative personality." is verified.

CONCLUSIONS AND DISCUSSION

Conclusions and Implication

With analysis of Moderated Multiple Regression by the SAS software 9.20, the empirical analysis results are divided into the following three parts. In model 1, we can draw that both age (-0.15**) and education (0.29*) has significant relationship with knowledge worker's individual creative performance. Compared with other types of knowledge employees, those who have higher education background tend to gain more advantages in innovation performance. In the perspective of innovation managements and human resources, recruitment and selection of creative talents, and training and development of employees to become more creativity can give birth to much positive effects on organizational innovation performance.

Analysis results from model 2 are the main effect tests of the model, with all two main variables significantly affecting the individual creative performance, which provide scientific support to the 1 and 2 hypothesis. The standardized regression coefficients are respectively Creative Personality (0.35**), and Job Autonomy (0.24**). According to standardized regression coefficients, creative personality has more effect on knowledge workers' innovation performance and job autonomy has less effect. This study provides some significant insights in order to improve creative performance of knowledge workers within the innovation management or human resource management. 1) Recruiting and training. When hiring new knowledge employees, we should pay more attention to recruiting and selecting individuals with creative personality by setting a creative personality test in the interview. Apart from screening new interviewer, from the perspective of long-term development, we need to train employees and stimulate their potential of creative personality to enhance the innovation capability of knowledge workers, as well as organizations, which will in turn become a steady stream of capital accumulation for further development of enterprises. 2) Supportive job autonomy. A more supportive school climate, which provides more job autonomy—task autonomy, process autonomy, and decision-making autonomy—could encourage more innovation practices. Ultimately, this supportive job autonomy would be the cornerstone for a continuous creativity of knowledge workers. Consequently, enough autonomy, including arranging work plans flexible, customizing tasks and workflows, and selecting co-workers, should be given to knowledge workers to strengthen their satisfaction, encourage their motivation in conducting innovation activities, and then to improve organizational innovation capacity and performance.

Limitations and Directions for Further Research

Knowledge workers are widely spread over varieties of industries and companies, so we could conclude with

the limited samples that this study could only be applied into some scientific companies, research institutes as well as college schools. Besides, due to the limitation of samples, we give up analyzing the data with multiple linear regression model (HLM) which is more suitable for examining moderated effects. Accordingly, more research is needed with enhancing sample size and widening samples so that the HLM method could be used to analyze the data. In this way, our findings could be replicated in other organizations and job categories.

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