Recruitment and Retention of Knowledge Workers in Taiwan's High Technology Industry

by

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Abstract

Organisations need to have the ability to recruit and retain appropriate knowledge workers in order to create an inflow of knowledge and skills to develop and maintain their competitiveness. High technology organisations, particularly, rely on knowledge workers to transfer human capital into intellectual capital by turning technological knowledge into products. Taiwan is renowned for information and communication technology (ICT) product design and manufacture. This research uses Taiwan's high technology industry as a sample to examine the recruitment, selection and retention practices for knowledge workers.

Three organisation ownership types exist in Taiwan's context: Taiwanese-owned, foreign-owned and non-private. This study asks: what are the current recruitment, selection and retention practices for knowledge workers in Taiwan's high technology industry? Are there any differences in the three types of ownership group? Do ownership groups influence knowledge workers' decisions to join or stay in their organisations? To answer these questions, a quantitative survey was conducted from September 2009 to March 2010, and two hundred valid questionnaire responses were collected (a response rate: 67%). Additionally, interviews were conducted with human resource managers in 10 organisations under various ownerships to collect information that was unobtainable in the questionnaire survey.

This research contributes empirical evidence about the current recruitment/selection and retention practices for knowledge workers in Taiwan's high technology industry. The results showed that organisations within various ownership groups preferred to use different practices. Taiwanese-owned firms predominantly used on-line agents to recruit knowledge workers and relied on employee ownership bonus programmes to attract and retain knowledge workers. Foreign-owned firms, significantly, used head hunters. They provided their knowledge workers with high base salaries, challenging and interesting work, and influential power over work-related decisions. Non-private organisations were significantly different in their adoption of company websites. They offered good training programmes, opportunities to access new technology, and attractive work-life balance, reflecting their research-oriented ethos.

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Chapter 1 : Introduction

This chapter will, firstly, explain the research rationale for choosing the research topic of the recruitment and retention of knowledge workers in the context of Taiwan's high technology industry. Secondly, it will present the research objectives and the contributions that the researcher aims to achieve in this study. Finally, the structure of this thesis will be presented, with a chapter by chapter brief.

1.1 Research rationale and objectives

1.1.1 Research rationale

1. Reasons for choosing Taiwan's high technology industry

The reasons for choosing the research context of Taiwan's high technology industry are in view of its importance to Taiwan's economy and the global market. High technology industry has played a critical role in the economic growth of Taiwan, which is known as one of 'four tigers' in the newly industrialised countries (NICs) of East Asia, together with South Korea, Singapore and Hong Kong. In Taiwan, high technology industry has contributed to more than 50% of manufacturing output, with continuous growth in production value in the last decade. Taiwan's high technology industry is also influential to the global supply chain of high technology products. Taiwan is known for hardware manufacturing of high technology products, such as notebooks, computers, semiconductors, flat panel displays and other information and communication technology (ICT) products or components. The example of the '921' earthquake (also known as Chi-Chi earthquake) which occurred in 1999 illustrates the importance of Taiwan's high technology industry in the global market. This earthquake measured 7.3 on the Richter scale and damaged Taiwan's industrial power supply which, as a consequence, affected the manufacturing capacities of many high technology firms in Taiwan. This resulted in a price rise of various ICT products that year. Many Taiwanese high technology firms thus expanded their multinational operations by transferring part of their manufacturing capacity to other areas, such as

China or Southern Asia, to meditate the production risk of concentrating at one location. In view of the significance of Taiwan's high technology industry to Taiwan and the global market, it is meaningful to study the management of high technology industry in Taiwan.

2. Reasons for studying knowledge workers

The reasons for studying knowledge workers stem from their importance to the organisations in the information age and the demand for their skills. The rapid and widespread development of information and communication technology has moved society towards a post-industrial economy (Bell, 1973), which is also described by different names, such as the knowledge society (Drucker 1968; Nonaka, 1994; Toffler, 2006) or the information age (Hamel and Prahalad, 1996; Hope and Hope, 1997; Lee and Maurer, 1997; Ramirez and Nembhard, 2004; Sampler, 1998). Under such circumstances, organisations have relied more on soft resources (for example, intellectual capital) to enhance their competitive advantage in response to increasingly intensive global competition (Ulrich, 1998).

Reich (1991) suggested that core workers in the information age are 'symbolic analysts'. Such 'symbolic analysts' include: problem-solvers, who manipulate outputs to fulfil customers' needs (such as R and D experts, designers or engineers), problem-identifiers, who help to identify customers' needs in the market (such as marketers, advertisers), and brokers (such as financiers or researchers). Blackler et al (1993: 855) considered the symbolic analysts as knowledge workers who "have the skills of abstraction, of systems thinking, of experimentation and of collaboration with others". In this research, the main target group of knowledge workers is the professionals and technicians who work in Taiwan's high technology industry, such as R and D workers, engineers, scientists, programmers and other professionals.

In terms of the importance of knowledge workers, Newell et al (2002) suggested that knowledge workers are important for three reasons. Firstly, knowledge workers possess the major means to the production of an organisation's services and products (16). In other words, the organisations rely on knowledge workers to convert the input of human capital into intellectual capital in the form of final products or services

(Swart, 2008). In some cases, the role of knowledge workers is particularly important since knowledge is simultaneously the input, medium and output for their work, such as professional and specialist services (Scott, 2005: 260). Secondly, the knowledge or skills demonstrated in the performance of these workers, or the quality of their work, are critical to the long-term success of the organisation (Despres and Hiltrop, 1995:14; Newell et al, 2002: 19). Thompson and McHugh (2002:154) highlighted that in the knowledge economy service, "the intangible nature of service means the transformation into a product of cognitive manipulation in which rules, routines and machinery are secondary". Thus, these researchers indicated that knowledge workers' performance could possibly make a direct impact on the performance and competitiveness of the company. Lastly, the discussion of knowledge workers is important because knowledge workers represent the shift of the main source of wealth creation in the information age. Because of the demand for their skills, these knowledge workers have better opportunities and potential to create wealth in the information age. This seems to be the case to the knowledge workers in Taiwan's high technology industry, who are called the 'new technology rich group (科技新貴)' by Taiwanese people.

In high technology industry, knowledge workers are in strong demand (Banerjee, 2006). Facing a business environment which features rapid technological change, a high level of technological uncertainty and a short product life cycle (Benkenstein and Block, 1994), high technology organisations need to leverage their employees' skills to compete in the market by innovation, creativity and efficiency. A number of researchers have suggested that knowledge workers in the high-technology organisations are crucial for applying their knowledge with creativity in the innovation activities of product research, design, and development (Glasmeier, 1985; Hecker, 1999; Morgan and Sayer, 1998). Thus organisations should adopt different management practices for knowledge workers to ensure the quality of knowledge workers and to facilitate the efficient and effective application and utilisation of knowledge and skills (Alvesson, 2000; Newell et al, 2002; Rowley, 1999; Vogt, 1995).

3. Reasons for focusing on recruitment and retention practices

The reasons for focusing on recruitment and retention of knowledge workers are firstly, the importance to organisations of acquiring required knowledge and skills and secondly, the consideration of skill shortage of knowledge workers. Recruitment and retention of knowledge workers is significant for companies, because the acquisition of the knowledge/skills possessed by the workers will affect the company's competitive advantage in the long run. This, in turn, impacts upon the company's profitability and sustainability (Harrell-Cook and Ferris, 1997; Kamoche, 1996; Schuler and MacMillan, 1984). In addition, turnover is costly for the companies. One Taiwanese-owned firm in this research, for example, indicated that the re-employment cost could be as high as six times a worker's base salary. In other words, failure to establish or maintain the capability to attract and retain such employees may result in a crisis of survival in the business environment. However, the tasks of recruitment and retention of knowledge workers are challenging to organisations, because knowledge workers are a relatively scarce resource in terms of labour supply, and they have better capabilities and mobility to choose which company they would like to work for (Horwitz et al, 2003; Jamrog, 2004; Newell et al, 2002).

Several factors may result in a skills shortage of knowledge workers. Firstly, knowledge workers are highly-skilled and well-educated workers and take time to cultivate and develop (Alvesson, 2001; Crouch, 1997). Secondly, the demand for knowledge workers has increased dramatically in line with economic and industrial development. Kaihla (2003) identified managers and skilled workers required in the high-technology jobs as the two key groups that companies are most likely to encounter a shortage problem with. In Taiwan, skilled workers, such as programmers, R and D engineers, scientists, technical specialists and experienced professionals, are in high demand. Thirdly, due to the development of information and communication technology, knowledge workers can perform their tasks with fewer constraints on time and location. This increases the global mobility of knowledge workers, intensifying the competition for acquiring them.

In terms of knowledge workers management, Carter and Scarbrough (2001) indicated that with careful management of recruitment and retention, such employees would

help organisations to generate value-added resources. Kamoche (1996) suggested that a company may establish the HR capabilities in view of gaining competitive advantage through appropriate HR policies and practices to secure, nurture and retain key personnel. For instance, individual performance could be an indicator to evaluate valuable employees, and retention could be achieved through the programmes relating to rewards, job security, training, career development and autonomy. Similarly, Newell et al (2002) have also indicated that the impact of HRM policies and practices could be reflected in reward systems, organisational culture and organisational career paths. For example, the acquisition of the required expertise considers not only the individual's intellectual capabilities but also his/her fitting with the organisation and a specific group of co-workers (71). Based on the argument that the adoption of HRM strategies, policies and practices should be adjusted to fit into different contexts (Boxall, 1996; Brewster, 1999; Budhwar and Debrah, 2001; Jackson and Schuler, 1995; Schuler et al, 1993), these researchers have provided guidelines for a further empirical study regarding the impact of HRM policies and practices on the recruitment and retention of knowledge workers in the context of Taiwan.

1.1.2 Research objectives and contributions that this study aims to achieve

Drawing from the research rationale, this research aims to achieve the following research objectives.

1. **To understand the current recruitment/selection and retention practices for knowledge workers in Taiwan's high technology industry.**

   Based on definitions of the Taiwanese government, high technology industry in Taiwan broadly include the industries in electronics (such as semiconductors, optical-electronics, integrated circuits and computers and peripherals, etc), precision machinery, biotechnology and digital content providers. In view of the influence on Taiwan's economy and society, attention will mainly be placed on organisations in the ICT (information, communication and telecommunication) sectors.

2. **To compare whether high technology organisations within different ownership groups would adopt different recruitment/selection and retention practices for their knowledge workers.**

Three groups of organisations with different ownerships were selected: Taiwanese-owned (privately), foreign-owned (privately) and non-private organisations. In other words, the organisation ownership group varies with either their origin of nation (i.e. Taiwanese or foreign-owned) or their being privately or non-privately owned.

Most of the previous empirical research has focused on the recruitment and retention of knowledge workers on organisations in the private sector, with limited attention paid to those in the non-profit sector. Nevertheless, the economic influence of non-profit organisations has increased and many non-profit organisations have hired professionals (Hurley and Green, 2005; Powell and Steinberg, 2006; Weisbrod, 1988). In Taiwan, in particular, the government established not-for-profit research institutes in the 1970s to support the national development of advanced technology in industry. These non-profit research institutes, which stood in the middle of the private and public sectors, contributed to the advanced technology development in Taiwan and have continued to play a critical role in Taiwan's high technology industry. As management for organisations in the public/non-profit and the private sectors differs due to distinctive contexts and constraints, this research aims to compare differences in HR policies and practices for the recruitment and retention of knowledge workers between the organisations in the private sector and non-private organisations in the non-profit sector (Ring and Perry, 1985). Meanwhile, this research also examines the recruitment and retention difficulties encountered by these organisations, and how they respond to such difficulties.

3. To understand the recruitment and retention practices for knowledge workers from the perspective of workers, in relation to the organisation ownership group.

    a. To investigate knowledge workers' experiences and perceptions on recruitment/selection and retention practices adopted by their current employers in Taiwan's high technology industry.

    b. To compare whether their experiences/perceptions are consistent with the practices adopted in Taiwan's high technology industry from the perspective of the organisations.

    c. To understand the factors that influenced the knowledge workers' decisions to join or stay in the high technology organisations.

Based on the research objectives, multi-methods will be used as the research method for data collection. A self-completed questionnaire was used as the major data collection technique to investigate the recruitment/selection and retention practices for knowledge workers from the perspective of workers. Interviews were used as a supplement to reveal the practices from the perspective of organisations, to cross-check the findings from different sources and provide a better understanding of, and explanation for, the results.

This research will contribute to the body of literature of empirical evidence for the current HR practices for the recruitment/selection and retention of knowledge workers in the context of Taiwan's high technology industry. Through a comparative analysis, this research will disclose the impact of organisation ownership group on practices for the recruitment/selection and retention of knowledge workers. Unlike most of the previous research which focused on organisations in the private sector, this research will compare the organisations under different ownership forms that differ in either their origin of nation, or in being privately or non-privately owned. In other words, this research will contribute to the empirical findings on the differences in knowledge worker recruitment and retention for organisations under various ownerships (including Taiwanese-owned, foreign-owned and non-private organisations).

1.2 Structure of this thesis

The thesis is structured in four parts: an introduction to the context of Taiwan and Taiwan's high technology industry; the literature review; the research methodology and the main findings. After the introduction (chapter 1), the first part contains the background knowledge of Taiwan and Taiwan's high technology industry (chapter 2). The unique industrial position of Taiwan's high technology industry in the global market and its contribution to Taiwan's economy are reviewed to understand the importance of high technology industry to Taiwan. The second part, the literature review, contains a discussion of knowledge workers and the HR practices of recruitment and retention for knowledge workers (chapter 3). The relevant literature, both theoretical and empirical, is reviewed to construct the foundation for further study in this thesis (chapter 4). The third part contains the research methodology (chapter 5) that presents the research design in terms of research questions and the choices in research philosophy, strategy and research methods. The fourth part contains the three chapters of findings (chapter 6, 7 and 8), presenting the results and analysis of empirical research, based on the themes of recruitment, selection and retention of knowledge workers in Taiwan's high technology industry. A concluding chapter (chapter 9) summarises the analysis and discussion.

The outlines of each chapter are as follows:

Chapter 2 briefly introduces Taiwan's historical background, national culture and legal environment. Furthermore, it discusses the definition and characteristics of high technology industry and the development of Taiwan's high technology industry. It also investigates Taiwan's labour market situation, which highlights the challenges of knowledge worker recruitment and retention in Taiwan's high technology industry.

Chapter 3 discusses the literature from the perspective of knowledge, knowledge workers and management of knowledge workers. It explores the theoretical discussion about the definition and characteristics of knowledge workers, and discusses the relationships between knowledge, knowledge workers and management of knowledge workers. It also reviews the contextual factors that may influence the adoption of HR practices for knowledge workers.

Chapter 4 reviews the theoretical and empirical discussions on recruitment, selection and retention for knowledge workers. This chapter is divided into three parts on the themes of recruitment, selection and retention. In each part, the definitions of recruitment, selection and retention respectively are reviewed. Secondly, the theoretical discussions on the HRM practices in line with each theme are reviewed. Lastly, chapter 4 reviews the empirical studies on HRM practices for the recruitment, selection and retention of knowledge workers.

Chapter 5 moves to the research methodology including the research framework and discusses the strengths and weaknesses of different research philosophies, strategies, and research methods for data collection. Basically, a deductive strategy and multi-method are adopted in this research to collect the empirical data. Firstly, a quantitative method of a self-completed questionnaire is deployed to investigate the management practices for the recruitment, selection and retention of knowledge workers in Taiwan's high technology industry from the perspective of knowledge workers. Secondly, a qualitative method of interviewing is deployed to cross-check the survey results and to provide a deeper understanding of the organisations' activities in knowledge worker recruitment, selection and retention from the perspective of the employer.

Chapter 6 investigates the recruitment channels used in Taiwan's high technology industry. This chapter begins with a descriptive analysis that reveals the different characteristics of respondents across the three organisation ownership groups. Based on the research participants' experiences, the results show that variation in ownership group placed a different emphasis on the recruitment channels for knowledge workers with distinctive qualifications and characteristics. This chapter also explains how the high technology organisations adopt different strategies and practices in response to the recruitment difficulties for knowledge workers.

Chapter 7 investigates the selection criteria and selection methods used by Taiwan's high technology industry. The results show that foreign-owned high technology firms paid greater attention on candidates' capabilities. In addition, the knowledge workers' decision-making in the selection of an employer is related to the distinctive HR and

management practices deployed by the high technology organisations under different ownership groups.

Chapter 8 examines a variety of factors that influence the knowledge workers' willingness to stay in high technology organisations. The results indicate that the organisations' characteristics, such as their country origin and their business orientation (whether R&D or profit-oriented), affect the adoption of HR and management practices that facilitate the retention of knowledge workers. In particular, Taiwanese high technology firms have relied heavily on employee ownership bonuses as an important retention tool. In addition, although knowledge workers who work in various organisations under different ownerships emphasise the different aspects of HR practices, the results show that knowledge workers are rational in making their decisions to stay in a company. This is evident in the research which finds a weak influence of the traditional Chinese value of Ren-Ching (favour to another person) based on a reciprocal exchange of Guanxi (relationship) on the knowledge workers' decisions of staying in an organisation.

Chapter 9 draws the conclusions to summarise the analysis of the main findings and discussions for the recruitment/selection and retention of knowledge workers in Taiwan's high technology industry. Although the organisations within different ownership groups focus on different strategies and practices for the recruitment and retention of knowledge workers, reward policies are found to be the most distinctive practices that differ in the three ownership groups. The three groups also prefer to select knowledge workers with different criteria, through different channels and selection methods. On the other hand, knowledge workers are found to be attracted to join or stay with their current employers by the distinctive practices adopted by the organisations in the three ownership groups. Finally, the section presents the contributions and limitations of this research, and suggests a future research direction.

Chapter 2 : High technology industry in the context of Taiwan

As the adoption of HR strategies and practices could be affected by the contextual factors of the host nation and the industrial characteristics, this chapter will examine the background of Taiwan from the perspectives of its history, culture, legal and industrial characteristics, and the development of Taiwan's high technology industry, as well as the labour market for Taiwan's high technology industry.

