PERCEIVED ORGANIZATIONAL CREATIVE CLIMATE IN DETERMINING THE WORK INNOVATIVENESS AMONG INFORMATION TECHNOLOGY ENGINEERS IN TAIWAN: KNOWLEDGE ACQUISITION CAPABILITY AS A MEDIATOR

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ABSTRAK

Tujuan-tujuan kajian ini adalah untuk: (a) menyelidik kesan langsung iklim organisasi yang kreatif dan inovasi kerja; dan (b) menyelidik samada keberkesanan keupayaan ilmu sebagai pengantara kepada hubungan di atas. Inovasi kerja dan keupayaan ilmu dikonsepsikan sebagai unidimensi. Iklim organisasi yang kreatif mengandungi sepuluh dimensi: kebebasan, sokongan idea, amanah/keterbukaan, gurauan/jenaka, masa idea, cabaran, dinamik/kegembiraan, debat, konflik dan pengambilan risiko. Hipotesis-hipotesis telah diuji menggunakan sample yang terdiri daripada 253 responden. SPSS (Statistical Package for Social Science) dan SmartPLS (Partial Least Square) telah digunakan untuk menganalisis data. Keputusan analisis kajian ini telah menunjukkan lima dimensi daripada iklim organisasi kreatif (kebebasan, sokongan idea, amanah/keterbukaan, gurauan/jenaka dan masa idea) memperoleh pengaruh positif yang ketara dengan inovasi kerja dan keupayaan ilmu. Tetapi, lima dimensi yang lain (cabaran, dinamik/kegembiraan, debat, konflik dan pengambilan risiko) tidak memperoleh pengaruh positif yang ketara dengan inovasi kerja dan keupayaan ilmu. Di samping itu, keupayaan ilmu didapati menjadi pengantara penuh terhadap hubungan antara kebebasan dan inovasi kerja; sokongan idea dan inovasi kerja; amanah/keterbukaan dan inovasi kerja; gurauan/jenaka dan inovasi kerja; dan masa idea dan inovasi kerja. Implikasi teoritikal dan praktikal bagi kajian ini dibincangkan dan kajian ini turut membincangkan cadangan bagi kajian pada masa akan datang.

ABSTRACT

The purposes of this study were to (i) examine the direct effect of organizational creative climate and work innovativeness, (ii) examine whether knowledge acquisition capability serves as a mediator in the above direct relationship. Work innovativeness and knowledge acquisition capability were conceptualized as uni-dimension. Organizational creative climate consists of ten dimensions: freedom, idea support, trust/openness, playfulness/humour, idea time, challenge, dynamism/liveliness, debates, conflicts and risk taking. The hypothesized relationships were tested using a sample of 253 respondents. The SPSS and SmartPLS (Partial Least Square) software were used for data analysis. The findings revealed that five dimensions of organizational creative climate (freedom, idea support, trust/openness, playfulness/humour and idea time) had significant positive influence on work innovativeness of knowledge workers and knowledge acquisition capability whereas another five dimensions (challenge, dynamism/liveliness, debates, conflicts and risk taking) were not significant with work innovativeness and knowledge acquisition capability. Besides, the knowledge acquisition capability was found to be significant positively related to the work innovativeness. Knowledge acquisition capability was significantly mediated on the direct relationships between freedom and work innovativeness; idea support and work innovativeness; trust/openness and work innovativeness; playfulness/humour and work innovativeness; and idea time and work innovativeness. The theoretical and practical implications of the study as well as suggestions for future studies are also discussed.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter introduces the research outline of the study. It starts with discussing the background of the study followed by the problem statement. Research objectives and research questions will then be determined. After that, it ends with the significance of the study, definition of variables and organization of the chapters.