2.1 Context of Taiwan

Taiwan is a small island located in the Pacific Rim. It has a high population density, considering 23 million people live in an area of 35,801 km^2, which is 1.7 times the area of Wales but with 7.6 times the population. With limited natural resources and a small market size, the economic development of Taiwan was driven by exports while concentrating on enhancing the quality of human resources in the island. The focus on economic independence and economic growth was particularly vital to the Taiwanese government, under the circumstances of confrontation with China after the Chinese Civil War in 1949.

Historically, Taiwan has been occupied by Holland, China, and Japan. After World War II, the Republic of China (R.O.C) acquired Taiwan from Japan in 1945. In 1949, the Kuomintang party (KMT) retreated to Taiwan due to the Chinese Civil War and brought new immigrants from mainland China. In 1987, the KMT government lifted martial law, which led to later developments in democracy, the media and the business environment. In 2000, the Democratic Progressive Party (DPP) for the first time became the ruling party in Taiwan and ended the regime of the KMT, which regained control over politics in 2008. Despite the fact that democratic development was evident, it also resulted in inconsistent policy formation and execution due to economic issues. The changes in policies reflected the differences in positions and viewpoints between the two political parties in Taiwan. One of the most obvious discrepancies in the economic issues was the policy towards China. Despite economic interaction between China and Taiwan becoming increasingly active, the

DPP suggested keeping a cautious attitude to an open China policy, whilst the KMT argued for developing a closer relationship with China. After the KMT won the presidential election in 2008, several policies were formed to intensify economic and labour market interaction, such as recognising academic degrees from mainland China and allowing more management professionals with Chinese nationality to work in Taiwan. These policies that relaxed the restrictions on Chinese professionals may have an impact on the labour market for knowledge workers for Taiwan's high technology industry.

National culture in Taiwan

A number of researchers have suggested that the national culture and the political, legal, social and economic factors in the host country would affect the organisation's adoption of human resource strategy, policies and practices (Budhwar and Debrah, 2001; Shen, 2006). Culture could be defined as 'an individual's most basic, consciously and unconsciously held assumptions, beliefs, norms and values' (Chiang, 2005: 1546; Schein, 1985). Situated within a wider Chinese context, Taiwan is traditionally rooted in Confucian philosophy (Chen et al, 2005; Huang, 2001; Huang et al, 2005). It is generally accepted that harmony and consensus are commonly shared values within the society of Taiwan. The values of harmony and consensus in Confucianism reflect a non-conflict and group-based system of social relations. This was empirically supported by Hofstede's (1980) study which discovered in Taiwan's a high tendency toward collectivism (Harris et al, 2003). In addition, his study also ranked Taiwan as having medium to high level of power distance, reflecting the inequality that exists among people in different power positions resulting from hierarchical relationships or social order. Traditionally, seniority in a family or in a bureaucratic system is highly respected in response to the maintenance of harmony and consensus within the society or the organisation.

Moreover, the importance of networking relationships (i.e. 'Guanxi') is commonly acknowledged. 'Guanxi' is the foundation for trust in business relationships (Huang et al, 2005) and interpersonal trust based on personal connections is considered to be the key element in employer-employee relationships (Chen et al, 2005). Thus, it will be interesting to observe whether 'Guanxi' would affect the recruitment and retention

activities in high technology organisations with different ownerships in the context of Taiwan. Face ('mianzi') is another important value in Chinese society. Face could be explained as someone who has a good reputation or was successful in the society, such as working in a company with a good reputation or having an impressive working title. Thus, what the organisation could offer to the employee (e.g. title, company's image and reputation, career potential, networking, etc.) may influence the success of recruitment and retention of employees. It is also important not to make others 'lose face' either in terms of maintaining 'Guanxi', or of respecting seniority or hierarchy, which again feeds back to harmonious social relationships.

Nevertheless, the influence of traditional culture seems to be declining with a tendency towards more individuality in Taiwan (Chen et al, 2005), perhaps because of the increasing interaction with Western countries. For instance, a survey of more than 3292 executives world-wide identified Taiwan having a medium to high degree on the 'intercultural understanding', which was ranked number eight out of fifty two countries (Briscoe and Schuler, 2004). In addition, although Taiwan is recognised as a part of a wider Chinese context that is affected hugely by Confucianism, HRM practices vary greatly within China, Hong Kong, Singapore, etc., due to the specific historical background that has resulted in different political, legal and social systems.

Legal environment

The Labour Standard Act has regulated a standard of working conditions for employees. Most often, multinationals would offer better working conditions to meet legal requirements and to compete with other multinationals within specific economic districts, such as science parks or the exporting district. Unions were ineffective. Based on the research by Kuruvilla et al (2002: 438), the impact of unions in Taiwan in terms of union influence was small and much weaker than the union influence in European countries. In 2005, the government changed the pension policy (i.e. New Labour Pension Rule), which allowed employees to combine the length of service in different companies as the calculation base of his/her pension fund. The New Labour Pension Rule allows a personal account for the workers' pensions which would accumulate their pensions even where they are employed by different employers. The old pension system was criticised for the limited number of workers who could

actually receive their pension after they retire due to the strict restrictions on the length of service in the same company. Logically, the new pension policy would have an impact on both the worker and employer. For the worker, it will be much easier to switch to another company as they are allowed to keep their pension rights. This could particularly benefit knowledge workers who are supposed to be more capable to switch their jobs, given that they are in demand in the labour market. As for the employer, since the employees can switch their jobs to another company at a lower opportunity cost, it may intensify the potential problem of turnover and thus the organisations need to pay more attention to the issue of retention. In addition, the new regulations require the company to increase the pension reserves ratio from two percent to six percent. This may favour large organisations which have sufficient financial resources to allocate a pension reserve for employees, and thus will be in a better position to recruit and retain employees.

Another important legal act is the Taiwan Company Law which allows firms to distribute employee bonuses from a certain percentage of the firm's net income in the form of either cash or stocks. This practice has been popularly implemented by high technology organisations in Taiwan. However, in 2008, the government issued a new accounting principle that required firms to list their distributed employee bonuses under the item of the firm's expenses. Furthermore, the firm should calculate the number of shares distributed to the employees by the stock's market value instead of its par value. As a result, employees were expected to receive fewer shares under the new regulations. This may cause a severe impact on the workers' real income, especially for those who work in firms that enjoy a high stock price and use stock bonuses as a major item of compensation to their employees. Meanwhile, effective from 2010, the stock bonuses received by the employees will be taxed at the stock's market value instead of the par value as before. This will also have a severe impact on the employee's income since they may pay more income tax. These changes in legal requirements may force high technology organisations to reconsider their reward policies and practices for the recruitment and retention of knowledge workers.

In addition, the awareness of environmental protection has grown rapidly during the past decade. Local people and governments are increasingly concerned with the

pursuit of economic growth at the high expense of environmental pollution. Therefore, organisations have to examine the environmental evaluation report at a higher or even more rigorous standard than legal requirements, and enhance the communications with local government and representatives to demonstrate their concerns for local interests and problems and respond to the local concerns quickly and effectively. This has resulted in relocation of some high technology manufacturing firms that had concerns about labour costs and a higher degree of pollution, such as PCB (Printed Circuit Board) manufacturers.

2.2 High technology industry in Taiwan

Definition and characteristics of high technology industry

The definition of high technology industry could be reviewed by several approaches. One approach defines the high technology industry in view of its industrial features. A number of researchers have highlighted the industrial features from the perspective of inputs, such as a high percentage of research and development (R&D) expenditure to sales (Huang and Chiang, 2000), or the employment of a high proportion of scientific, technical and engineering personnel (Glasmeier, 1985; Morgan and Sayer, 1998). Benkenstein and Block (1994) pointed out that high technology industry is characterized by operating in an uncertain and fast-changing business environment, in view of the short product life cycle and increasing technological uncertainty. Another approach considers the nature of activities that the organisations are engaged in. The activities mainly comprise research, design, development, introduction of new products and innovative manufacturing processes. These activities are conducted mainly through the systematic application of scientific and technical knowledge (Hecker, 1999: 19) by a significant number of technically-qualified workers or professional experts (Glasmeier, 1985; Morgan and Sayer, 1998). These approaches, which focus on either the industrial features or the nature of activities highlighted the nature of change in the high technology industry (Aydalot and Keebel, 1988: 4).

Alternatively, most of the organisations in the public / non-profit sector directly list the activities of high technology industries. For example, the OECD (2002: 281)

defined high technology industries as containing the sectors of pharmaceuticals, office and computing machinery, radio, TV and communication equipment, medical, precision and optical equipment, and aircraft and spacecraft. The Taiwanese government listed the major high technology sectors in the Science Parks, including integrated circuit (IC), computer and peripherals, telecommunications, optoelectronics, precision machinery, biotechnology and green energy / energy saving products (Chen and Huang, 2004; CTSP, 2010; STSP, 2010). The industrial features of high technology industry in Taiwan represent "high market potential, relevant industrial integration, high value-added, high technological level, low degree of pollution and lower level of reliance on energy" (Yang, 2005). Examining the high technology sectors in the Hsinchu Science Park, the high technology industry was featured with a high input of R&D expenditure (see table 2.1).

Table 2.1 Allocation of funds to R&D in Hsinchu Science Park

Item	Year	Industry sector						Total
		IC	Computer and peripherals	Tele-communication	Optoelectronics	Precision machinery	Biotechnology	
R&D expense/ Sales (%)	2000	4.5	2.9	4.6	4.6	5.9	65.1	4.2
	2001	11.8	4	6	7.1	2.1	19.9	8.9
	2002	10.6	3.7	5.9	5	3.6	28.4	8.5
	2003	8.3	3.4	3.9	4.9	4.4	24.1	6.8
	2004	6.4	4.3	4.3	4.8	5.6	16.2	5.8
	2005	7.9	4.6	4.8	3.9	6.2	14.6	6.8
	2006	6.6	4	5.4	3.4	5.6	17.5	5.9
	2007	6.8	3.6	6.1	2.4	9.8	22.4	5.9
	2008	10	4.3	7.9	2.7	10	14.2	8.2

Source: Hsinchu Science Park, 2010a

The development of high technology industry in Taiwan

High technology industry is important to the economic development of Taiwan in view of its contribution to the output, expansion in employment and deployment of high quality manpower (Hsieh and Hsing, 2002; Yang, 2005). Taiwan's high technology industry constitutes more than 50% of the total manufacturing output in Taiwan. Table 2.2 illustrates the contribution of high technology industry to Taiwan's manufacturing output.

Table 2.2 Taiwan's high technology industry manufacturing output

	2000	**2001**	**2002**	**2003**	**2004**	**2005**
Manufacturing output						
Amount (TWD billion)	4547.2	3963.5	4299.7	4806.8	5617.1	5776.8
% of total manufacturing output	53.6	53.2	54.5	54.8	54.3	54.2

Source: Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Taiwan, 2006

The biggest contribution came from the electronic components and ICT products. In 2010, the information and electronics industry (including electronic components, computer and peripherals, optoelectronics and electronics) accounted for 35% of manufacturing output. The production value reached 4839 billion in New Taiwanese Dollars (equivalent 153 billion US Dollars) (STPI, 2011).

Taiwan's high technology industry has achieved great global success. Various ICT products enjoyed the highest percentage of the worldwide market share (table 2.3). The success of the ICT products was achieved through strong vertical integration of various high technology sectors. Semiconductor and LCD panel manufacturing were the key segments in Taiwan's high technology industry. In terms of production value, the foundry industry was ranked as the top worldwide, accounting for 69% of the global market share (Chung, 2011). LCD panel production led the world with 43% of the market share (DOIS, 2007).

Table 2.3 Taiwan's ICT products with a high worldwide market share

	Worldwide market share (%)	Rank	Rank
Notebook PC	95.3	1	
Motherboard	93.5	1	
Cable CPE	93.0	1	
WLAN NIC	90.8	1	
Netbook	90.7	1	
Server (System & Pure MB)	88.7	1	
LCD Monitor	71.8	1	
DSL CPE	65	1	
CDT Monitor	59.2	1	
IP Phone	54	1	
DSC	42.6		2
Desktop PC	38.9		2
Server (System)	37.3		2
ODD	25.8		2

Source: MIC, March 2010

In the 1980s, Taiwan's government strategically encouraged the development of technology-intensive, high value-added and low energy consumption industry. Thus, high technology industry was selected as a key strategic industry (TIER, 2006). The globally competitive high technology firms were widely spread in the sectors of information and computing, integrated circuits (IC) and optical electronics. The high technology firms developed strong R&D teams which helped companies to design good quality products at a competitive cost, and the superior mass production capabilities in terms of advanced manufacturing techniques and flexible manufacturing scheduling formed the strategic competitiveness of the high technology industry in Taiwan (Chen, 2007; ITRI and MIC, 2007; Liu, 2005).

There were four stages in the development of Taiwan's high technology industry (CCID, 2010). In the start-up stage (before 1976), the National Chiao-Tung University set up the Electronic Research Institute in 1958 and a Semiconductor Laboratory in 1964, cultivating scientifically and technologically highly-skilled workers. Since 1973, Taiwan sought technology transfers from advanced countries through the establishment of research institutes and through joint ventures and

licensing deals with multinationals (Hobday, 1995). In the second stage (1976 to 1992), Taiwan's high technology industry took-off. Rather than relying on technology transfer, Taiwan started to develop its own technology. In 1981, the state-owned Hsinchu Scientific Park was established, attracting significant amounts of investment in high technology industry and the inflow of highly-skilled overseas Chinese professionals. As a result, technology was widely diffused to the manufacturers in the private sector. Clusters of high technology firms gradually established themselves, building strong vertical industrial integration supply chains in high technology industry. In the third stage (1992 until 2008), high technology industry, particularly the information and computer sectors, developed quickly and achieved impressive success internationally. In the electronics and computer sectors, the manufacturers shifted from being original equipment manufacturing (OEM) providers to original design manufacturing (ODM) providers, and gradually built their technology development capability. A number of high technology industry sectors and corporations gained leading positions in the global competitive environment, such as foundry manufacturing, IC packing and testing, large-size TFT-LCD panels, etc[1] (MOEA, 2010).

The ICT (information, computer and telecommunication) sectors took advantage of vertical integration, from the IC design in the upstream of the industrial value chain to the own-brand products of downstream products. In the current stage (2008 until now), facing the changes in the product environment, such as trends of cloud computing and carbon reduction, the Taiwanese government guided the industrial movement to change from hardware-oriented to software-oriented with emphasis laid on the development and utilisation of green technology.

In 2008, the U.S. financial crisis led to the global economic recession, resulting in a sharp decline in Taiwan's high technology exports causing issues of corporate layoffs or non-paid leave to affect a large number of technologically-skilled workers. The Hsinchu Scientific Park Administration reported that 76% of workers in the Hsinchu

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[1] The example of leading Taiwanese high technology firms: TSMC and UMC (world rank top two semiconductor foundry manufacturers), Acer (world rank top-three brand PC/laptop provider) and AUO (world rank top-three TFT LCD manufacturer).

Scientific Park were affected by the non-paid policies[2]. Because of a sudden drop in orders, many firms asked their employees to take non-paid leave, rather than laying off their workers midway through a recession. Firms could, therefore, control their costs and retain their workers whilst awaiting a business rebound. This phenomenon showed the weakness of Taiwan's high technology development policy which relied on exports from technology sectors to boost the economic growth and was thus vulnerable to international fluctuations. As a result, the Taiwanese government planned to adjust its industrial structure to mediate the industrial concentration risk. Rather than focusing on ICT product manufacture alone, the Taiwanese government encouraged the companies to diversify their businesses to six key emerging industries, such as biotechnology, green energy, high-end agriculture, tourism, health care and culture and creative industries (CEPD, 2009). Thus, high technology firms should enhance their research and development capabilities in design, contents, cloud computing, and/or green energy development to expand their industrial scale and increase their products' value-added. The focus on high technology industry switched from an export-oriented direction to a service-oriented one.

Table 2.4 summarises the key policies and regulations governing Taiwan's high technology industry and their impacts upon it. Basically, to facilitate the development of high technology industry, the Taiwanese government formulated various policies and regulations to attract private investment, to improve the business environment, to build up technology infrastructures and to enhance human resources.

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[2] http://www.libertytimes.com.tw/2009/new/feb/10/today-e1.htm;
http://www.taiwanus.net/news/news/2009/200902091411051157.htm

Table 2.4 Taiwanese government policies and regulations and their impacts on Taiwan's high technology industry development

Period	Policies and regulations	Impacts
1980 to 1992	1. Set up of Hsinchu Science Park 2. Enacted regulations to provide tax credits to high technology firms 3. Lift of bans on exchange rate control and permits for setting up privately-owned banks and security firms	(1) Building the infrastructure for the development of start-up technology firms (2) Attracted significant investments in high technology industry (3) Fostered the internationalisation and liberalisation of the business environment (4) Provided the capital momentum for the further development of high technology industry.
1992-2007	1. Industry Upgrade Regulation allowed tax credit for R&D and training expenses 2. Government sponsored R&D expense to a maximum of 50% under Leading New Products Development Project 3. Encouraged co-research and co-development activities between universities, research institutes and high technology industry 4. Increased the cultivation of science and technology talent through higher education and vocational training centres 5. Provided grants for research projects to scholars and scholarships for overseas studies	(1) Enhanced the high technology firms' R&D expenditures (2) Fostered R&D activities of high technology firms to keep maintaining and enhancing their competitiveness (3) Increased the supply of science and technology skilled workers (4) Enhanced the quality of the human resources that are critical to the development and application of knowledge and skills in the R&D activities
2008 - now	1. Conducted national development blueprint of 'Green Silicon Island' 2. Selected six strategic emergent industrial sectors: (1) Biotechnology (2) Green energy (3) Dedicated agriculture (4) Travel and tourism (5) Medical service and care (6) Culture and creativity	(1) Expected a lead investment of 200 billion TWD investment from the government in the aspects of diversification, branding and key technologies acquisitions (2) Aimed to attract further private investment to expand the industrial scale, enhance the production output and increase products' value-added (3) Change from an export-oriented economy to a balanced domestic/international market economy to maintain both economic growth and quality of life

Source: Council of Economic Planning and Development (CEPD), 2010; Ministry of Economic Affairs (MOEA), 2010; National Science Council (NSC), 2010; Taiwan Institute of Economic Research (TIER), 2006; compiled by author

2.3 The labour market in Taiwan's high technology industry

The development of human capital was a key factor contributing to Taiwan's economic growth and the success of its high technology industry (Huang, 2001; Lee et al, 1994; Liu, 1998). Along with the policy shift from labour-intensive to technology-intensive and service industries since 1980s (Chen, 1997; Zhu, 2003), the demand for highly-skilled workers, especially in science and technology, has increased. Examining the historical employment analysis in Hsinchu Science Park, as presented in table 2.5, employees with a bachelor's degree or above in Taiwan's high technology industry gradually increased and became a majority of the workforce. This illustrated that the demand for highly-skilled workers steadily increased and the high technology industry increasingly recruited workers with a higher educational level of at least a bachelor's degree.