1.2 Background of the Study

Technology and innovation are driving forces that determine the economic growth and global competitiveness of a nation. Taiwan has won recognition in the international market for its technology development in industries. In the World Economy Forum (WEF) Global Competitiveness Report 2013-2014, Taiwan was ranked 12th out of the 148 economies worldwide and 4th in Asia according to the Global Competitiveness Index (Industrial Development Bureau, 2013). Under the State of Cluster Development category, Taiwan was ranked 1st in the world. Besides, Taiwan was ranked 7th among the 59 economies in 2012 World Competitiveness Yearbook (WCY) and 3rd in Asia through excellent achievement in science and technology infrastructure (Department of Industrial Technology, MOEA, 2013).

Table 1.1 shows the ranking of Taiwan with respect to scientific and technological infrastructure compared to other countries. Taiwan was ranked 4th behind Hong Kong, United States and Singapore in technological infrastructure while it ranked 7th among the countries in scientific infrastructure. This showed that Taiwan's government emphasized on the development of science and technology in the country by providing and improving the scientific and technological infrastructure.

Table 1.2 shows the innovation and sophistication factors. According to the table, Taiwan was ranked 14th among the countries in the comparison of the innovation and sophistication factors. Taiwan was ranked behind Japan which was the 2nd place among the Asian countries. In fact, innovation and sophistication were the keys factors for innovative driven economies which comprised of business sophistication and innovation. The business sophistication was admitted to be beneficial to improve efficiency of production in goods and services which then led to increase in productivity and thus increased the nation's competitiveness. Innovation was found to be important for economies because it could enhance the standard of living in the long run. As the countries moved to the innovation driven economies, the companies would compete by developing new and different goods by using the sophisticated business processes as well as through innovation. Hence, the innovation and sophistication factors sub-index became parts of the measurement of the Global Competitiveness Index in the stage of innovation driven economies.

Besides, Taiwan was ranked 11th in the Networked Readiness Index of the WEF's Global Information Technology Report 2012. Network readiness was then considered a key indicator of enhancing competitiveness (Office of Information

Services, Executive Yuan, 2012). This indicated Taiwan's strong innovation capability which led it to capture the IT market.

Table 1.1

IMD Scientific and Technological Sub-index

IMD Scientific and Technological Sub-index			
Technological Infrastructure		Scientific Infrastructure	
1st	Hong Kong	1st	United States
2nd	United States	2nd	Japan
3rd	Singapore	3rd	Germany
4th	Taiwan	4th	Israel
5th	Israel	5th	Korea
13th	Germany	7th	Taiwan
14th	Korea	8th	China
24th	Japan	13th	Singapore
26th	China	21st	Hong Kong

Source: *The World Competitiveness Yearbook 2012(IMD), The Global Competitiveness Report 2012-2013 (WEF)*

Table 1.2

Innovation and Sophistication Factors

Innovation and Sophistication Factors	
1st	Switzerland
2nd	Japan
3rd	Finland
4th	Germany
7th	United States
14th	Taiwan
17th	Korea
22nd	Hong Kong
34th	China

Source: *The World Competitiveness Yearbook 2012(IMD), The Global Competitiveness Report 2012-2013 (WEF)*

The research and development (R&D) as well as innovation represent the commitments of the world towards the creation of new knowledge and exploration of research results. In EIU's Global Innovation Index 2009-2013, Taiwan ranked 6th in the world and became number one among the newly industrialized countries. The Internet Economy Outlook 2012 by the Organization for Economic Cooperation and Development (OECD) showed that Taiwan spent more than 1 percent of the gross domestic product (GDP) on information and communication technology (ICT) research and development in 2011 meaning that Taiwan emphasized on development in information technology. Moreover, the innovation capability of a country can be seen from the investments on research and development. The investment on research and development will yield a great impact on the economic growth of a country. Hence, it was evident that Taiwan played a major role in the supply chain of the international innovation, research and development and then became a knowledge hub in Asia and the global innovation corridor (Department of Investment Services, 2012).

The strong innovation capability of Taiwan led it to become an essential contributor to the world's innovation particularly in the global information and communications technology (ICT) industry. It now stands at the forefront of industries such as those of notebook computers, wafer contract foundries, IC encapsulating testing and IC design. It ranked first in over ten categories of ICT products and acted as an important procurement center for global ICT companies and buyers. Taiwan's innovation capability and competitiveness was drawn from the well-established production pipeline, highly experienced engineers and strong research & development capabilities (Taiwan Trade Center Bucharest, 2012). Knowledge workers such as information technology engineers provided most of the contribution

to the Taiwan information technology industry in order to boost the development of innovation. They utilized their innovativeness in their job.