Table 2.5 Workforce analysis in Hsinchu Science Park by education

Year	PhD	Master	Bachelor	Junior college	High school	Other	Total (%)	Total (persons)
2000	1%	15%	19%	26%	33%	6%	100%	96,677
2001	1%	17%	20%	26%	29%	7%	100%	92,747
2002	1%	18%	20%	26%	29%	6%	100%	94,382
2003	1%	18%	21%	25%	28%	7%	100%	97,159
2004	1%	19%	23%	23%	28%	6%	100%	106,480
2005	1%	18%	24%	23%	27%	7%	100%	114,868
2006	1%	18%	24%	22%	26%	8%	100%	121,501
2007	1%	19%	26%	22%	25%	7%	100%	129,460
2008	1%	22%	30%	19%	22%	5%	100%	130,577
2009	2%	23%	31%	18%	21%	5%	100%	132,174

Source: Hsinchu Science Park, 2010b

Focusing on knowledge workers with science and technology backgrounds, Lo et al (2006: 46) reported the total number of science and technology workers in 2004 was around 812,840 persons, accounting for 8.3% of the total number employed in Taiwan. The demand came largely from business organisations (81.3%) for workers with an engineering and technology qualification (93.6%). Of science and technology workers, 76.4% of them had a bachelor's degree and 23.6% had a master's degree or above. Compared with the business organisations, the research institutes employed more

workers with a master's or above degree (73.2%) than the business organisations (21%).

In terms of the labour supply, the Taiwanese government encouraged an increase in the supply of science and technology skilled workers to the labour market through three approaches: an expansion in higher education, vocational training and the recruitment of overseas professionals (Lo et al, 2006: 46). The solution was centred around the policy of expansion in higher education. As a result, the number of universities and colleges rapidly increased. The fast growth in college-educated workers provided a substantial supply of engineers or technicians in the labour market due to a shorter training period of two-years. However, despite this policy easing the problem of labour shortages of highly-skilled workers, it was criticised for the decline in the quality of higher education (Chien, 2007). To enhance the quality of higher education, the Taiwanese government allocated funds to scholarships for students to encourage overseas PhD studies, particularly in science and technology disciplines.

In addition, the interviews revealed that the Taiwanese government aimed to enlarge the labour supply of R&D workers by promoting an industrial master's programme which encouraged universities to assist in cultivating R&D workers for high technology industry. The high technology firms were involved in the activities of joint selection, sponsorship and hiring of the students after they had obtained the master's degree. The main advantage was that it ensured the workers' knowledge and skills matched the corporation's business needs, enabling the organisation to effectively leverage the knowledge and skills possessed by their workers. Another policy to enlarge the labour supply of R&D workers was a transfer of the Defence Industrial Training programme to a Research and Development Substitute Service programme. Under this policy, Taiwan's Ministry of Defence allowed graduates with a master's degree or above to work as R&D workers in the private sector or research institutes during the period of their three-year compulsory military service[3]. This programme became a source of recruitment for the high technology organisations, which could apply for a quota from the authority, upon the authority's approval. Although the

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[3] The normal compulsory military service period is one year for men in Taiwan who've reached conscription age. For those who choose to join a Research and Development Substitute Service Programme, the service period is extending to three years.

organisations actually hired these R&D workers, these workers were only entitled to their full salary, paid by the organisations, from the second year of service[4].

In the longer-term, Lo et al (2006) have forecasted that there will be a trend of a labour shortage in science and technology workers who have a master's degree or above, especially in the fields of information and electronics, industrial engineering, industrial design and fundamental science. This reflects the high technology industry's strong demand for highly-skilled workers to engage in research and development activities. In addition, it is difficult to find these highly-skilled workers with industrial experience with multi-disciplinary professionals and an international perspective. In short, despite the labour supply of workers with bachelor's degree being ample, the labour market for highly-skilled workers is expected to remain tight due to the requirement for a high quality of workers by the high technology organisations.

Table 2.6 Year 2005–2010 forecast of science and technology skill availability in Taiwan's labour market

Unit: person	Bachelor	Master and above
Labour supply	68,600	21,950
Labour demand	48,200	30,850
Availability (Shortage)	20,400	-8,900

Source: Lo, Chaio and Fan (2006)

2.4 Conclusion

The adoption of human resource policies and practices should be adjusted to fit the context of host countries. The national culture, political environment, and social and economic development in the context of Taiwan is very different from a western context. Even though Taiwan is considered to be a part of a wider Chinese context that is affected by Confucianism, HRM practices vary greatly within China, Hong Kong, Singapore, etc., due to the distinctive sub-culture in each area (Lowe, 1996: 103). However, the influence of traditional culture seems to be declining after decades of economic development. Along with the development of Taiwan's high technology

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[4] According to the regulation, these workers must be paid at military standard wage in the first year, the same as any other man who serves a one-year compulsory military service.

industry, Taiwan has learned contemporary HRM practices from multinationals, together with the increasing numbers of overseas professionals and local managers who have acquired their educational background in western countries or Japan before returning to work in Taiwan (Yeh, 1991). As the operation and competition of high technology industry is highly globalised, the industrial characteristics of high technology industry affect organisations' adoption of human resource policies and practices.

Taiwan's high technology industry has played a critical role in Taiwan's economic growth, accounting for more than half of Taiwan's total manufacturing output. Taiwan's high technology featured the engagement of high valued-added economic activities through an intensive-technology utilisation process. In an attempt to sustain the competitive advantage of corporations, attention was placed on research and development activities with technological applications for the manufacturing processes and new products, which relied on knowledge workers' input and performance. Despite the number of highly-skilled workers seemingly being sufficient, the labour market for high technology industry was expected to remain tight, as the high technology industry was increasingly demanding a high quality of human resources. Thus, the recruitment and retention of knowledge workers is still an important issue and challenge for the high technology organisations in view of the inherent skill shortage and higher degree of mobility for knowledge workers.

Chapter 3 : Literature Review – Management of Knowledge Workers

The term 'knowledge' is abstract and contestable, which results in a broad range of debate and a variety of definitions of 'knowledge workers'. In this Chapter, the concept of knowledge will be examined first, followed by a discussion on the definition and characteristics of knowledge workers, and issues concerned with the management of knowledge workers. A theoretical framework of contextual factors that differentiates the management of knowledge workers will also be discussed.

3.1 Knowledge

Knowledge has been considered as a strategic resource for economic organisations since industrial society developed (Gellner, 1964; Wolin, 1961). Moving into an information age, it seems that more companies have emphasised being 'knowledge-based' organisations that rely more on the intellectual capacity of workers, in order to sustain a competitive advantage in an intensified competitive business environment (Alvesson, 1993). However, it is arguable whether the types of knowledge possessed by knowledge workers make them a distinctive group different from traditional workers and worthy to be discussed.

Certain authors have supported a broad view of knowledge workers, suggesting a loose definition of knowledge workers in line with a broad interpretation of knowledge as 'knowing' or 'know how'. This perspective implies that everyone could be recognised as a knowledge worker. For example, Blackler (1995) did not consider knowledge workers as a privilege group and stated that it would be more proper to focus on 'knowing' rather than 'knowledge'. Thompson et al (2001) emphasised the broader growth of need for knowledgeability in work. Purcell et al's (2004) study revealed that, even in a relatively low-skilled business, for example, a call centre, some degree of product knowledge and firm-specific knowledge were necessary to the employees.

A number of researchers have laid emphasis on individual knowledge (Nonaka, 1991, 1994; Polanyi, 1958, 1967). Nonaka (1994), for example, suggested two types of knowledge. One is tacit knowledge that refers to informal knowledge, experience or know-how. The other is explicit knowledge that refers to formal, systematic and codified knowledge. He argued that the individual is the fundamental unit to develop knowledge and knowledge is created though dynamic interactions of explicit and tacit knowledge.

Spender (1996) suggested that knowledge exists at both the individual and collective level. He indicated that "knowledge is less about truth and reason and more about the practice of intervening knowledgeably and purposely in the world" (64). He highlighted the interaction between individual and social knowledge, suggesting four types of knowledge: conscious (individual and explicit), automatic (individual and implicit), objectified (social and explicit), and collective (social and implicit).

Table 3.1 Types of knowledge

Name	Structure / Type of knowledge
Collins, H. (1993) Blackler F. (1995)	5 types: embrained, embodied, encoded, embedded, and encultured knowledge
Polanyi, M. (1958, 1967) Nonaka, I (1991, 1994)	2 types: Tacit knowledge: informal knowledge, experiences, or know-how; Explicit knowledge: formal, systematic, and codified
Spender, J.C. (1996)	Knowledge exists at both individual and collective levels
Vogt, E. (1995)	The knowledge pyramid: data, information, knowledge, wisdom

Source: compiled by author

A narrowly-defined knowledge perspective lays emphasis on theoretical knowledge (Bell, 1973; Drucker, 1994; Frenkel et al, 1995). Bell (1973), in particular, emphasised the central features of information and computer-based technology (e.g.

programming and algorithms, computer and data transmission) and theoretical knowledge that are vital for economic and institutional development and innovation in the post-industrial society. Drucker (1994), who first coined the term knowledge workers, also considered knowledge more in terms of theoretical and analytical knowledge. Crouch (1997) suggested that knowledge workers possessed advanced skills or high-skills such as technological or pharmaceutical knowledge, in contrast to the low-skills owned by traditional workers.

The different viewpoints on knowledge also focus on the way knowledge is acquired. Several authors have emphasised that theoretical knowledge could be acquired through formal education (Drucker, 1994; Ramirez and Nembhard, 2004). However, other researchers have argued that knowledge could also come from more informal means such as experiences in specific areas or organisational knowledge (Newell et al, 2002; Nickols, 2000). This viewpoint echoed the existence and importance of tacit knowledge that plays a role in an organisation (Manwaring and Wood, 1985; Thompson et al, 2001) and the process of innovation (Nonaka, 1991, 1994). Unlike traditional skills, knowledge or expertise in a specific domain can easily become obsolete (Allen and Velden, 2002; Bhatt, 2001; Lee and Hong, 2002; Schultze and Stabell, 2004). Therefore, it is likely that knowledge workers keep learning on the job or use other resources to update their knowledge and skills (Scott, 2005).

Comparing narrowly-defined and broadly-defined knowledge, Alvesson (1993) indicated that narrowly-defined knowledge which includes formalised and theoretical knowledge covers too little, while broadly-defined knowledge, including cultural, interpersonal and other forms of tacit knowledge and creative skills, covers too much. Other authors share this viewpoint, suggesting that in gaining the base of theoretical knowledge, other tacit knowledge and skills such as analytical or social skills are required in the process of knowledge creation or application (Frenkel et al, 1995; Newell et al, 2002; Reich, 1991; Swart and Kinnie, 2003). This perspective argues that formal and theoretical knowledge is vital to the knowledge workers, as it helps knowledge workers to further develop new products or services based on their knowledge acquired from formal educational channels (Alvesson, 1993; Bell, 1973; Drucker, 1994). However, it should also be recognised that other types of knowledge exist at the individual and organisational levels that facilitate workers' knowledge

acquisition and utilisation in the process of innovation. Thus, it may be more important to focus on the knowledge workers' ability to integrate, so that individuals can collectively utilise their theoretical knowledge, specialist skills and tacit knowledge to complete their task (Frenkel et al, 1995; Newell et al, 2002; Reich, 1991). Reich (1991), in particular, highlighted the significance of knowledge workers' ability in symbolic manipulation and analysis skills, which could be collectively utilised with technical, marketing and financial insights. This viewpoint echoed the importance of economic value that could be created though the creation and application of knowledge in a market-based economy (Bell, 1973; Scarbrough, 1999; Yakhlef and Salzer-Morling, 2000).

3.2 Knowledge workers

Several researchers have argued that knowledge workers are a socially-constructed phenomenon (Alvesson, 2000; Knights et al, 1993; Robertson and Swan, 2003), and have highlighted the ambiguity of defining knowledge workers due to the insufficiency of rigorous methodology and theory guiding the notion of knowledge workers (Alvesson, 1993, 2001; Collins, 1997; Scarbrough, 1993, 1999).

3.2.1 Defining knowledge workers

Knowledge workers can be defined, mainly, in three ways. The first perspective lays emphasis on knowledge workers' qualifications and abilities. Knowledge workers are usually characterised by a high education level and by the possession of specialist knowledge and skills. These skills are characterised by high demand, short life cycles and skills that are critical to organisations. These skills, for example, include symbolic analysis ability (Despres and Hiltrop, 1995; Lee and Maurer, 1997; Reich, 1991), information analysis, distribution and production abilities (Banerjee, 2006; Vogt, 1995) or the ability to use tools or technology (Barley and Orr, 1997; Bell, 1973; Kubo and Saka, 2002). Reich (1991) referred to knowledge workers as 'symbolic analysts'. He considered 'symbolic analysts' to include problem-solvers who manipulate outputs to fulfil customer needs (such as R&D experts, designers,

engineers), problem-identifiers who help to identify customer needs in the market (such as marketers, advertisers) and brokers such as financiers or researchers. These people "have the skills of abstraction, of systems thinking, of experimentation and of collaboration with others", and can collectively use their technical skills with marketing, strategic and financial insights (Blackler et al, 1993: 855). Newell et al (2002:18) defined knowledge workers as "individuals with a high level of education and specialist skills, combined with the ability to apply these skills to identify and solve problems." Meanwhile, Vogt (1995: 33) defined a knowledge worker as "a person with the motivation and capacity to co-create new insights and the capability to communicate, coach, and facilitate the implementation of new ideas."

The second perspective attempts to define knowledge workers mainly based on the work that they do (Barley and Orr, 1997; Davenport et al, 1996; DiGiovanni, 2004; Dove, 1998). Davenport et al (1996), for example, suggested that knowledge workers should be defined based on their activity, such as their research and product development, advertising or professional services. This description was criticised for the tendency of grouping together a variety of occupational groups. Other researchers have argued that knowledge workers should be defined based on the nature of the work that they do. Barley and Orr (1997: 5) suggested that knowledge workers primarily engage in work that is "comparatively more complex, analytical and abstract", typically dealing with manipulating symbols, concepts, and information. Scarbrough (1999) highlighted that the lack of occupational identity was one of the most important features of knowledge workers. He asserted that knowledge workers should be defined based on the nature of work they perform, which is "relatively unstructured and organisationally contingent, and thus reflects the changing demands of organisations more than occupationally-defined norms and practices" (p.7).

The third perspective is concerned with the relationship between knowledge workers' knowledge and the output generated from the application of their knowledge. For example, Scott (2005: 260) defined knowledge workers as "an employee whose main input and output is knowledge". Baron (2004: 25) highlighted that knowledge workers' knowledge is often linked with the product or the service provided by the organisations, such as lawyers, accountants, software designers and advertising

professionals. A summary of definitions of knowledge workers is outlined in table 3.2 (page 33).

Among these definitions, many of the studies were theoretical. Empirically, several researchers studied knowledge workers through the perspective of knowledge-intensive firms (Alvesson, 1993, 2001, 2004; Alvesson and Roberson, 2006; Robertson and Swan, 2003). To the knowledge-intensive firms where most work can be said to be of an intellectual nature, knowledge workers are considered as those well-educated and qualified employees who form the major part of the work force in the companies (Alvesson, 2000: 1101). For example, Alvesson and Roberson (2006) conducted case studied to investigate four consulting firms based in the UK and Sweden, observing how these firms managed their consultants by using a strategy of elite identity construction. Flood et al (2001) studied the causes and consequences of psychological contracts among knowledge workers by investigating 402 full-time employees from 11 organisations in the high technology and financial services industries. They found that knowledge workers who participated in their study were "mobile and well educated, with a predominance of computer systems, information technology and software engineering educational qualifications" (1153).

Other researchers have conducted empirical research about knowledge workers from the perspective of knowledge work (Davenport et al, 1996; Scarbrough, 1999). For example, Scarbrough (1999) considered knowledge workers as those who engaged in relatively unstructured and organisationally contingent work. He conducted an empirical case study of Microsoft to discuss the conflicts in the management of knowledge workers in the institutional context for R&D management. Davenport et al (1996) studied the knowledge work process in 30 organisations. Knowledge workers were considered as those who conducted activities such as research and product development, advertisements, education and professional services like law, accounting and consulting.

Some researchers tried to find a proper definition of knowledge workers by investigating the way companies view knowledge workers, or how knowledge workers view themselves. For example, Horwitz et al (2006) surveyed around one hundred CEOs in knowledge-intensive firms based in South Africa and Singapore.

They found that knowledge workers were best described by including a set of definitions. They revealed that knowledge workers have three major attributes: working with ambiguity intensive information and knowledge, possessing an extant scientific body of knowledge, and being required to share and deploy personal knowledge for organisational purposes (a communitarian/ social phenomenon).