According to the Taiwan Economic Daily News, the internet and e-commerce companies planned to hire more knowledge workers after the Chinese New Year because the demands towards the knowledge workers increased due to the market growth. Since the rapid growth of the Taiwan market, the information technology engineers were in big demand by companies especially in mobile application and data analyses (Mu, 2012). This showed that the rapid growth of information technology industry brought up the demand on knowledge workers with their work innovativeness. Hence, the work innovativeness of knowledge workers became a main concern particularly in the information technology industry.

1.3 Problem Statement

Taiwan was ranked 1st in ICT product share in more than ten product categories. IT products had gained a large piece of market share in the IT world market which reflected the strong performance of Taiwan's IT companies such as Asus, HTC and others (Table 1.3). This reflected the high work innovativeness of IT engineers of the organization. The greater work innovativeness of IT engineers can lead to the greater performance of IT companies.

Table 1.3

The Annual Production, Global Market Share and Global Ranking of Taiwan's Information Technology Products

Products	Annual Production (thousand units)	Global Market Share	Global Ranking
Notebook	143,256	93.7%	1
Net Book	25,665	88.3%	1
Desktop	54,618	46.0%	1
Mother board	120,861	94.0%	1
Server system	3,173	40.9%	1
LCD Monitor	116,950	71.9%	1
Digital Camera	61,166	46.5%	1
IC Foundry	18,290	66.4%	1
IC Package	11,119 Million USD	47.9%	1

Source: *Industrial Development Bureau, MOEA, 2011*

Taiwan is facing profit decrease and intense competition from China. Since the worldwide PC shipment decline in the first half of 2013, Taiwan IT companies shifted their attention to tablets but they failed to dominate the market as the laptop did. At the same time, the sales of smart phone grew rapidly, but HTC, the well-known Taiwan manufacturer struggled with dwindling market share and lackluster sales. Taiwan realized that the future success of its technology export-dependent economy depends on its ability to innovate. However, Taiwan spent less on its research and development but it focused on designing and manufacturing hardware meaning it lacked of expertise in software development that generates large portion of revenues for the technology industry.

Besides, the culture of most companies and even society acts against innovation. Some companies are family owned and hierarchical led by old generations

who favor long working hours rather than creativity. This constraint makes it more difficult for those who want to do things differently. There was a news report (Cindy, 2013) that a previous engineer, George Chao, who worked at an IT company jeopardized his health and sacrificed his family life because of long working hours – 14 hours a day nearly every day. Finally, he chose to quit his job. He stated that it was impossible to be innovative in such an environment. A relaxed atmosphere is what people need in order to be creative. However, Taiwan lacks such an environment for IT engineers and thus many of them chose to quit their job. Other than that, the red tape and protectionism make it difficult for the IT companies to hire foreign talent in order to tap the overseas markets. Hence, the IT companies had to boost its innovation by placing emphasis on its own IT engineers and enhance their innovativeness instead of to seek out help from outside.

Knowledge workers are the key for boosting innovation in the companies. How to utilize and how to stimulate the work innovativeness of knowledge workers are the issues in the industry especially the information technology industry which is mostly dependent on innovativeness. Hence, there is a need to conduct a research to explore the factors which may influence the work innovativeness of IT engineers. There could be many factors which may influence the work innovativeness of IT engineers.

Indeed, there are four levels of factors that can influence employee's innovativeness which are individuality, the job, team and organizational level. Most of researches studied individual and organizational level variables. According to Anderson et al. (2004) and Clegg et al. (2002), the person, job and team-related

factors such as personality traits, autonomy, goals and relationship with colleagues and line managers play an important role in affecting the initial stage of innovation process which is to stimulate the employees' innovativeness rather than the organizational level factors such as structure, culture or climate of the organization. But, individuals are team members, and teams are nested within the organizations (Amabile et al., 1996; Anderson et al., 2004). Hence, they will be influenced by climate and organization culture. This proved the interdependency between the levels of factors.

The organization provides the context for stimulating the employee creativity and innovativeness which are considered as the root of the innovation whether it is measured in terms of the individual, team or organization (Amabile et al., 1996; Anderson et al., 2004; Woodman et al., 1993). Ekvall (1983) suggested that the climate influenced how organizational members communicate, solve problems, make decisions, handle conflicts, learn and motivate. He also stated that the climate has influence on job satisfaction and organization members' ability to innovate. Therefore, organizational creative climate is used as a factor in the present study in order to examine its influence on the IT engineers' work innovativeness.

The studies on relationships of organizational climate with innovation have mainly focused on western countries but were seldom carried out in non-western countries. Recent literature had discussed about the approaches in improving the organization's creative climate (Amabile, 1996; Anderson, 1996; Dubina, 2006a, 2007; Ekvall, 1996; Hunter, et al., 2005; Isaksen, et al., 1999; Martins and Terblanche, 2003; Mathisen and Einarsen, 2004). This acknowledged the influence of

organizational creative climate. Moreover, some previous studies had proven that there was a direct relationship between creativity climate and performance (Abbey and Dickson, 1983; Baer and Frese, 2003).

However, the inconsistent research results of the climate and performance persisted. Seibert et al. (2004) was unsuccessful in proving that there was a significant relationship between empowerment climate and individual job performance. Patterson et al. (2004) argued that the inconsistent result between organizational climate and performance might be due to the existence of mediating effect such as perceived justice, perceived organizational support, commitment, job involvement, job satisfaction and motivation.

Besides, recent studies also argued that the possible mediating effect might include knowledge management dimensions, such as knowledge transfer, knowledge acquisition, and knowledge application (Zhang and Begley, 2011; Tan and Aizzat, 2011; Pérez-López and Alegre, 2012; Waheed et al., 2012; Mercedes Segarra-Cipres et al., 2014; Sankowska, 2013). The previous literature had admitted the mediating effect of knowledge acquisition on innovation. Ricardo, Francisco and Pablo (2012) studied on the mediating role of knowledge acquisition on the relationship between social capital and firm innovation. The results showed that the knowledge acquisition fully mediated on that relationship. Mangui (2011) studied the mediating effect of knowledge acquisition towards the network munificence and innovation. The result indicated that the relationship between mutual trust and knowledge reservation and also innovation performance was mediated by knowledge acquisition.

However, studies to include knowledge acquisition capability as the mediator to intervene in the relationship between organizational creative climate and work innovativeness are still under researched. Therefore, this study aims to explore the relationship between the perceived organizational creative climates and work innovativeness of IT engineers mediated by knowledge acquisition capability.

1.4 Research Questions

This study provided the answers for the following questions:

1. Does organizational creative climate influence the work innovativeness?
2. Does organizational creative climate influence the knowledge acquisition capability?
3. Does knowledge acquisition capability influence the work innovativeness?
4. Does knowledge acquisition capability mediate the relationship between organizational creative climate and work innovativeness?

1.5 Research Objectives

The objectives for this study are:

1. To determine the relationship between organizational creative climate and work innovativeness.
2. To examine whether organizational creative climate influence the knowledge acquisition capability.
3. To examine whether knowledge acquisition capability influence the work innovativeness.

4. To determine whether knowledge acquisition capability mediates the relationship between organizational creative climate and work innovativeness.