The most popular accepted definition that was found in common in both South Africa and Singapore is:

> "Knowledge workers have high levels of skills/education, technological literacy, high cognitive ability and abstract reasoning. This includes the ability to observe, synthesize and interpret data, and to communicate new perspectives and insights to lead to more effective decisions, processes and solutions for the organization." (p. 791)

Scott (2005) investigated the definition of knowledge workers by examining whether the theoretical definition of knowledge workers adequately portrays the essential elements of knowledge work. In his case study of a healthcare manufacturing corporation, he investigated the opinions from 57 workers from a division within which most employees were considered as knowledge workers based on a theoretical definition (i.e. an employee whose main input and output is knowledge). He found that knowledge workers considered four elements were important for knowledge workers in doing knowledge work. These factors included:

> "their dependence on technical knowledge and prior expertise, their ability to manage their own schedules and process, dealing with different people to perform their work and being in an environment with a relatively flat hierarchy and coordination among personnel that are not physically collected (p. 270)"

Table 3.2 Samples of definitions of knowledge workers

Researchers	Definitions of knowledge workers
Banerjee (2006: 202)	Ones who primarily produce, distribute and manipulate information
Barley and Orr (1997: 5)	Knowledge workers are those who "make use of tools that generate symbolic representations of physical phenomena" and are "those who engage in comparatively complex, analytical and abstract work".
Davenport et al (1996: 54)	Knowledge workers are involved in activities such as "research and product development, advertising, education and professional services like law, accounting and consulting".
Davenport and Prusak (2000)	Workers who create knowledge, such as product development engineers, or use knowledge as a dominant aspect of their work, such as financial auditors
Despres and Hiltrop (1995: 14)	Knowledge workers manipulate and orchestrate symbols and concepts, identify more strongly with their peers and professions than their organisations, have more rapid skill obsolescence and are more critical to the long-term success of the organisation.
Dove (1998: 27)	3 groups of knowledge workers 1. Creation of knowledge work based on innovation (e.g. engineers); 2. Portable knowledge work based on wide, immediate utility (e.g. MBA graduates or software programmers); 3. Specialist knowledge work based on narrow definition but high utility (e.g. code-writing programmer)
Drucker (1994: 6)	An employee who applies theoretical and analytical knowledge acquired through formal education to develop new products or services
Horwitz et al (2003: 31)	A knowledge worker as working with both ambiguity-intensive information or knowledge, as well an extant scientific body of knowledge and being required to share and deploy personal knowledge for organisational purposes – a communitarian/ social phenomenon.
Lee and Maurer (1997: 248)	They effectively work with ideas, symbols, and other abstractions.
Newell et al (2002: 18)	Individuals with high levels of education and specialist skills combined with the ability to apply these skills to identify and solve problems.
Scarbrough (1999: 7)	Knowledge workers are defined primarily by the work that they do – work which is relatively unstructured and organisationally contingent, and which thus reflects the changing demands of organisations more than occupationally –defined norms and practices.
Scott (2005: 260)	An employee whose main input and output is knowledge
Vogt (1995: 33)	A person with the motivation and capacity to co-create new insights and the capability to communicate, coach, and facilitate the implementation of new ideas

Source: compiled by author

Critiques of knowledge workers

While a number of researchers have recognised knowledge workers as a privileged group that cut across occupational groups (Davenport et al, 1996; Lee and Maurer, 1997; Newell et al, 2002; Scarbrough, 1999), other academics have criticised the concept of knowledge workers. They argued that knowledge workers are not a privileged group and criticised the general definition of knowledge workers that lump together of various occupations (Blackler, 1995).

Firstly, it is argued that everyone could be considered as a knowledge worker because a variety of knowledge exists in different forms and levels and even a low-skilled worker needs to be knowledgeable to complete their tasks (Blackler, 1995; Knights et al, 1993; Thompson and McHugh, 2002; Thompson et al, 2001; Warhurst and Thompson, 1998). For example, Purcell et al's (2004) study revealed that, in the relatively low-skilled business of a call centre, some degree of product knowledge and firm-specific knowledge were necessary for employees. Thus, researchers suggested that it is better to lay emphasis on the knowledgeability of work (Thompson et al, 2001) or the process of 'knowing' (Blackler, 1995) rather than on knowledge workers.

Secondly, although knowledge workers are generally more well-educated, it does not "necessarily indicate a higher level of knowledge inherent in the jobs in which these people are employed" (Warhurst and Thompson, 1998: 4). It is argued that the concept of knowledge workers might have been emphasised for political reason in an attempt to demonstrate the progress of society (Knights et al, 1993). In addition, the emphasis on the trend of the growing number of knowledge workers may be misleading due to a growth in credentialism (Kumar, 1995: 25). As a result, a job title is re-labelled to improve the name; for example, from travel agents to travel consultant, or plumbers to heating engineers (ibid: 4).

Although every task may require a certain level of knowledge, the emergence of knowledge workers was closely related to the rapid spread and development of knowledge driven by the development of information and communication technology (ICT) in an information age. Thus, it may be more appropriate to consider knowledge

workers as a separate group who possess a more sophisticated knowledge in contemporary society. Consequently, this group of employees may require different management practices in organisations due to the characteristics of knowledge workers, which will be discussed in section 3.2.2.

The distinction between knowledge workers and traditional professionals

Newell et al (2002: 20) claimed that "knowledge work cuts across occupations and is qualitatively different from some of the traditional, manual occupations of the old industrial economy." Unlike the traditional professional groups, like lawyers or accountants, the emergence of knowledge workers are associated with rapid technological development that has fostered the creation of new knowledge presented in the form of new technology and the spread of knowledge. Several researchers have argued that the main distinction separating knowledge workers from the traditional professionals is that traditional professional groups 'work from knowledge', drawing on a distinctive predefined body of expertise, while the group of knowledge workers 'work with knowledge' (Carter and Scarbrough, 2001: 217; Newell et al, 2002: 70; Scarbrough, 1999: 7). The work that knowledge workers do is more complex and could be considered as "a joint product of human interactions with informational and intellectual assets delivered through information and communication technologies (ICT)" (Scarbrough, 1999: 7). In other words, knowledge workers usually need to work in an environment that provides collective knowledge and co-work with other knowledge workers or even clients to a significant extent (Swart, 2008: 453). The extensive application of ICT enables knowledge workers to work 'virtually' with their colleagues or their clients. Sometimes the workers may be required to be physically located at their client's workplace. The change in work environment or the way to work may cause impacts on the organisation's recruitment and retention strategy, such as the selection criteria in terms of worker's capability or skills or the relationship with their clients.

Scarbrough (1999:7) indicated that knowledge workers are less powerful than traditional professionals for three reasons. Firstly, knowledge workers may rely heavily on their employers to provide access to the means of knowledge production. Secondly, the value of knowledge held by knowledge workers is determined by the

interest or needs of organisations rather than based on considering knowledge as an 'internal good' on its own. Finally, the power that knowledge workers can exercise is more associated with the labour market conditions than the controlling power over their specialised knowledge. Alvesson (2000, 2001) suggested that knowledge workers lay less emphasis on the typical features attributed to the traditional professionals, such as codes of ethics, a strong professional association, or monopoly power over work.

Defining knowledge workers in this study

This study shares the view that knowledge workers are well qualified, well-educated and have usually accrued an advanced level of education (Alvesson, 2001; Collins, 1997). In general, the theoretical definition of knowledge workers could be either based on the knowledge workers' ability (Newell et al, 2002; Vogt, 1995), or the nature of work that the workers do (Scarborough, 1999). In particular, researchers have used various approaches to identify knowledge workers.

One approach to identify knowledge workers is based on the occupation or the nature of work they are involved in, such as auditing, marketing, research and development, etc (Davenport et al, 1996). Another approach is to define them according to the industry where the workers are employed. Several researchers indicated that knowledge workers are often found in certain industries that exist in a rapidly changing technological environment and lay an emphasis on innovative activities, such as Information and Communication Technology (ICT) or the pharmaceuticals sectors (Banerjee, 2006; Crouch, 1997). For example, Banerjee (2006) indicated that the software industry requires people with software skills as the main source of production, but also requires different talents having a variety of skills (e.g. linguistic skills) and other functional experiences. The other approach is to identify knowledge workers through knowledge-intensive firms (Alvesson, 2000; Alvesson and Robertson, 2006; Robertson and Swan, 2003; Starbuck, 1992). Knowledge workers are regarded as the major employees who engage in intellectually-based work in those firms that include, for example, management consultancy companies, engineering and computer consultancy companies, advertising agencies, R&D units and high technology companies.

In this research, a multi-method is adopted, indentifying knowledge workers based on both the industry they work for and the worker's occupation. It is agreed that in certain industries such as ICT or the pharmaceuticals sector, the percentage of knowledge workers may be higher due to the industrial characteristics. This study then focused on selecting research participants from the organisations engaged in the high technology industry. In addition, the targeted research participants (i.e. knowledge workers) were identified based on their occupations or the activities they were involved in, such as R&D, engineering, programming, or technical support, etc.

3.2.2 The characteristics of knowledge workers

Knowledge workers should be managed as a separate and privileged group due to the characteristics of knowledge workers (Newell et al, 2002; Swart, 2008). Autonomy and self-management are considered to be the most distinctive characteristics of knowledge workers, due to the nature of knowledge work which is relatively unstructured, complex, and uncertain (Alvesson, 2004; Newell et al, 2002; Robertson and Swan, 2003; Scarbrough, 1999). Thus, the nature of the work requires knowledge workers to have autonomy to decide how to do their work and arrange their work schedules (Newell et al, 2002). Davenport et al (1996) argued that knowledge workers themselves also expect to act more autonomously in their work, allowing them to use their expertise more freely rather than simply following routines.

The characteristics of knowledge workers are evident in their job expectations. Pay is often found to be the most important item that affects knowledge workers' job satisfaction and commitment (Haesli and Boxall, 2005; Horwitz et al, 2003; May et al, 2002). It has been argued that pay is important to knowledge workers because the status of knowledge workers is determined less by hierarchy but more by the value of the knowledge and skills they possessed (Barney, 1991; Reed, 1996; Swart, 2008). The spiral of high pay in connection with the positive perception of valuable knowledge assists knowledge workers in determining their career moves (Swart, 2008). However, knowledge workers are also strongly driven by intrinsic motivation, such as challenging work and learning opportunities (May et al, 2002). They desire

opportunities to pursue developing knowledge and transferable skills and strengthening their expertise. The emphasis on knowledge and skill development helps to enhance the mobility of knowledge workers and the degree of autonomy in their career choices.

Another feature of knowledge workers is the close interaction in social networks related to their professional expertise. Knowledge workers often engage in knowledge work that requires collaborative activities and produces a final product or service that utilises collective knowledge from different domains. This leads to working extensively with their co-workers or customers, deepening their relationship with their social network. In addition, their interaction in social networks helps to develop and share knowledge and experiences (tacit knowledge) among knowledge workers. Due to close interaction in a social network connected to their professional expertise, knowledge workers tend to identify themselves more strongly with their peers and professions rather than with organisations (Despres and Hiltrop, 1995).

3.3 Management of knowledge workers

3.3.1 Managing knowledge

The interest in managing knowledge workers stems from organisations' intentions to effectively employ human capital with their intellectual capital, to enhance the competitive advantage. Therefore, one perspective suggests the importance of managing knowledge which exists at the individual and organisational levels (Blackler, 1995; Nonaka, 1991, 1994; Thompson and Walsham, 2004). Nonaka (1994), for example, examined the dynamic interaction between explicit and tacit knowledge owned by individuals in the knowledge creating process. He argued that although the individual is the fundamental unit to develop knowledge, organisations play a more important role in setting up the context that enables the knowledge to be stored and amplified. Blackler (1995) suggested that the organisation should rely on collective knowledge rather than individual knowledge and should utilise the knowledge to solve novel problems rather than familiar ones. A number of

researchers have agreed with the importance of collective knowledge which could be developed through the process of sharing understandings, sensemaking and individual knowledge and experiences (Blackler, 1995; Brown and Duguid 1991; Lindkvist, 2005; Spender, 1998; Weick, 1979). Swart (2008), for example, highlighted that knowledge workers work in an environment that provides collective knowledge. For example, in high technology industry, knowledge workers are often involved in collaborative work or projects with different teams within or across organisations. In view of the significance of collective knowledge in the process of knowledge creation or application, knowledge sharing and distribution becomes one of the key issues in knowledge management.

Hansen et al (1999) suggested two types of knowledge management strategies: codification and personalisation strategies. The codification strategy adopts an ICT-based approach that seeks to codify knowledge through the adoption of information and communication technology (ICT) to store, transfer and distribute knowledge (Alavi and Leidner, 1999; Ruggles, 1998; Scarbrough et al, 1999). The personalisation strategy adopts a community approach that seeks to share and develop knowledge through close interaction of personal contacts (Newell et al, 2002).

An ICT-based approach usually involves the setting up of a 'knowledge management system' that utilises ICT tools such as emails, the intranet or data warehouses to capture, store and share knowledge between workers. However, the ICT approach has been criticised for its limitations in certain respects. For example, the knowledge management system is unlikely to be effective without taking account of human resource management (that is, the roles of employees or human resource policies and practices) (Carter and Scarbrough, 2001; Oltra, 2005). In addition, it is arguable whether 'knowledge' or only 'data' and 'information' is to be stored and transferred in an ICT-based knowledge management system (Newell et al, 2002). This perspective argued that firstly, knowledge cannot be passively transferred through ICT-based tools in view of the socially constructed nature of knowledge. Secondly, it is difficult to codify the tacit knowledge that helps the knowledge workers to understand and effectively utilise the codified knowledge (ibid: 103-105).

The community approach is involved in the development of a community that is usually formed in an informal and self-selected way. Brown and Duguid (1991, 1998) highlighted the concept of 'communities-of-practice' (CmP), which suggested that 'tightly knit' groups that have been working together long enough develop a community to share mutual understanding, individual knowledge and experiences. CmP suggests that knowledge is learned through social interactions among sub-unit groups informally bounded within organisations. It highlights the significance of social networks in a collective knowledge production environment. Similarly, Lindkvist (2005) suggested a concept of 'collectivity-of-practice' (CIP). Different from CmP, a group of people is usually organised as a temporary task force which comprises of different skilled individuals. In such circumstances, knowledge is learned from the process of problem-solving, and the organisation plays a critical role in distributing knowledge by creating a context that enables knowledge sharing and distribution within the organisation.

Hansen et al (1999) argued that there was no 'best' practice for a knowledge management strategy, and the organisation should choose a 'best-fit' one to the individual organisation. Following Hansen et al's framework, Haesli and Boxall (2005) explored the relationship between knowledge management and human resource management. They found that the organisations developed a different emphasis on knowledge worker recruitment or retention activities in line with their knowledge management strategies. In one of their case studies, one organisation that adopted a codification knowledge management strategy (i.e. using an ICT-based approach to store, transfer and distribute knowledge) was concerned more about how to attract and recruit new employees. The other organisation that adopted a personalisation knowledge management strategy (i.e. using a community approach to develop a community to share mutual understanding, individual knowledge and experiences within the group) paid attention to how to retain their current employees.

Alvesson (2001) argued that knowledge management is more likely to operate as a practice of managing people or information rather than facilitating knowledge creation. As a consequence, knowledge management may be better regarded as an attempt to manage people (i.e. the community approach) or information (i.e. the ICT-

based approach). In other words, an effective knowledge managing strategy cannot ignore the role of human resource management (Scott, 2005; Zupan and Kaše, 2007).

3.3.2 Managing people

The previous discussion suggests that an organisation can not disregard the role of people, in particular knowledge workers who carry the knowledge, to effectively manage the knowledge to achieve organisational goals. From a strategic standpoint, the issue of knowledge workers is vital not only because they own the main means of the company's production but also because they are a relatively scarce resource in terms of labour supply (Horwitz et al, 2003; Jamrog, 2004; Newell et al, 2002). A skills shortage of knowledge workers may arise for several reasons. Firstly, knowledge workers are usually highly-skilled and well-educated (Alvesson, 2001; Crouch, 1997), and it takes time to cultivate and develop such a specific work force. Secondly, the demand for knowledge workers has increased dramatically in line with economic and industrial development.

Kaihla (2003), for example, identified managers and skilled workers required in high-tech jobs as the two key groups who are in short supply. Thirdly, due to the development of ICT, knowledge workers can perform their tasks with fewer constraints on time and location. The increased global mobility of knowledge workers has intensified the competition between companies for acquiring such workers across industries and countries. Thus, it also leads to the issue of turnover, which is costly for the companies due to their attempts to retain their existing valuable employees or hire new workers to take over responsibilities. Horwitz et al's (2003:25) study, for example, found that the turnover of knowledge workers in Singapore has been higher than that of other employee groups and the re-employment cost for such a knowledge worker could be up to 2.5 times of the worker's annual salary. Therefore, recruitment and retention of knowledge workers is often concerned with shortages in the supply of knowledge workers, intense competition for knowledge workers, and high re-employment costs. As Carter and Scarbrough noted (2001: 222):

"A central concern of HRM, especially in relation to knowledge workers, is the recruitment and retention of valued employees. The importance of managing the employment relationship such that it generates value added resources for the organisation has an obvious link to the recruitment and retention of staff."

Certain academics have suggested that organisations should take human resource management, organisational structure and organisational culture into consideration when managing knowledge workers and their work (Alvesson, 2004; Causer and Jones, 1993; Newell et al, 2002; Rowley, 1999).

As knowledge workers rely more on their intelligence to perform tasks and are usually well-paid, they are considered as an 'elite' or a 'golden collar' group (Alvesson and Robertson, 2006; Kelley, 1990; Newell et al, 2002). This term implies that this group of people need to be managed carefully in terms of a good working environment and employment conditions (Newell et al, 2002: 28). In view of the autonomous characteristics of knowledge workers, Causer and Jones (1993) argued that it would help knowledge workers to achieve a better quality of work by granting more autonomy to the knowledge workers. Several researchers have suggested that organisations should lay emphasis on the management of efficiency (Vogt, 1995) or productivity (Ramirez and Nembhard, 2004) in knowledge worker management. Because work in high technology industry is complex and involves inputs of sophisticated knowledge and skills from various aspects, it is often difficult to monitor or control the details of the work (Newell et al, 2002; Scarbrough, 1999). Frenkel et al (1995) indicated that organisational structures in high technology firms tend to be more flat and operate with more trust-oriented relationships, in response to demands for autonomy for knowledge workers and knowledge work.