1.6 Significance of the Study

This study will provide contribution theoretically and practically. Theoretically, this study can contribute to the academic research. The previous studies had studied the relationship between organizational creative climate and job performance. The influence of organizational creative climate towards the innovation performance had been proven. But, there was a missing link in the relationship between organizational creative climate and innovation performance which led to the inconsistent results. The mediation factor used to study the missing link influenced the relationship between organizational creative climate and innovation performance. In this case, knowledge acquisition capability was used as a mediator in order to study whether it influenced organizational creative climate and work innovativeness. Therefore, the findings of this study will expand the literature of organizational creative climate and work innovativeness by providing empirical evidence of the relationship between organizational creative climate, knowledge acquisition capability and work innovativeness. In addition, the findings will also contribute to the expansion of the theory of individual creative actions that serve as the fundamental support to the research framework that links organizational creative climate, knowledge acquisition capability and work innovativeness.

Practically, the findings of this study was able to provide new insights on how to improve the work innovativeness of the information technology engineers in Taiwan's information technology (IT) Industry by giving attention to organizational creative climate and knowledge acquisition capability. Since Taiwan has become the main part of the global information technology market, the work innovativeness of information technology engineers which leads to the organization's innovation performance is important in order to help Taiwan continuously hold a bigger share in the world market. Hence, it is critical to seek out the factors that induce the work innovativeness of IT engineers. Through this study, the information technology companies might be able to determine the factors that would influence the work innovativeness of information technology engineers and thus provide solutions to stimulate the work innovativeness. The top management of IT companies might seek the way to encourage and improve the performance of IT engineers and thus increase the organizational performance. Not only that, the IT engineers might find out the type of work environment that they prefer to work in and encourage the communication between them and top management.

1.7 Definitions of Variables

1.7.1 Perceived Organizational Creative Climate

Organizational Creative Climate is defined as an attribute of the organization, a conglomerate of attitudes, feelings and behaviors which characterizes life in the organization and exists independently of the perceptions' and understandings of the employees of the organization. This definition was adopted from (Ekvall et al., 1983).

Table 1.4 shows the ten dimensions of organizational creative climate and the definition for each dimension.

Table 1.4

Ten Dimensions of Organization Creative Climate and the Definition for Each Dimension

Dimensions	Definition
Challenge	The emotional involvement of the members of the organization in its operations and goals
Freedom	The independence of behavior exerted by the people in the organization
Idea support	The ways new ideas are treated
Trust/Openness	The emotional safety in relationships
Dynamism/Liveliness	The eventfulness of life in the organization
Playfulness/Humor	The spontaneity and ease displayed
Debates	The occurrence of encounters and clashes between viewpoints, ideas and differing experiences and knowledge
Conflicts	The presence of personal and emotional tensions
Risk taking	The tolerance of uncertainty in the organization
Idea time	The amount of time people can use for elaborating new ideas

Source: (*Ekvall, 1990*).

1.7.2 Knowledge Acquisition Capability

Knowledge acquisition also known as knowledge generation refers to the activity of recognizing the knowledge in the environment and then transforming it into a representation that could be internalized or used (Holsapple & Joshi, 2003).

1.7.3 Work Innovativeness

Work innovativeness is defined as " all employee behavior directed at the generation, introduction and/or application (within a role, group or organization) of ideas, processes, products or procedures, new to the relevant unit of adoption that are supposedly to significantly benefit the relevant unit of adoption" (Spiegelaere et al., 2012).

1.8 Organization of the Chapters

The present study comprises of five chapters. Chapter 1 discusses about the background of the study, problem statement, research objectives, research questions, significance of the study and definition of variables. Chapter 2 focuses on the literature review of organizational creative climate, knowledge acquisition capability and work innovativeness. After this, the theoretical framework and hypotheses of the study will be proposed in Chapter 2 . Chapter 3 highlights the research methodology used in this study such as the research design, population and sample size, questionnaire, design of the variables and measures, data collection and data analysis methods. Chapter 4 indicates the statistical data analyses and the results of the study. Chapter 5 focuses on the discussions of the findings and implications, limitations of the present study, suggestions for future research and the conclusion for the present study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature regarding the organizational creative climate and work innovativeness. Taiwan's information technology industry will be discussed as well as the term of information technology engineers as knowledge workers. In addition, the knowledge acquisition capability and work innovativeness will also be discussed. The relationship between organizational creative climate and work innovativeness which was mediated by knowledge acquisition capability will be determined. Lastly, the theoretical framework will be constructed along with the hypotheses.

2.2 Taiwan Information Technology Industry

In the early 1980s, the newly industrialized countries (NICs) including Taiwan changed from labor intensive to high technology industries. At that time, Taiwan information technology industry started to grow. Nowadays, the information technology industry is essentially and important contributed to Taiwan's economy.

Table 2.1

Composition of Gross Domestic Product (GDP) by Sector in 2011

Sector of Economy	Share of GDP (%)	Annual Change in GDP Share (%)	Annual Change in Output Value (%)
Agriculture	1.75	0.11	7.54
Industry	29.49	-1.63	-4.62
Manufacturing	24.76	-1.27	-4.27
Construction	2.84	0.03	1.59
Electricity, natural gas, water supply and remediation services	1.69	-0.12	-6.06
Mining and quarrying	0.21	-0.26	-55.43
Services	68.76	1.52	2.92
Wholesale and retail trade	18.81	0.52	3.52
Finance, insurance and real estate	15.26	0.34	2.92
Public administration and defense	7.33	0.07	1.74
Transportation and storage	2.96	-0.22	-6.50
Other	24.40	-	-

Source: *Directorate-General of Budget, Accounting and Statistics, Executive Yuan*

Table 2.2

Development of the Manufacturing Industry in 2012

	Contribution to total output (%)	Industry output (US$ million)	Number of employees (thousand persons)	Average output per employee (US$ thousand)
Manufacturing Industry	100.0	413,087	2,652	156
1. Metal and Machinery Industries	29.05	107,732	778	139
2. ICT industry	29.58	135,242	899	150
3. Chemical Industry	31.43	129,469	482	269
4. Consumer Goods Industries	9.94	40,645	464	88

Source: *Monthly Report on the Manufacturing Industry*, IDB/MOEA

Table 2.1 shows the gross domestic product (GDP)'s composition by sector in 2011. Industry was the second largest sector of the economy which contributed to the Taiwan economy after services. The manufacturing industry devoted more than three quarters among all sectors in industry. On the other hand, Table 2.2 indicates the development of the manufacturing industry of Taiwan in 2012. ICT industry was the second largest industry after the chemical industry followed by metal and machinery industry, and consumer goods industry.

In fact, now Taiwan plays a significant role in the IT world market. It act as an important procurement center for global ICT companies and buyers. The information and communications technology (ICT) companies in Taiwan play an important role in global supply chain for electronics products. Those ICT companies account for about three-quarters of PC's world production and half of the liquid-crystal displays (LCDs) in the world market. Besides, they also account for a quarter of the semiconductors and about a fifth of the mobile phones. From this, it could be seen that Taiwan has obtained a huge niche in the world's ICT industry ("Taiwan's Technology Industry", 2013). Table 2.3 indicates the ICT products produced by Taiwan which was ranked number one in the world. The figure shows that notebooks gained 89 percent of the world's share. Other ICT products produced by Taiwan such as tablets, had also gained more than 50 percent shares in the world market. Besides, Taiwan provided the largest production volume of desktop to the world. This proves that Taiwan is now playing a main role in global ICT industry by its strong ability in ICT.

Table 2.3

Products Made by Taiwan Ranked No.1 in the World

Item	Production Value (US$ million)	World share %	Production Volume	World share %	World's largest production by volume
Notebooks	81,102	89.0	171.28 million pieces	89.0	
Tablets	27,908	70.7	97.02 million pieces	68.9	
Foundries	20,927	68.0	22.14 million pieces	65.7	
Desktops	15,789	26.5	58.30 million pieces	45.7	★
Shoes	12,200	37.0	1,200 million pairs	35	
LCD Monitors	12,000	52.7	105.12 million pieces	67.8	
IC Packages	11,743	48.8	--	--	
Servers	5,697	--	4.79 million pieces	56.2	★
Motherboards (system & pure MB)	5,456	84.5	115.75 million pieces	78.5	
WLAN CPEs	3,280	66.9	414.77 million pieces	86	
Digital Still Cameras	2,526	30.0	42.62 million pieces	41.2	★
Portable Navigation Devices	2,167	64.0	16.31 million pieces	54	
xDSL CPEs	2,035	62.5	58.50 million pieces	68	
Cable Modems	1,737	81.0	32.85 million pieces	86	
Electronic Glass Fabrics	1,371	60.7	--	--	
Blank Optical Disks	1,270	73.0	--	--	
Golf Heads	756	81.0	39.00 million pieces	80	
Electric Thermometers	338	55	27.5 million pieces	55	
Diving Suits	300	80	4.0 million pieces	82	
Dry Film Photoresists	280	35	240 million square meters	40	★