Other perspectives have argued that corporate culture plays a key role in the management of knowledge workers in knowledge-intensive firms, and that this may be more effective than using the control of hierarchy and structure (Alvesson, 1993; Robertson and Swan, 2003; Starbuck, 1992). For instance, Robertson and Swan's (2003) study revealed that knowledge-intensive firms may deliberately shape a culture featured with ambiguity to successfully balance the expectations of autonomy from the employee side and the demand for control from the employer. Therefore,

corporate culture may be a factor which could influence the recruitment and retention of employees.

The challenge for knowledge worker management is how to balance autonomy and control, and flexibility / uncertainty and efficiency (Robertson and Swan, 2003). Scarbrough (1999) highlighted that the conflicts in the management of knowledge workers arises from three levels: institutional conflict, organisational conflict and individual conflict. At the institutional level, the conflict "derives principally from the problematic relationship between the economic institutions of firms and markets and the knowledge-producing institutions of science, education and the professions."(9) In other words, tension is generated due to the gap between the demand for economic value from commercialising the knowledge application on one side, and of the workers' interest in knowledge creation, research and product development on the other side. At the organisational level, the conflict could be considered as the tensions between autonomy and control, resulting from the different roles, career structures and affiliations between employers and knowledge workers. For example, managers may be more likely to act by the guidelines of organisational interests and needs, while knowledge workers may be more concerned with the professional norms, community and social relationships. At the individual level, the conflict relates to the employment relationship where employers have the power to hire and fire workers and the employees have the mobility to choose the organisations they would like to work for. While organisations usually prefer to hire the workers whose expertise can be immediately leveraged, individuals when choosing their employer are more concerned with their short-term job or long-term career, and their work-life balance. Thus, Scarbrough (1999) suggested that knowledge worker management should focus on the quasi-resolution of the potential conflicts in different institutional and organisational contexts.

Approaches to knowledge worker management

It is arguable whether the HRM should adopt 'best practices' or 'adjusted practices' according to different contextual factors. Carter and Scarbrough (2001) identified two approaches for managing knowledge workers: the 'best practice' approach and the knowledge worker approach. The 'best practice' approach suggests that the

philosophy or practices of human resource management could be applied universally transcending specific contextual factors. The authors indicated that the best practice approach "makes a relatively straightforward argument and is imbued with 'recipe style' thinking" (217). However, they argued that although certain best practices could help create and sustain the 'hypertext' organisation, the model of best practices could be problematic in cases with an absence of any contextual factors (see also, Nonaka and Takeuchi, 1995). In addition, the implementation of such best practices may vary in different organisational contexts, and the capabilities of the firms and the interpretation of managers to implement these 'best practices' could vary. Other researchers have supported the argument that the 'best practice' approach may be either overstated or misguided (Becker et al, 1997; Cappelli and Crocker-Hefter, 1996). Becker et al (1997), for example, suggested that it may better to regard best practices as only a point of departure. Drawing from this, organisations could use best practices as a benchmark to further tailor distinctive management practices that are suitable for the situation of individual organisation.

In contrast to the best practice approach, the knowledge worker approach highlights the distinctive characteristics of so-called 'knowledge workers', suggesting knowledge workers to be treated as a special group of workers who are regarded as the main source of the productivity and competence of an organisation. Thus, greater attention should be placed on the recruitment, development and retention of knowledge workers (Carter and Scarbrough, 2001: 217).

3.4 Theoretical perspectives for understanding knowledge worker management

3.4.1 Theoretical perspectives for understanding knowledge worker management

Several theoretical perspectives related to human resource management help in understanding the context of adopting a knowledge worker approach. A resource-based view considers human capital as one category of resources that the organisations might rely on to gain and maintain sustained competitive advantages of organisations, in addition to other physical resources owned by the company (Barney,

1991; Boxall, 1996; Elias and Scarbrough, 2004; Grant, 1991; Haesli and Boxall, 2005; Hall, 1993; Mueller, 1996; Wright et al, 2001). A number of researchers have highlighted the importance of human resource policies and practices to the management of knowledge workers in terms of recruitment and retention of valuable employees, especially for knowledge-intensive firms (Alvesson, 2000; Causer and Jones, 1993; Starbuck 1992). For example, Cappelli and Crocker-Hefter (1996) indicated that distinct human resource management practices could help the organisation to shape their core competences and drive the competitiveness of the organisation by differentiating the product. This perspective recognised knowledge workers as a valuable resource to the organisations, so it is important for the organisations to capture and maintain the human capital by careful attraction, selection and retention practices.

The human capital perspective basically considers 'people' as valuable assets that can generate or potentially generate economic value to the company (Becker, 1964). Snell and Dean (1992: 468) referred to human capital as "people possess[ing] skills, experience, and knowledge that have economic value to firms". They indicated that human capital, in terms of skills and knowledge, could enhance the productivity of the company, and the value is often presented in a less tangible format such as problem-solving, cross-departmental work coordination, and exercising judgment in novel situations. Starbuck (1992) suggested that it is important to accumulate the 'stock' of knowledge by increasing the inflow (for example, hiring people) and decreasing the outflow (for example, retaining people) of knowledge. Similarly, Rowley (1999) also suggested that attracting and retaining knowledge workers is important for organisations to acquire knowledge and access the knowledge repositories.

The accumulation of human capital could be 'bought' externally in the market (i.e. by hiring) or 'made' internally in the organisation (i.e. by training and development) (Cascio, 1991; Flamholtz and Lacey, 1981; Jackson and Schuler, 1995; Snell and Dean, 1992). This indicates that human capital has a market value. Since people who actually 'own' the human capital can move across organisations relatively freely, organisations need to attract them with a competitive compensation package (Becker, 1964; Jackson and Shuler, 1995; Jacoby, 1991; Snell and Dean, 1992), and retention of employees is then considered as part of the human resource investment (Flamholtz

and Lacey, 1981). Aiming to enhance employee's productivity, human capital theory emphasised the importance of investment in human capital through appropriate HR policies and practices, such as selective staffing, comprehensive training, developmental performance appraisal and equitable rewards (Snell and Dean, 1992).

The perspective of intellectual capital also explains why knowledge worker management is important to the organisations. Flood et al (2001: 1152) considered intellectual capital as a source of innovation and organisational advantage. Intellectual capital comprises the elements of human capital, social capital, client capital and organisational / structure capital (Edvinsson, 1997; Edvinsson and Malone, 1997; Newell et al, 2002; Stewart, 1997; Sveiby, 1997; Swart, 2006). Swart and Kinnie (2003: 37) suggested that human resource management practices could be used to facilitate human capital to be effectively transferred into intellectual capital. Scarbrough (1999:7) considered the work involved by knowledge workers as "a joint product of human interactions with informational and intellectual assets delivered through information and communication technologies (ICT)". Drawing from the perspective of intellectual capital, several researchers indicated that social capital plays an important role to jointly function with human capital in the process of knowledge creation, development and application by enhancing knowledge sharing (Haesli and Boxall, 2005; Nahapiet and Ghoshal, 1998; Nohria and Eccles, 1992; Swart, 2008).

Social capital refers to the network of relationship that constitutes valuable resources in individuals or social units for the conduct of social affairs (Nahapiet and Ghoshal, 1998: 243). Swart (2006) indicated that social capital provided access to other desired resources and builds the identity of the members in the social network. It also impacts on human resource management practices. Swart (2008: 461) indicates that certain human resource practices such as recruitment, development, pay and rewards, performance management and retention could be influenced by the network. For example, knowledge workers might use information gathered from their social networks as a base to compare the current human resource policies and practices in their organisations, and try to push their employers to match market practices. Human resource practices such as a cautious selection process or reward system may

reinforce the identity of the 'elite' group, facilitating the willingness of knowledge sharing due to the shared identity of the social group (Newell et al, 2002: 79).

The human and social capital perspectives suggested that organisations adopt a 'soft' HRM approach where the human resource policy intends to generate employees' commitment through 'soft' control practices that lead to the delegation of authority and encourage the development of trust which facilitates teamworking (Thompson and Harley, 2008; Von Krogh et al, 2000). Tyson (1997) summarised the features of the 'soft contracting' approach: management emphasises the vision and values of the organisation; the organisation aims to develop a high-trust culture; long-term socialisation is normal; rewards are linked to experience and length of service; longer-term careers are encouraged through appraisal and development policies. However, it argued that the soft approach might be adopted within certain limits. For example, Newell et al (2002: 80) indicated that it may be easier for organisations to take a hard approach under highly competitive pressure. Lepak and Snell (2002) revealed that organisations would manage knowledge workers by using a mix of approaches that focus on their commitment, productivity and collaboration. Causer and Jones (1993: 3) pointed out that some factors might limit the application of a soft HRM approach, such as a change of business strategy or product lines, influence from external funding sources, or a limit to the investment in training due to concerns of the 'poaching' of trained staff by competitors.

3.4.2. Contextual factors differentiating HRM practices in knowledge worker management

Researchers' attention has been increasingly drawn to debates about the extent to which the HRM policies, practices or strategies could be imposed on host countries. In the view of international human resource management, it is widely acknowledged that HRM practices are not universal but are 'context-specific' with various 'socially-constructed' practices in different countries or societies (Beer et al, 1984; Boxall and Purcell, 2008; Brewster, 1999; Budhwar and Debrah, 2001; Jackson and Schuler, 1995; Schuler, 1992; Schuler and Jackson, 1987; Schuler et al, 1993; Schuler and MacMillan, 1984; Wright and McMaham, 1992; Ulrich, 1991).

Jackson and Schuler (1995) suggested a variety of factors in relation to the internal and external contexts of organisations which could influence HRM philosophy, policy and practices of organisations. The internal contextual factors include technology, structure, size, life cycle stages, and business strategy; and the external contextual factors include legal, social, and political environments, unionisation, labour market conditions, industry characteristics (e.g. segment of organisation), and national culture. The HR practices adopted in host countries are largely affected by these factors, which therefore create variety in the procedures adopted by different organisations.

Figure 1 Integrative framework for understanding HRM in context
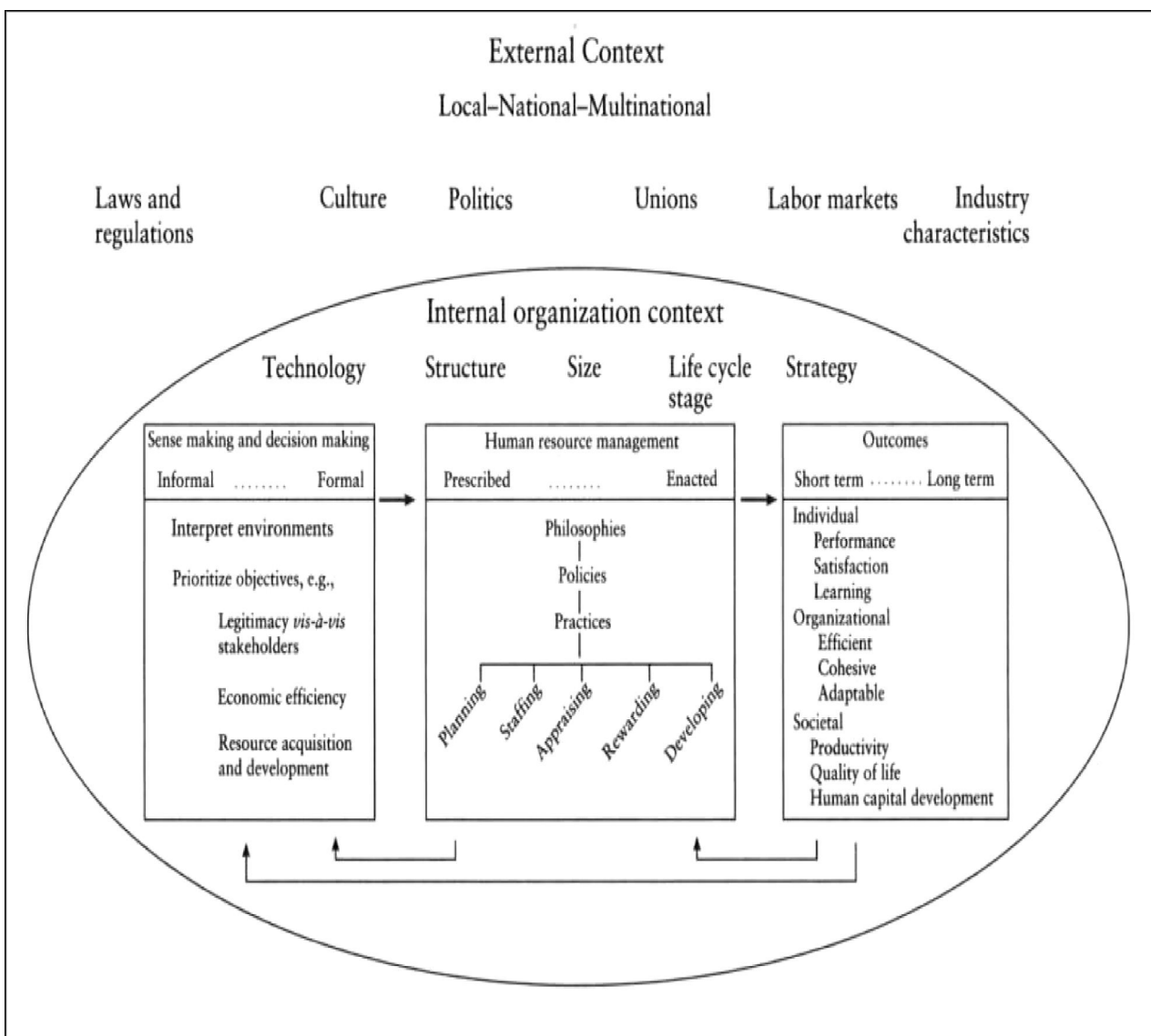
Source: Jackson and Schuler (1995)

Budhwar and Debrah (2001) have proposed a framework to examine cross-national human resource management activities, especially for developing countries. They argued that cross-national HRM policies and practices are affected by factors from three aspects. The first aspect refers to national factors, including national culture, national institutions, business sectors and the dynamic business environment. Secondly, there are contingent variables including the age, size, nature, ownership, life-cycle stage of organisation, the presence of trade unions and HR strategies and the interests of different shareholders. The third aspect refers to organisational strategies and policies that are linked to primary HR functions and internal labour markets.

Similarly, Shen (2006) suggested that the HR policies and practices could be determined by the host-contextual factors and the firm specific factors in the organisations. The host-contextual factors include external factors such as political, legal, economic and socio-culture factors. Firm-specific factors encompass organisational elements such as the age, size, ownership, development stage, international experience, and organisation strategy. In this study, the research setting is high technology organisations in Taiwan, which limits the impact from host context factors and industrial characteristics. Thus, the adopted human resource policies and practices in the organisations will be influenced by firm-specific factors (or contingent variables), particularly organisational ownership.

Firm-specific factors are the attributes inherent in an MNE, related to the country where it originates, the industry that it competes in, and its firm specific attributes (Shen, 2006: 300; Welch, 1994: 151). Difference in organisational ownership may contribute to differences in HRM policies and practices, including HR flow (recruitment, selection, training and development), work systems (e.g. control, job specification), reward systems (e.g. wages, benefits and performance appraisals), and employee influences (e.g. employee participation). Much empirical evidence has been provided by studies, comparing HRM practices adopted in Taiwan (Bae et al, 1998; Chen et al, 2005; Huang, 2000, 2001; Wu and Lee, 2001). The ownership of the companies influenced the strategies taken by the multinationals in line with differences in the culture, market, and economy of parent countries. For example, Huang's (2000) research revealed that Taiwanese firms were more likely to fill the

job vacancies internally and to consider seniority as a criterion for pay increases than the non-Taiwanese multinationals. Nevertheless, all firms, regardless of their national ownership, emphasised the principle of effective people management, supported by findings that discovered outcome was employed as the major appraisal criterion. This indicated that the HRM policies, practices or strategies imposed on host countries were influenced by the countries that the organisation originated in to a certain degrees.

However, the focus of management of knowledge workers in these studies was mainly placed in the for-profit organisations in the private sector. Non-profit organisations were rarely discussed in the research. Non-profit (also known as not-for-profit) organisations belong to the 'third sector' that are neither the traditional private for-profit nor the public sector (Borzaga and Defourny, 2000). Although the form and size of non-profit organisations vary, the most distinctive feature of non-profit organisations that differentiate them from for-profit firms is that organisations do not pursue profit as their priority of organisational purpose (Anheier, 2000; Lettieri et al, 2004; Renshaw and Krishnaswamy, 2009; Salamon and Anheier, 1992; Weisbrod, 1988). A major difficulty for finding a model governing the knowledge worker management for non-profit organisations is the heterogeneity of organisations in the non-profit sector. Renshaw and Krishnaswamy (2009) suggested that the non-profit sector encompassed various types of organisations such as charities, voluntary or non-government organisations (NGO). Weisbrod (1988) indicated that there were various forms of non-profit organisations. One of them was a hybrid combination of nonprofits with private firms and governmental organisations, which was a newer mechanism for the government to conduct programmes of national concern outside the government. These organisations are positioned between the pure private and public organisations with some attributes of each sector. One example is the research institutes and industrial laboratories set up in connection with the national innovation systems to support advanced technological development in the national interest (Nelson, 1993).

Certain authors have indicated that non-profit organisations face similar challenges to for-profit organisations in an increasingly competitive environment, as non-profit organisations need to enhance their efficiency and performance due to the relatively

limited resources and funding agencies' requirements (Anheier, 2000; Firstenberg, 1986; Hay, 1990; Powell, 1987; Renshaw and Krishnaswamy, 2009). Thus, non-profit organisations have also searched for the transfer of management techniques from the for-profit sector, aiming to survive in a competitive environment. However, much of the research has concentrated on structural or operational aspects rather than on people management.

For example, studies of 'knowledge-intensive' bodies in non-profit organisations[5] have concentrated on knowledge management in an attempt to improve the organisational efficiency and performance in the non-profit context (Hurley and Green, 2005; Lettieri et al, 2004; Renshaw and Krishnaswamy, 2009). It is widely accepted that the technology, structure and people should be coordinated to accomplish an effective knowledge management programme (Leavitt, 1965). Several researchers have suggested that the Community of Practice (CmP) approach is more important for supporting the work in the non-profit sector, as it facilitates knowledge sharing and building trust, friendship and mutual understanding among workers. Hurley and Green (2005) indicated that CmP encourages knowledge sharing between organisations, and in turn benefits the whole non-profit sector in realising effective knowledge management. Renshaw and Krishnaswamy (2009) argued that the adoption of ICT-based approach in the non-profit sector was still immature, so CmP is relatively more important to the knowledge sharing at the individual and community level. Despite this, limited empirical research is available to examine how non-profit organisations manage their knowledge workers, which is particularly important for non-profit research institutes primarily composed of highly-skilled scientists and technological professionals.

3.5 Conclusion

The nature of knowledge work usually requires input of various forms of knowledge, including explicit, tacit and organisational knowledge. Nevertheless, the attempt to manage knowledge or knowledge work cannot ignore the role of knowledge workers

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[5] Hurley and Green (2005) indicated that non-profit organisations were 'knowledge-intensive' bodies as they usually employed professionals such as psychologists, counselors, educational specialists, etc.

who actually carry the knowledge. In general, knowledge workers are theoretically considered as a group of people who are usually well-educated with special skills that could be used in their work. It is recognised that the concept and definition of knowledge worker are contestable and ambiguous in theoretical discussions, in view of critiques of, for example, knowledge being required in all work, the lumping together of a group of occupations for knowledge workers, or the overlap of professional and knowledge workers. The challenge in empirical studies is how to identify knowledge workers based on the theoretical discussion of knowledge workers. Empirically, a number of researchers conducted studies about knowledge worker management through the perspective of knowledge work, knowledge management or knowledge-intensive firms. These researchers used various approaches to identify knowledge workers in their empirical studies, such as by the workers' occupation or activities they were involved in (for example, engineers), by the industries that require a large number of workers (for example, high technology industry), or by the knowledge-intensive firms where knowledge workers form the major workforce (for example, consultancy firms). In this research, a multi-method is adopted to identify knowledge workers based on the industries they are employed in (i.e. high technology industry) and their occupations or the activities they are involved in while working for their companies.

Drawing from the perspective of human capital, the discussion of knowledge workers is important because they possess the knowledge and skills that could enhance a company's competitiveness and are the major contributors to a company's final products. The issue of knowledge worker management is particularly important to knowledge-intensive organisations that aim to facilitate the conversion of human capital into intellectual capital and support the collaboration between human activities and other intellectual assets. It is suggested that organisations should carefully manage the group of knowledge workers in line with their distinctive characteristics, such as the autonomy and self-management required by the worker, high pay and close interaction and collaboration with other workers in their work. Accordingly, organisations should adopt management practices that best fit in with the individual organisational context to manage their knowledge workers.

In this research, the contextual factors that may influence knowledge worker management focus on organisational ownership in terms of the organisations' origin of country or whether they are in the for-profit or non-profit sector. In view of knowledge stocks and knowledge flow, the activities of recruitment and retention of knowledge workers were selected as the themes to be investigated in this study, which will be discussed in the next chapter.

Chapter 4 : The Recruitment, Selection and Retention of Knowledge Workers

The previous chapter discussed the concept of knowledge and knowledge workers, and the reasons why organisations focus on recruitment and retention in terms of knowledge worker management. For high technology organisations, the task of recruitment and retention is widely acknowledged as vital and challenging, in view of a highly competitive business environment featuring rapidly changing technologies, short life-cycle products, and a tight labour market. In this chapter, the activities of recruitment and selection will both be reviewed, as these two activities are closely linked to the organisation's recruitment process of attempting to acquire the desired knowledge and skills possessed by the workers. It will then examine frequently adopted retention strategies and practices for knowledge workers.

4.1 Recruitment of knowledge workers

Sourcing and attraction

Recruitment can be defined as "the process of generating a pool of capable people to apply for employment in an organization" (Gold, 2003: 221). Newell (2005: 121-123) suggested that organisations should firstly make a decision whether to recruit internally or externally. Internal recruitment may have the advantage of motivating employees, and it is usually associated with a 'soft' HRM approach that emphasises training and development. However, internal recruitment may have the disadvantage of not bringing any talent to organisations. In contrast, external recruitment may have the advantage of bringing new knowledge, experience and ideas into organisations, but it might have an adverse effect on employee motivation.

For high technology organisations, it is important to focus their attention on external recruitment for two reasons. Firstly, in response to the fast changing and developing technological environment, it is essential and necessary for high technology firms to recruit candidates externally to update their technology, knowledge, and technical skills to sustain their competitive advantage. Secondly, the knowledge and technology

required in knowledge work tends to be more sophisticated and complicated, which might limit the firm's ability to recruit internally to a certain extent (Causer and Jones, 1993). In addition, the high attrition rate of knowledge workers, especially in Asia's high technology industries (Horwitz et al, 2003; Chen et al, 2008), implies that high technology firms experience a heightened demand for external recruitment when there is an insufficient internal supply.

Several scholars have suggested that the emphasis in recruitment should be placed on attraction (Gold, 2003; Newell, 2005: 116; Newell and Shackleton, 2001: 113). Organisations might use different recruitment methods to effectively attract different segments of applicants, such as graduates or experienced staff (Causer and Jones, 1993; Haesli and Boxall, 2005). The chosen segment of applicants may reflect certain challenges for an organisation. For example, empirical research has revealed that firms might rely heavily on graduates as the main source for their pool of applicants, when they are encountering retention problems (Chen et al, 2008; Haesli and Boxall, 2005). High technology firms in Taiwan are also concerned about the quality of graduates (Chien, 2007). In general, the high technology firms might focus on how to attract applicants (either graduates or experienced workers) in order to generate a large enough pool of applicants to choose from in view of the tight labour market (Amaram, 2005; Lock, 2003; Stokes, 2000; Watson, 2001).

Recruitment methods

Iles and Salaman (1995: 211) when referring to recruitment methods state that "the actual channel or vehicles used to attract candidates also seem to influence whether the right kinds of applicants are encouraged to apply, and to persist in their application". Many empirical studies have been conducted to reveal the recruitment methods used by high technology firms. In general, the major sourcing options for recruiting IT talent include: building relationship with educational agencies, internships, recruiters, internet, current employee referral, job fairs, and networking at conferences and trade shows (Stokes, 2000). Lockwood and Ansari (1999) investigated the recruitment and retention strategies and practices for U.S. IT specialists. They found that firstly, traditional local news advertising was still useful, and secondly, specific company web sites were more effective than other on-line

employment websites. Newell (2005: 124) indicated that these methods have different advantages: online advertising has the advantage of attracting a large pool of applicants at lower costs, and the company website could reach candidates who were not actively seeking work. Lockwood and Ansari (1999) also found that some companies would offer different levels of financial incentives for employee referral programmes, depending on the position of the vacancy. College internship programmes provided a good chance for both sides to 'look and see'. Amaram (2005) revealed that the most popularly used recruitment methods in the U.S. to attract IT workers included headhunters and employee referrals (with financial incentives). Headhunters and recruiters were also the most effective channel to search for qualified candidates.

However, it seems that similar recruitment methods have different degrees of effectiveness in different contexts. For example, employee referral programmes offering financial incentives were reported as an effective method in the U.S. (Amaram, 2005; Lockwood and Ansari, 1999) but as a limited success in the U.K. (Causer and Jones, 1993). Empirical research reveals that high technology firms in Taiwan relied more on formal recruitment methods, such as media advertisements, than informal recruitment methods such as employee referrals or word of mouth (Hsu and Leat, 2000; Zheng et al, 2008). However, it was evident that the organisations needed to be flexible in their use of both formal and informal recruitment methods when the labour market was tight (Zheng et al, 2008).

The impact of human resource management practices on recruitment

Research investigations have showed that human resource policies and practices affect recruitment outcomes (Orlitzky, 2007). Williams and Dreher's (1992) research into 352 US banks identified that compensation policies (i.e. pay and benefit levels) would affect the applicant pool size, job offer acceptance rate and time taken to fill vacancies. Benefits were positively associated with the applicant pool size and negatively associated with days required to fill a position. Pay level was positively associated with the acceptance rate and with the days required to fill a position.

Horwitz et al (2003, 2006) revealed that an effective recruitment strategy should incorporate related human resource management practices that are effective in attracting applicants. In their empirical study of knowledge-intensive firms in Singapore and South Africa, they found that the most popular recruitment strategy may not be the most effective one. For example, the most popular recruitment strategy in Singapore included advertised jobs, internal talent development, headhunters, on-line recruitment, and career plans used for re-deployment and promotion. However, the most effective recruitment strategy appeared to be distinctive bundles of human resource practices, including very competitive total packages in the upper quartile of the market, internal talent development, reputation as employer of choice, proactive recruitment initiatives and advertised jobs. Some of the most popular recruitment strategies (for example, online web recruitment and headhunters) were also identified as the least effective ones. These results differed from ones in the study by Amaram (2005) who identified that several popularly used recruitment methods were also effective.

Stokes (2000) placed an emphasis on the main ways that help organisations to differentiate themselves and attract talent. The strategy and practices included building the company's reputation, visibility and vision, a work environment that shows concern for the individual, compensation levels and creative packages, training and development opportunities, performance-based culture, and availability of new technology.

Baron and Hannan (2002) investigated 100 high technology organisations and suggested five different types of high technology start-ups which placed emphasis on different human resource practices to attract, select and retain employees. For example, a 'star' organisation may use high wages and provide resources and autonomy to recruit workers. A commitment-based organisation would seek to recruit people who are likely to work in the organisation long-term. A bureaucracy model would emphasise selecting qualified persons to fit particular roles. An autocracy model would use money as the main tool to attract candidates and retain employees. An engineering model would offer interesting and challenging work to attract and recruit knowledge workers. This model was found as the most popular model used by high technology start-ups in their research.

4.2. Selection

Selection refers to "the process by which managers and others use specific instruments to choose from a pool of applicants a person or persons most likely to succeed in the job(s), given management goals and legal requirements" (Gold, 2003: 221). Newell and Shackleton (2001: 24) suggested that selection could be considered as a decision-making process in an attempt to choose the 'right' person who will be the best fit for a particular job vacancy.

A traditional selection approach suggests that selection is a one-way decision making process (Newell, 2005). Organisations would attempt to identify and choose the 'best' candidate who meets the personal specification and competence requirement of the position through a rational decision making process. However, this approach ignores the fit between the organisation and employee by ignoring the expectations of the employees who would like (or prefer) to work in the organisation under certain conditions. On the contrary, using an exchange approach, the organisation places emphasis on the 'fit' between the organisation and the individual during the selection process. Newell et al (2002: 70) indicated that "the selection process of knowledge workers is highly intensive with a great emphasis placed on finding the right fit between the individual and other members of the knowledge group". Drawing from the exchange perspective, selection could be considered as a mutual selective decision-making process. Empirical evidence indicates that the 'best-fit' approach can effectively help organisations to reduce early turnover and enhance employee commitment (Holton and Russel, 1999).

4.2.1 Selection criteria

Beardwell and Wright (2004: 204) suggested a systematic approach to recruitment and selection that includes defining vacancies, attracting applicants, assessing candidates and making decisions. Organisations should firstly decide who they want to recruit. In other words, organisations would set up the required capabilities of the workers. A traditional approach could be through job analysis, which would lead to

further person specification. Much of the literature has suggested that person specifications place an emphasis on competence (Boam and Sparrow, 1992). Competence could be defined as "the work-related personal attributes, knowledge, experience, skills and values that a person draws on to perform their work well" (Roberts, 1997: 6).

In the case of knowledge workers, the required knowledge and skills might be the main selection criteria for high technology firms. From the human capital and intellectual capital perspectives, the new recruits could enrich the company's 'stock' of knowledge (Starbuck, 1992) since they would bring in either new technology with future potential, or other knowledge/ technical skills that are currently valued by the organisations. In addition to knowledge and technical skills, Causer and Jones (1993) argued that firms might also be concerned about the social skills and abilities of candidates in view of the features of knowledge work that are heavily involved in team work with co-workers, collaboration with partners or liaison with clients. Organisations might take their client relationships into accounts, as the knowledge workers might co-work with their customers to a significant extent and even physically work in the client's organisation (Newell et al, 2002; Swart and Kinnie, 2003).

Causer and Jones (1993) indicated that high technology organisations seldom lowered their selection standards in order to hire employees. Organisations attempted to maintain a certain standard of technical and social criteria in selection, even in a tight labour market. This is because the competence of the candidates and the fit between the candidate's expertise and the business requirement are critical concerns for the organisations. The 'fit' between the organisations and employees were important considerations in the selection process. Robertson and Hammersley (2000) revealed that a knowledge-intensive firm in their case study rejected candidates mainly due to the incompatibility between the organisation's way of working and the individual. Baron and Hannan (2002) indicated that a high commitment organisation would emphasise fit and simultaneously use the 'work group as community' as the basis of attachment and retention. Chien and Chen (2007) developed a data-mining model for a leading Taiwanese semiconductor manufacturer to assist the decision makers in

identifying the most suitable talent to fit the company's culture and job function characteristics.

The research indicates that firms would consider the compatibility of the candidates' attitudes and behaviours with the organisational culture as one important criterion in the process of knowledge worker selection. In addition to skills and compatibility with the team or organisation, the employees' long-term potential would be another selection criterion for high technology firms (Baron and Hannan, 2002).

4.2.2 Selection methods

Organisations may use a variety of selection instruments in the selection process to ensure the 'fit' between the organisations and employees (Causer and Jones, 1993). Interviewing may be a 'universally popular' selection tool (Beardwell and Wright, 2004). Although interviews have been criticised (Beardwell and Wright, 2004; Newell, 2005) due to their limitations (for example, being a unreliable indicator of future performance), employers could use a variety of selection techniques to supplement interviews, such as using structured interviews, psychometric tests and work sampling. For example, Robertson and Hammersley (2000) found a knowledge-intensive firm used intelligence and personality tests as the main selection tools before interviews, whist the main reason for rejecting candidates was their bad 'fit' with the organisation. Chien and Chen (2007) suggested firms could use data mining techniques to identify the effective recruitment channels and pre-screening criteria, together with the adoption of personality and cognitive tests. In the U.K., the most common selection tools used by organisations were short-listing, interviewing and references (Cook, 2004; Millmore, 2003; Newell, 2005).

The validity of selection methods is mainly concerned with the prediction the performance of new recruits (Newell, 2005). Witt and Burke (2002) found that IT professionals' performance (for example, the indicators of fewer coding mistakes, efficient problem-solving and innovation ability) were positively related to the scores in general mental ability tests and personality agreeableness tests. Hermelin and Robertson (2001) used meta-analysis to indicate that structured interviews and

cognitive ability tests were high validity selection methods while personality tests were low validity selection method. However, one of the problems of attempting to predict future performance during the selection process is that there are other factors (for example, situational factors) that may affect the employee's performance (Newell, 2005; Robertson, 1994).

In addition, effective recruitment is also concerned with the retention period of new recruits. For instance, in Chien and Chen's (2007) empirical study of a leading Taiwanese semiconductor manufacturing firm, they measured the firm's effective recruitment by considering the new recruit's retention period and performance rating. They found that other management practices conducted by the employee's department or supervisors might have contributed to the quit-rate of new recruits.

4.2.3 Individual's perspectives of employment decision-making

Considering selection as a mutual process by both the organisation and the individual, it would be meaningful to understand the individual's attitude and opinions about the firm's recruitment and selection activities. Iles and Salaman (1995: 211) highlighted that recruitment is the first stage at which both applicant and organisation can exchange their mutual expectations. They indicated that the message sent out during the process of recruitment by organisations may affect applicant attraction. For example, a glossy positive message may initially attract applicants to accept an offer, but can later lead to higher turnover due to the 'gap' between the real situation and the applicant's expectations. Thus, the applicants might prefer to use informal recruitment channels to obtain more reliable and realistic information. In addition, different messages may attract different groups of people. For example, subsidised childcare benefit may attract parents, and flexible schedules of working practices may attract retired people (Amaram, 2005).

Lockwood and Ansari (1999) identified certain important factors that may affect the IT specialists' employment decisions in the U.S. They are, in descending order: money (base salary plus bonuses and stock options), the chance to learn new skills, the reputation of the company concerning technological innovations, a flexible work

environment / work conditions (e.g. physical, overtime, colleagues and boss, casual dress), and benefits. They pointed out that some of the traditional benefit plans (for example, a health plan) were taken for granted. The employees expected 'outside the box' benefits, such as on-site day care and flexible work schedules. Childcare had increased importance and might affect the applicant's employment decision due to the increase in dual-career families. In addition, more applicants were attracted by flexible work schedules that could be achieved through work design (for example, job sharing, flexitime, and telecommunications). Similarly, Amaram (2005) revealed that more firms in the U.S. were seeking to attract and retain employees by providing tailor-made benefits packages. In addition, corporate advertising and a firm's reputation were identified to have positive effects of attracting applicants and perceived applicant quality (Collins and Han, 2004; Orlitzky, 2007).