Mask ROMs	272	59.8	--	--	
Chlorellas	268	62	882 metric tons	47	
Resuscitators	25	33.3	2.5 million pieces	33.3	

Source: *Industrial Development Bureau, MOEA*

2.3 Information Technology Engineers as Knowledge Workers

American scholar, Peter Drucker, defined knowledge worker as "those who master and use symbols and concepts, use knowledge or information to work". Knowledge worker is also defined as the employee who utilizes the theoretical and analytical knowledge obtained through formal education in order to launch new products or services and practises continuous learning (Scott, 2005). Besides, knowledge workers are known as those who access, explore and use information and add value to a company and its stakeholders (Tymon and Stumpf, 2002).

According to Smith and Rupp (2004), a knowledge worker is characterized as someone who gathers, develops processes and uses information but does not create, produce or manage a tangible product or service which is beneficial to the company. That kind of knowledge workers are considered as complex persons who bring unique skills, intelligence and work methods to the workplace (Amar, 2002). Besides, Thomas (2007) agreed that knowledge workers own higher professional ability, education background and industry experience, and their aim is to create and utilize the knowledge. Peng and Zhang (2001) agreed that the extension of knowledge worker apparently has reached to the white collar and professional employees.

In fact, Gregerman (1981) determined several characteristics of the knowledge worker as shown below:

1. The knowledge worker has full authority to decide how to do what.

2. Their tasks are normally non-repetitive and the methods used to resolve problems or issues have different approaches and techniques.

3. The productivity of knowledge worker is difficult to quantify.

4. Their 'production rate' varies depending on the complexity of the issue and the influences of the environment.

5. Projects or tasks assigned to them are middling to long term since they may span over months or years.

6. Their effectiveness mostly depends on the extent of knowledge application and innovations employed.

7. Their jobs usually influence other workers' job and the organization.

8. They respond well to organizational recognition.

9. They show great extent of interest to participate in the work or team work.

10. They want challenging and interesting work which is worthwhile to the organization.

11. They show high willingness to participate in personnel development opportunities which help in improving themselves.

Knowledge workers are those whose works are mainly intellectual and non-routine which is involves the creation and application of knowledge (Hislop, 2005). The reviews from past researchers determined that knowledge workers dealt with complex and mostly new technologies. Hence, occupations such as lawyers, information technology /software designers, advertising executives, accountants,

consultants, business consultants, scientists/engineers, architects, employees working in education industry and service industry couldbe identified as knowledge-intensive (de Jong and Hartog, 2007; Tymon and Stumpf, 2002).

In this case, IT engineers are considered as knowledge workers since they need to collect and utilize a huge amount of information in order to complete their work (Cheuk, 1998). Hertzum and Pejtersen (2000) stated that IT engineers have freedom in choosing how they want to complete their tasks and are expected to make decisions in different situations where many possible solutions are available. This explained the same characteristics in knowledge workers and IT engineers which proved that IT engineers could be categorized as knowledge workers.

2.4 Work Innovativeness

Work innovativeness refers to an individual's openness to new ideas and decisions on using innovations which are free from the effects of others' experience on his system (Midgley and Dowling, 1978). Based on Rogers' Theory, the individual innovativeness in information technology is classified as the willingness of a person to explore new technology. Anderson et al (2004) stated that employee innovativeness emphasized on examining what contributes to an employee's tendency to bring up innovative ideas which create innovations.