4.2.4 Recruitment difficulties and organisational responses

High technology firms might encounter greater recruitment difficulties when knowledge workers are in high demand and the labour market is tight (Amaram, 2005; Causer and Jones, 1993; Zheng et al, 2008). Lee and Maurer (1997) suggested that firms should undertake staff planning including forecasts of future need. However, Causer and Jones (1993) found that sometimes this would be difficult for high technology firms due to the rapidly changing business environment, and the cost of advanced hiring being only affordable by large or multinational organisations. In addition, they indicated that even if firms could fill a vacancy within an acceptable timeframe, they might still face recruitment difficulties if a high turnover rate and high replacement staff costs occurred. In general, organisations encountered more recruitment difficulties (i.e. they had to fill vacancies within an acceptable time or cost) when recruiting experienced staff. The organisations found particular difficulties in recruiting certain types of workers whose skills were extensively in demand by other industries, such as software programmers, or those had knowledge of relatively obsolete technology or skills, such as analogue expertise. In spite of recruitment difficulties, however, the organisations would speed up the recruitment process by intensifying the selection process rather than reducing its selection standards.

Zheng et al (2008) indicated that it is more likely the organisations will undertake active and informal recruitment methods in response to recruitment difficulties resulting from a tight labour market. Research has also indicated that employers might prefer informal recruitment sources (for example, employee referrals) because workers who were recruited through those channels felt obligations to the sponsors, thus tending to stay longer with less turnover (Iles and Salaman, 1995: 211). From the social capital perspective, personal contact is an effective recruitment method due to the knowledge worker's close network connections and the effect of 'like attracts like' that may recruit suitable workers. However, it may have disadvantages, such as a reduction in diversity and a possible hindrance to innovation (Iles and Salaman, 1995; Newell et al, 2002).

Ulrich (1998) indicated that firms might enhance their human resource competency by using three strategies of buying (acquiring talent from other firms), building (training and development of internal talent), and borrowing (using consultants or outsourcing partners). In view of the buying strategy, Cappelli (2000) suggested a market-driven approach that requires organisations to consider the impact on compensation, job design, job customisation and hiring practices. Causer and Jones (1993) suggested that organisations focus their attention on certain areas of human resource policies to respond to recruitment difficulties, such as personnel planning, thoughtful recruitment and selection procedures, and training / redeploying / retaining current employees. They revealed that firms intended to strengthen links with specific institutions that would provide qualified and suitable (e.g. fitting organisational needs or career ladders) graduates for their recruitment pool, develop close links with specific recruitment agencies and target specific recruiting areas where their competitors were located to recruit experienced staffs. They highlighted the solution of internal recruitment, which is similar to Ulrich's (1998) building strategy. For example, organisations could conduct frequent redeployment by moving individuals from one project to another in the operations of R&D work, and provide ad hoc training to meet the needs required by each task. However, due to the nature of work that is usually complex and complicated, the fast changing business environment and technological development, the training and redeployment strategy might be costly and limiting to a certain level. To conclude, it suggested that firms might design proper human resource management practices containing aspects such as appropriate

reward systems, career structures and training programmes, to attract the 'right' persons (Causer and Jones, 1993; Newell et al, 2002).

4.3 Retention

Retention is defined as an organisation's "ability to hold on to employees" (Heery and Noon, 2001), and particularly to valuable employees (Kalra, 1997). There might be two reasons why retention is a critical issue for high technology firms. Firstly, retaining valuable employees would help prevent organisations from depleting their stock of knowledge (Starbuck, 1992), thus maintaining the firm's competitive advantage. In some cases, it would especially hurt a company if the whole team left and brought their R&D capacity or client base to the firm's competitors (Alvesson, 2000). Secondly, seeking replacement knowledge workers might be relatively difficult and costly. It has been estimated that reemployment costs (such as recruitment and advertising costs, induction and training costs, and time cost to fill in the vacancy) might be as high as 2.5 times the staff's annual salary (Horwitz et al, 2003). However, a high turnover rate does not always signify that firms have retention problems, as it can be caused by a change of business strategy, such as dropping from a particular product market. In addition, turnover might help the organisation to reduce the problem of career blockage and career plateauing (Causer and Jones, 1993).

Empirical studies have revealed that retention might be the main challenge for organisations that hire graduates or rely on graduates as the main source of their recruitment pool. However, the reason why organisations rely on hiring graduates might be because they suffer from retention problems (Chen et al 2008; Haesli and Boxall, 2005). The problem of retention seems to be more severe in Taiwan, especially for the high technology firms, due to the shorter average service length of tenure in Taiwan than in other countries. This was evident in the research by Chien and Chen (2007) who found the average turnover rates in their case companies was nearly 30%, higher than in the context of Singapore where it was 20% (Horwitz et al, 2003).

One of the reasons resulting in a challenge to knowledge worker retention may be the conflicts between employees' organisational identity, team identity and occupational identity (Scarbrough, 1999; Swart, 2008). Lee and Maurer (1997) indicated that the commitment of knowledge workers (particularly engineers) might be related to their career interests. They identified three types of engineers with different career interests: project-oriented engineers who focus on their job's technical aspects, profession-oriented engineers who focus on their occupational role implications and management-oriented engineers who focus on career advancement. They also identified reasons for engineers' voluntary turnover. Firstly, employees may be attracted by more interesting job opportunities. Secondly, employers may fail to respond effectively to certain issues employees are concerned with (for example, under-emphasis on prototypes and field testing). Thirdly, employees may change their career due to limited industry prospects or changing aspirations, such as changing personal interests or seeking a better work-life balance. Thus, the authors suggested that organisations should review their HRM practices (such as employment planning, recruitment and hiring), compensation (salary and benefits), grievance procedures, training and development, and career planning (long term and mutually beneficial career services).

Approaches of managing retention of knowledge workers

A traditional approach indicates that organisations mainly use management instruments to 'control' employees' attitudes and behaviours, for example, to perform well in their job or to prevent them from leaving. The development of literature on the subject has suggested that organisations should place emphasis on managing organisational commitment or loyalty (Alvesson, 2000; Meyer and Allen, 1991, 1997; Morris et al, 1993; Walton, 1985). Walton (1985) suggested that organisations should take a high-commitment approach that emphasises the self-control of workers. Meyer and Allen (1991) indicated that organisational commitment could come from three sources: the employee's positive emotional attachment to the organisation (affective commitment), the employee's perceived costs, including monetary and social costs, of leaving the organisation (continuance commitment), and employee's feeling of obligation to the organisation (normative commitment). The empirical evidence supports that organisational commitment could effectively result in lower turnover in

organisations (Meyer and Allen, 1997). Guest (2007) emphasised that organisational commitment could be achieved by psychological contract that is centred on trust and seek reciprocal promises, inducement, and obligations between the individual and organisations. Thus, retention would be improved by providing workers with greater autonomy and intrinsic job satisfaction. Based on this framework of the psychological contract, the firm's policies and practices may have an impact on work satisfaction, work-life balance and job security, which will in turn influence employee's intentions of leave or stay.

In the management of knowledge workers, research has recognised the important role that trust and loyalty play in organisational retention (Alvesson, 2000; Newell et al, 2002). It has been suggested that distinct human resource practices, organisational design and employee relationships would be taken into account in managing knowledge workers' loyalty (Horwitz et al, 2003). Alvesson (2000) identified two types of loyalty. The first is instrumental loyalty which would be maintained by using legal agreements, money, and other compensation for achievements. The second is identification-based loyalty which involves perceived similarities, shared positive emotional attachment and social relationships. In view of the potential conflicts of employees' organisational identity, team identity and occupational identity (Scarbrough, 1999; Swart, 2008), Alvesson (2000) suggests that organisations take a 'social-integrative management' approach that combines two means of managing knowledge workers' identification-based loyalty. Firstly, an institution-based approach suggests that the company may reinforce a positive corporate identity by shaping the company's image, for example, through emphasising the firm's past history and future vision. Secondly, a communitarian-based approach places an emphasis on interpersonal relations among organisational members and the feeling of being part of a social community, and thus would indirectly strengthen staff retention within organisations.

Similarly, research has suggested the organisations adopt an institution-based approach to guide their retention strategies. Horwitz et al (2003) suggested the organisation should shape an image of 'best employer'. Based on the report by Hewitt Associates (2001), they summarised three key differentiated attributes of the 'best employers'. The 'best employer' would be expected to have the ability of "finding

and developing talent aligned with the strategic business goal, growing and adapting quickly in a rapidly changing environment, and flexibly balancing workplace demands with the need for work/ life balance" (Horwitz et al, 2003: 26). This implies that knowledge workers might be concerned about the firm's overall competitiveness, ability to recruit, development and retention of valuable employees, and the working practices and environment that help employees' work-life balance. Haesli and Boxall (2005) also identified one firm in their case study that considered the employment brand of an 'innovative organisation that looks after its employees' as an important retention strategy.

Knowledge workers' expectations

A number of academic researchers have highlighted that knowledge workers' attitudes and expectations are one of the important determinants of organisational commitment, so it is important to understand knowledge workers' expectations as groups or communities within organisations (Horwitz et al, 2003; Kinnear and Sutherland, 2000; Newell et al, 2002). Knowledge workers' expectations are related to their professional characteristics. For example, knowledge workers usually enjoy greater autonomy because they expect and demand a certain degree of autonomy to do their work, so they are able to use their professional expertise to initiate, plan and organise their work rather than simply following a routine (Newell et al, 2002: 27).

Empirical evidence has revealed that pay is often the most important factor for knowledge workers (Horwitz et al, 2003; May et al, 2002). Swart (2008) explained that pay is important to knowledge workers because knowledge workers' status is less hierarchical or tenured based. In addition, pay is considered as the price paid by organisations for knowledge workers' skills. Good pay is both a reward and a positive sign of the knowledge workers status and career advancement. In addition to pay, knowledge workers are concerned about the intrinsic nature of work, such as job variety, job challenges, and learning opportunities (Haesli and Boxall, 2005; Horwitz et al, 2003; May et al, 2002). Haesli and Boxall (2005), for example, highlighted that engineers particularly considered interesting work as an important factor in relation to their job satisfaction. Other important factors that knowledge workers are concerned about include promotional prospects, co-worker relations, influence over decisions

relating to their work and employment security (Haesli and Boxall, 2005; Horwitz et al, 2003; May et al, 2002).

Thompson and Heron (2005) suggested that organisational justice was related to knowledge workers' commitment. This further suggests the importance of internal equality, which could be achieved through a fair performance review programme that linked with the worker pay increase and promotion. Other researchers have highlighted the importance of the role played by workers' expectations in organisational retention. Haesli and Boxall (2005), for example, pointed out that effective retention approaches relied heavily on managers' abilities to understand and meet the engineers' employment expectations. Ulrich (1998) suggested that, strategically, employers should focus on the retention of 20 to 25 percent of the key employees that the organisation could not afford to lose. The steps to do this includes identify who these key employees are, to understand their expectations, and find a way to keep them. Kamoche (1996) suggested that retention could be achieved through programmes relating to rewards, job security, training and career development, and autonomy.

Empirical evidences of effective retention strategies and practices

A considerable amount of literature has been devoted to investigating popular and effective retention strategies for retaining knowledge workers. For example, Horwitz et al (2003) found that the top five most effective retention strategies for high technology firms in the context of Singapore were challenging work, a highly competitive pay package, having performance incentives/bonuses, opportunities to develop in a specialist field, and senior management support. Their findings suggested that organisational attachment could be enhanced through practices related to job design and affective commitment. In addition, occupational and organisational loyalty might be increased simultaneously through mediating effective human resources practices, such as highly competitive pay and the intrinsic quality of work.

In the U.S., Lockwood and Ansari (1999) suggested several effective retention strategies for retaining IT specialists, including a raise of salary, offering bonuses to stay, a well-defined career ladder and promotion opportunities, commitment to

training, personal recognition, stock option bonuses, and time-off reward. Stokes (2000) identified similar retention practices as Lockwood and Ansari (1999) suggested. He, additionally, pointed out that other retention strategies such as job rotation and opportunities to work on cross-functional teams, frequent performance reviews and rewards, organisational culture, feeling of belonging to the organisation, and job security were effective. Amaram (2005) highlighted that businesses in the U.S. provided tailor-made benefits packages (such as flexible work hours, child-care and elderly-care facilities) to attract and retain employees. The organisations were even "modifying the corporate culture to be more responsive to their employees personal needs" (53). He further argued that firms must keep investing in employees' training and development in spite of the risk of losing them, as one of the best ways to retain employees was the continuous skills development for the workers.

Causer and Jones (1993) found from their case studies of high technology firms in the U.K. that financial rewards were related not only to individual performance, but also to relative market scarcity of skills. Reward practices need to be flexible to be competitive in an external labour market, which may result in increasing 'exceptions' of offered salaries outside the bands permitted in the appointees' grades. In addition, the design of 'technical ladders' in the career structure helped to retain technical specialists who preferred to develop their technical skills and abilities rather than perform managerial roles or pursue career objectives.

Haesli and Boxall (2005) conducted two case studies of high technology firms in New Zealand. One company's effective retention strategies included interesting work, innovative organisational culture that emphasised engineers' autonomy and freedom of innovation, and the employment brand of the organisation. Among these retention strategies, interesting work was identified to be particularly attractive to new graduates. The other company that was troubled by higher early turnover responded with a more proactive approach to their retention strategy by developing an exit interview database, offering re-employment to some employees who took a time break for overseas travel, and conducting focus groups to investigate employees' concerns and making efforts to overcome them. A dual-career ladder was also developed for those engineers who preferred to focus on the career roadmap of

technological development. Other practices included offering benefits and improving the work environment to allow employees to work more pleasantly and effectively.

4.4 Conclusion

To conclude, the literature review has suggested that organisation culture, structure, and HR systems and practices would effectively interact to attract and retain knowledge workers. For example, the structure of organisations tends to be flat to facilitate the operation of knowledge work and fulfil the demands of autonomy and self-directed development of knowledge workers (Swart, 2008). Kamoche (1996) suggested that a company may establish HR capabilities to gain a competitive advantage through appropriate HR policies and practices to secure, nurture and retain their key personnel. Specifically, the impact of human resource policies and practices on recruitment and retention of knowledge workers could be reflected in the programmes relating to rewards, career development, corporate culture, job security and training (Causer and Jones, 1993; Kamoche, 1996; Newell et al, 2002).

Reward systems that contain financial and non-financial rewards could have a severe impact on both recruitment and retention of knowledge workers. The theoretical and empirical research suggests that compensation (pay and benefits) plays a critical role in attracting and retaining knowledge workers. In addition to the standard benefits package, organisations may consider to provide tailor-made and hidden benefits to meet the individual worker's needs. For example, extra days-off in compensation for working over-time could be used as a retention tool. Non-financial rewards may be related to the nature of work, such as challenging or interesting work and the recognition of personal achievement (Horwitz et al, 2003; Newell et al, 2002). In some cases, knowledge workers may value intrinsic rewards more than purely financial rewards. This implies that organisations may consider the impact of job design on the recruitment and retention of knowledge workers, such as using job customisation or job rotation as instruments to retain employees (Cappelli, 2000; Horwitz et al, 2003).

In addition, career development and training practices may influence the recruitment (especially internal recruitment) and retention of knowledge workers (Causer and Jones, 1993; Kamoche, 1996; Newell et al, 2002). In view of career development, promotion opportunities would be one important consideration for the retention of knowledge workers. However, Butler and Waldroop (2001) argued that there is a trend shifting from traditional career paths that were based on the firm's interest, to sculpting jobs based on the interests of knowledge worker professionals. In particular, for engineers in high technology firms, a technical ladder separated from the managerial roadmap would be helpful to retain the specialists who are more interested in the development of cutting edge technology (Causer and Jones, 1993; Haesli and Boxall, 2005).

Training is considered to be an important tool to build the talent pool for internal recruitment and retain knowledge workers. Horwitz et al (2003) indicated that the organisation should enable employees to acquire skills to increase their employability. Similarly, Kalra (1997) suggested that the organisations should shift the traditional training practices to an integrative and continuous process of capability development. Several researchers also have indicated that knowledge workers might be more capable and autonomous in pursuing careers external to their organisations (Amaram, 2005; Despres and Hiltrop, 1995). Amaram (2005) argued that although job-hopping might be a common phenomenon in high technology industry, organisations should keep investing in training their workers as a key retention instrument.

Moreover, the work design and work environment could affect the recruitment and retention of knowledge workers. Horwitz et al (2003) suggested that one of the key retention strategies was top management's support in creating a conducive working environment where allowed the employees to work in a fun, flexible and resourceful manner. This implies that organisations may shape a corporate culture through proper work design and working practices. For example, the organisations could create a working culture enabling employees to act freely, adopt management practices that facilitate effective communication, pay attention to job design, and allow employees to gain prominence through self-development and involvement in interdisciplinary and cross-functional projects. However, Newell et al (2002) highlighted that one of the difficulties when transferring corporate culture into practices is that corporate

culture, to a large extent, emerges as a bottom-up form rather than from the top-down. It is because "the actual values and norms adopted by employees arise out of their own shared experience and interactions with fellow employees" (83). Nevertheless, in view of the characteristics of knowledge workers and their work, it is suggested that the implementation of working practices by organisations should be made more thoughtful by respecting and trusting individuals and showing concern for the work-life balance of their employees.

The next chapter will present the research methodology in this study. It includes the research questions, the hypotheses to be tested, the research philosophy, the research strategies and the research methods. The details of data collection in the research process and data analysis methods will also be described.

Chapter 5 : Methodology

Introduction

This chapter will discuss the methodological issues and procedures that were used to collect and analyse data in this study, in an attempt to answer the research questions and devise hypotheses. This chapter includes eight sections. Firstly, it will introduce the research enquiries and devised hypotheses. After that, the research philosophy, research strategies and research methods will be discussed, from section two to section four. Next, the implementation of sample selection, data collection and data analysis will be presented, followed by a conclusion.

5.1 Toward a methodology: research enquiries and hypotheses

The literature review in the previous chapters highlighted the demand for distinctive human resource practices for knowledge worker management due to the characteristics of knowledge workers (Alvesson, 2004; Scarbrough, 1999; Swart, 2008). The academic interest in studying the recruitment and retention of knowledge workers caught the researcher's attention, as it affects companies' knowledge flow and accumulation which, in turn, impacts upon their competitive advantage, especially for knowledge-intensive firms (Newell et al, 2002; Starbuck, 1992).