Besides, Agarwal and Prasad (1998) stated that individual innovativeness had plays a main role in understanding new information technology with the intention to use that new information technology. Innovativeness is the most important predictor

of an individual's creativity, thus, the organizational innovation and survival could benefit 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 then relate the workers' innovative activities to their success in the workplace.

In addition, Stoma (1980) defined performance as the degree of achievement of organizational objectives while Morhman (1989) stated that performance is the final results of taking some actions to realize achievements in a certain degree. According to Amabile (1988), innovation performance consists of products, concepts and processes with features of novelty and originality in order to meet the organizational developments. Oldham and Cummings (1996) made a re-interpretation of innovation performance emphasising on products or creative ideas that reflect the different individual levels such as the rate of introduction of new products, new process systems or new devices. Creative performance is considered to be the output of ideas, products or procedures that are novel or original which might be useful or practical (Amabile, 1996; Sternberg & Lubart, 1996).

However, there is still no universally accepted definition of innovation in spite of its importance in organization literature. West and Farr (1990) defined innovation as the intentional introduction and application (within an individual, group or organization) of ideas, processes, products or procedures that are new to the related group and device to be significantly profitable to the individual, the group, organization or the whole society. West and Farr (1989) stated that innovative work behavior was defined as an employee's behavior to generate, apply and implement the

novelty ideas, products, processes, as well as methods to the job in a departmental unit or organization. Examples of work innovativeness behavior are to search for new technologies, provide recommendation of new strategies to reach goals, use new work methods as well as to get the support and resources to carry out the novelty ideas.

2.5 Organizational Creative Climate

Ekvall and his co-workers (1983) defined organizational climate as a conglomerate of the attitudes, feelings and behavior which characterize life in an organization. Ekvall (1991) defined climate as "the observed and recurring patterns of behaviour, attitudes and feelings that characterize life in an organization." Besides, Litwin and Stringer (1968) stated that the organization climate could be defined as the sum of the perceptions of the employees who work in the organization. Veldsman (1995) defined the organizational climate as the psychological structures of organizations and their sub-units, and it was also described as the personality or character of the organization's internal environment. He also stated that the internal environment was influenced by various forces and then influenced aspects such as employee achievement, behavior, attitudes and job satisfaction.

Moreover, Bruke and Litwin (1992) defined organizational climate as the perceptions that individuals have on how the local work unit is managed and the effectiveness of their colleagues and themselves working together on the task. Dickson et al. (2006) stated that organizational climate is an essentially multilevel construct that involves distinct perceptions and beliefs regarding the organization's physical and social environment. According to Arabaci (2010), organizational climate

is the entire characterizing of internal aspects of an organization comparing it to its peers, affecting the behaviors of the members in that particular organization with different perceptions from each member, and hence closely interrelated with several factors including organizational commitment, trust, sense of justice, alienation, exhaustion as well as job satisfaction.

Organizational climate refers to common practices, shared beliefs and value systems that are followed by an organization (Schneider, 1990). Individually, the climate is a set of attributes and expectancies that characterize the overall pattern of organizational activities (Jaw & Liu, 2003). Organizations could encourage the employees to have free thinking, open communication on their opinions and ideas, to find out non-routine alternatives by drawing up an innovative climate (Edmondson, 1999; Jaw & Liu, 2003; Norrgren & Schaller, 1999).

In the 1980s and 1990s, the organizational climate that stimulated innovation and creativity was the focus of three main research programs conducted by Ekvall (1988), Amabile's (1989) and Isaksen's (1995) and their respective questionnaires were developed to measure the creative or innovative climate. The questionnaires were Creative Climate Questionnaires by Ekvall (1988, 1991, and 1996); Work Environment Inventory by Amabile (1989) and Situational Outlook Questionnaire by Isaksen (1995).

The Creative Climate Questionnaires (CCQ) were encompassed 10 dimensions which comprised of 5 items each and a total of 50 questions. The dimensions were the results of the analyses that were studied. The 10 dimensions