However, it has been argued whether there are 'best practices' for the management of knowledge workers or whether firms should adjust the human resource practices in line with organisational features, such as the 'knowledge worker approach' suggested by Carter and Scarbrough (2001). The theoretical frameworks (Jackson and Schuler, 1995; Schuler et al, 1993) suggested that a number of the contextual factors such as national culture and organisational features (for instance, structure, size or strategy) would affect the organisational adoption of human resource practices. The empirical evidence of effective recruitment and retention practices for knowledge workers have been extensively discussed in a western context, but relatively limitedly discussed in

the eastern context. Although a number of commonly used recruitment and retention practices were identified in the eastern context, the focal points were placed on workers in general, rather than knowledge workers.

This research intends to focus on analysing variations of recruitment and retention practices in Taiwan for knowledge workers in three groups which differed in their ownership type. As mentioned in Chapter 2, the government played a key role to promote the taking-off and development of Taiwan's high technology industry by setting up not-for-profit research institutes and by implementing certain policies, such as the establishment of the state-owned science park to encourage entrepreneurship. The non-private research institutes attracted overseas Chinese professionals and technological specialists back to Taiwan, and further provided a strong base for the staffing and advanced technology required by the private sector in Taiwan's high technology industry. Although a number of empirical researchers (for example, Huang, 2000; Hsu and Leat, 2000) have investigated and confirmed that differences in organisational ownership would affect the organisation's adoption of HRM practices, the comparison of organisational ownership differences is mainly limited to the private sector.

Considering the important and unique role played by non-private organisations in Taiwan's high technology industry, this research added the non-private organisations into the comparison. In addition, the success of Taiwanese-owned high technology firms, in view of their contribution to Taiwan's industrial and economic growth and the manufacturing capability to the global IT market, relied on the continuous input from the privately-owned firms. However, most of the research has studied the success of Taiwan's high technology industry, especially for Taiwanese-owned firms, from the perspective of strategic management, such as the impact of government policies on industrial development (for example, Hsu and Chiang, 2001) or R&D expenditure on productivity (for example, Tsai and Wang, 2004). Seldom have researchers undertaken studies from the perspective of human resource practices. Therefore, the comparison of practices for the recruitment and retention of knowledge workers in three different ownership sectors may help to examine why the different ownership types of high technology firms could be successful in Taiwan's high technology firms from the perspective of human resource management.

The reason for choosing ownership of organisations as the variable is because the organisation's ownership may influence the organisation's vision, business strategy or product market choice. For example, the non-private organisations have focused on developing advanced technology and innovative products to support Taiwan's high technology industrial development, guided by the Taiwanese government. Unlike the non-private organisations, the private organisations have to consider the cost-benefit effect when they decide which technology and products they would like to develop and when. As a result, foreign-owned firms may aim to provide differentiated products in the market and emphasise marketing activities. Taiwanese-owned firms have strengths in mass-production manufacturing, so they usually aim to provide products with good quality at competitive price.

Based on the previous concerns, together with a lack of a dominant theory governing the management of knowledge workers (Swart, 2008), several research enquiries were raised.

1. What are the effective recruitment methods for knowledge workers in Taiwan? Do the firms encounter any recruitment difficulties and how do they respond to them?
2. What are the selection criteria and selection methods for knowledge workers in Taiwan?
3. What are the effective retention methods for knowledge workers in Taiwan? Do the firms encounter any retention difficulties and how do they respond to them?

Considering the importance of high technology industry to Taiwan's economy, in view of the value of manufacturing output [6] (TRI, 2006) and expansion in

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[6] The research that was funded by Taiwanese government (research award number SER 095-032) reported that the manufacturing output for the high technology industry in Taiwan was ranked in the top three in the world. Source: http://old.npf.org.tw/PUBLICATION/TE/095/TE-R-095-032.htm <Access date: 18 June 2010>

employment[7] (DOS, 2010), this research aims to investigate the recruitment and retention of knowledge workers in Taiwan's high technology industry.

Theoretical rational for hypothesis

As discussed in Chapter 3, a resource-based view of the firm considers human capital is one of the valuable resources that could influence the firm's strategy and their capabilities and positions of competitive advantages (Boxall, 1996; Wright and McMaham, 1992). Chapter 3 also discussed the adoption of human resource strategy, policies and practices should 'best fit' the organisation's specific context, aligning their human resource management to their business strategy to achieve the organisational objectives (Beer et al, 1984; Boxall and Purcell, 2008; Jackson and Schuler, 1995; Schuler, 1992; Schuler and Jackson, 1987; Schuler and MacMillan, 1984; Wright and McMaham, 1992; Ulrich, 1991). The contextual factors included, for example, the organisational national ownership (Schuler et al, 1993); quality of business funding (Boxall and Purcell, 2008); business strategy (Beer et al, 1984; Jackson and Schuler, 1995); workforce characteristics (Beer et al, 1984) and technology (Jackson and Schuler, 1995). Therefore, this research was set to investigate the HR practices in the organisations with different national ownership; that is, the Taiwanese-owned and foreign-owned firms. Additionally, this research included the non-private organisations, as the different source of business funding and strategy in private sector and non-private sector may lead to different HR strategies and practices.

Schuler (1992) utilised a behavioural approach, arguing the HR practices could impact on employee behaviours to achieve desired organisational outcomes. He proposed a 5-P model to link the strategic human resource activities with the strategic needs of the business. The five "P's" included the HR philosophy, policies, programmes, practices, and processes. He suggested that the five "Ps" should be systematically linked to the strategic needs of the business in a broader context, in an attempt to influence the individual or group behaviours required by the business from

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[7] Ministry of Economic Affairs (MOEA) statistics showed that number of employees in the field of high technology industry has increased stably. Source: http://2k3dmz2.moea.gov.tw/gnweb/Indicator/wFrmIndicator.aspx <Access date: 18 June 2010>

a strategic perspective. Drawing from Porter's framework of competitive strategies, Schuler and Jackson (1987) suggested human resource management practice menus, aligned to the organisation's competitive strategies (innovative strategy, quality-enhancement and cost-reduction). The choices of HR practices were shown in the aspects of human resource planning, staffing, appraising, rewards and development, as illustrated in figure 2.

Figure 2. Human resource management practice menus

Human Resource Management Practice Menus

Planning Choices

Informal	----------	Formal
Short Term	----------	Long Term
Explicit Job Analysis	----------	Implicit Job Analysis
Job Simplification	----------	Job Enrichment
Low Employee Involvement	----------	High Employee Involvement

Staffing Choices

Internal Sources	----------	External Sources
Narrow Paths	----------	Broad Paths
Single Ladder	----------	Multiple Ladders
Explicit Criteria	----------	Implicit Criteria
Limited Socialization	----------	Extensive Socialization
Closed Procedures	----------	Open Procedures

Appraising Choices

Behavioral Criteria	----------	Results Criteria
Purposes: Development, Remedial, Maintenance		
Low Employee Participation	----------	High Employee Participation
Short-Term Criteria	----------	Long-Term Criteria
Individual Criteria	----------	Group Criteria

Compensating Choices

Low Base Salaries	----------	High Base Salaries
Internal Equity	----------	External Equity
Few Perks	----------	Many Perks
Standard, Fixed Package	----------	Flexible Package
Low Participation	----------	High Participation
No Incentives	----------	Many Incentives
Short-Term Incentives	----------	Long-Term Incentives
No Employment Security	----------	High Employment Security
Hierarchical	----------	High Participation

Training and Development

Short Term	----------	Long Term
Narrow Application	----------	Broad Application
Productivity Emphasis	----------	Quality of Work Life Emphasis
Spontaneous, Unplanned	----------	Planned, Systematic
Individual Orientation	----------	Group Orientation
Low Participation	----------	High Participation

Source: Schuler and Jackson (1987), Linking competitive strategies with human resource management practices, *The Academy of Management Executive*, 1(3), pp. 212

The HR practices researched in this study were centred on human resource staffing, including knowledge workers' recruitment, selection and retention. According to Guest's (2007) psychological contract model, the HR policies and practices would be

associated with the psychological contract of employees, leading to attitudinal consequences, such as organisational commitment, work satisfaction, work-life balance, etc. and behavioural consequences, such as the intention to stay/quit. Thus, the HR practices in the aspects of appraisal, compensation and training/development will be also reviewed to examine the impacts on the recruitment and retention of knowledge workers. The details of hypotheses will be illustrated below.

Hypotheses for knowledge worker recruitment

Drawing from the resource-based view of the firm, human capital is considered as one of the most important resources for the organisations to gain and maintain sustained competitive advantage (Barney, 1991; Boxall, 1996; Elias and Scarbrough, 2004; Grant, 1991; Haesli and Boxall, 2005; Hall, 1993; Mueller, 1996; Wright et al, 2001). Wright and McMahan (1992), for example, suggested that the firm's strategy would influence the organisation's HRM practices and in turn influence the HR capital pool and HR behaviours. Linking the business strategy with HRM strategy, Schuler and Jackson (1987) suggested that the organisations adopting an innovative strategy should emphasise external sources in recruitment, as the internal recruitment would help to enrich the organisation's stock of knowledge by bringing updated knowledge or technology (Starbuck, 1992). Jackson and Schuler (1995) indicated that the organisational internal contextual factors would influence the adoption of HRM practices, such as technology. Due to the development of web-based technology, the internet was widely used by organisations. For example, Zheng et al (2008) found that the internet was significantly used by firms in Asia's Dragon countries (Taiwan, Singapore, South Korea and Hong Kong) to recruit managers/professionals. Thus, the hypothesis was devised to test whether on-line agents were popularly used by Taiwanese-owned firms in the recruitment of knowledge workers in high technology industry.

Hypothesis 1.1: On-line agents were more popularly adopted by Taiwanese-owned firms than the other two groups of organisations in knowledge worker recruitment.

For foreign-owned firms, Hsu and Leat (2000) found that western-owned firms used 'recruitment consultants' for managerial and professional/technical vacancies.

Similarly, Amaram (2005) revealed that third-party head hunting firms are the most popular method used by large organisations to recruit their IT workforce. Therefore, hypothesis 1.2 was devised:

Hypothesis 1.2: Head hunters were more popularly adopted by foreign-owned firms than the other two groups of organisations in knowledge worker recruitment.

Because of the development of web-based technology, company websites become another choice of recruitment method for organisations. Lockwood and Ansari (1999) indicated that company websites may be highly effective for some large organisations. It was found that the non-private organisations have set up well-constructed websites to recruit knowledge workers from various sources, such as overseas recruitment and the Research and Development Substitute Service programme. Thus, hypothesis 1.3 was devised to test:

Hypothesis 1.3: Company websites were more popularly adopted by non-private organisations in knowledge worker recruitment.

Hypotheses for knowledge worker selection

Based on Harvard framework of strategic human resource management, Beer et al (1984) argued that the workforce characteristics could influence the organisation's choice of HRM policies for human resource flow. As Alvesson (2001) indicated, knowledge workers were usually well-educated and educational background of the applicants could be one of the most important criteria for the organisations in the process of selecting knowledge workers. Because the non-private organisations were R&D institutes and most of the jobs there were R&D-oriented work, the hypothesis was devised to test whether the non-private organisations emphasised the applicant's educational qualification in the selection process.

Hypothesis 2.1a: Applicants' educational background was more important to non-private organisations than the other two groups of organisations in the selection of knowledge workers.

As discussed in chapter 2, individual knowledge is valuable not only for the existence of explicit knowledge but also tacit knowledge. Nonaka (1994) suggested that knowledge could be created through the dynamic interaction between explicit and tacit knowledge at the individual level. Hedlund (1994) argued that individual tacit knowledge could move up to a group level when team worked in a complex work, and even to an organisation level to form the corporate culture. Empirically, Lin (2006) found that western-owned firms emphasised knowledge worker's work experiences in the selection process. Therefore, the hypothesis was devised to confirm whether this finding was sustainable.

Hypothesis 2.1b: Applicants' work experience was more important to foreign-owned firms than the other two groups of organisations in the selection of knowledge workers.

Schuler et al (1993) proposed an interactive framework of strategic human resource management for multinationals, suggesting an organisations international orientation would influence their human resource practices. As English is popularly used as an international language that helps the headquarters to transplant their practices through the communication process (Hsu and Leat, 2000; Huang, 2000; Lin, 2006), the hypothesis was devised to examine the argument that foreign-owned multinationals in Taiwan were more concerned with the English abilities of knowledge workers.

Hypothesis 2.1c: Applicants' English ability was more important to foreign-owned firms than the other two groups of organisations in the selection of knowledge workers.

Wright et al (2001) noted that knowledge has become a focal point in the strategy literature within the resource-based paradigm. That is, firms could gain the competitive advantage by better integrating and applying specialised knowledge to surpass their competitors. Schuler and Jackson (1987) suggested that organisations which adopted an innovative strategy would tend to recruit externally. Starbuck (1992) explained that the new recruits could enhance the organisation's human capital and in turn to enrich their 'stock' of knowledge by bring in the knowledge/technical skills that are currently valued by the organisations or with future potential. Empirically,

Huang (2000) found in his research that American firms preferred to acquire the skills and talent they needed externally. Thus, a hypothesis was devised to examine whether foreign-owned firms emphasised more the individuals' abilities of knowledge workers in the selection process.

Hypothesis 2.2: Individuals' abilities were more important to foreign-owned firms than the other two groups of organisations in the selection of knowledge workers.

Linking to business strategy to HRM strategy, Schuler and Jackson's (1987) suggested that organisations adopting an innovative strategy would tend to consider their human resource planning and development from a long term perspective, and provide broader career paths to employees. Baron and Hannan (2002) studied high technology start-up firms, revealing that the employees' long-term potential could be one of the selection criteria for knowledge workers to high technology firms. As the non-private organisations focused on researching advanced technology and developing innovative products, the hypothesis was devised to test the argument that non-private organisations may place more emphasis on knowledge worker's potential in their selection process, than foreign-owned and Taiwanese-owned firms.

Hypothesis 2.3: Candidates' development potential was more important to non-private organisations than the other two groups of organisations in the selection of knowledge workers.

Drawing from the perspective of strategic human resource management, Jackson and Schuler (1995) suggested that technology was one of the internal organisation contextual factors that would influence the adoption of human resource practices. Because of the development of web-based technology, it was very popular for organisations to set up websites and use the websites as a tool to attract and recruit employees. Technologically, the organisations could ask applicants to apply for a job through on-line mechanisms and enforce the applicants to submit certain required information to their data base. The interviews with the human resource managers revealed that non-private organisations in particular required the applicants to provide biographical information through the on-line job application system, because such information may help them to evaluate the fit between applicants and the

organisations. Therefore, the hypothesis regarding to the selection tool for knowledge workers was devised:

Hypothesis 2.4: Biographical information was more popularly adopted by non-private organisation firms than the other two groups of organisations in knowledge worker selection.

The organisational ownership is another contingent factor that could influence the organisational human resource practices and process (Schuler, 1992; Schuler et al, 1993). The literature suggested that the national ownership of organisations would influence the HR practices in their subsidiaries through the influence of headquarter culture (Huo and Von Glinow, 1995; Yuen and Kee, 1993). According to the study of Chien and Chen (2007), a cognitive test was one of the major selection tools used by Taiwanese-owned high technology firms, which may be because the Taiwanese-owned firms emphasised the fit between employees' characteristics and organisational culture. Thus, a hypothesis was devised to test whether there was a significant difference in using cognitive tests between the organisations with a Taiwanese origin and foreign-owned firms.

Hypothesis 2.5: Cognitive tests were more popularly adopted by the organisations with a Taiwanese origin than the foreign-owned firms in knowledge worker selection.

Following the rationale of the impact of ownership through the national culture, Hsu and Leat (2000) found that Taiwanese-owned firms frequently used a written test as a selection tool to evaluate the candidate's abilities. Considering the impact of industry characteristics, because one of the characteristics of high technology industry is the highly globalised product market and English is a popularly used international language in the global market, the hypothesis was devised to test whether English test was an important selection tool for Taiwanese-owned firms.

Hypothesis 2.6: English tests were more popularly adopted by Taiwanese-owned firms than the other two groups of organisations in knowledge worker selection.

As for the foreign-owned firms, the literature suggested that interviewing was commonly used in a western context (Cook, 2004; Millmore, 2003; Newell, 2005). Interviews provided the chance to both the candidates and organisations to exchange the information, such as job-related and organisational information, as well as worker's expectations (Iles and Salaman, 1995). As Yuen and Kee (1993) indicated that the subsidiaries' HR practices could be influenced by the headquarters, the hypothesis was devised to test whether foreign-owned firms used interviews more than the other two groups of organisations to select knowledge workers.

Hypothesis 2.7: Interviews were more popularly adopted by foreign-owned firms than the other two groups of organisations in knowledge worker selection.

In addition, references were another popular selection tool used in a western context (Cook, 2004; Millmore, 2003; Newell, 2005). Considering the influence of headquarter culture to subsidiaries' HR practices, the hypothesis was devised to test whether foreign-owned firms more frequently used references than the other two groups of organisations to select knowledge workers.

Hypothesis 2.8: References were more popularly adopted by foreign-owned firms than the other two groups of organisations in knowledge worker selection.

Hypotheses for factors that influence knowledge workers' selection of their employers

Linking business strategy to HRM strategy, Schuler and Jackson (1987) suggested the organisations which adopted innovative strategies tend to offer high base salaries to their employees. The literature review in the previous chapters also concluded that pay is one of the most important items concerning knowledge workers (Horwitz et al, 2003; May et al, 2002). As the foreign-owned high technology firms tended to adopt a more innovative strategy rather than a cost-reduction strategy, the hypothesis was devised to test whether foreign-owned firms offered a higher base salary to knowledge workers in line with their business strategy.

Hypothesis 3.1a: Base salary was more important to knowledge workers in foreign-owned firms than those in the other two groups of organisations when they selected their employers.

Schuler and Jackson (1987) also suggested that the organisations adopting innovative strategies tend to offer long-term incentives and emphasised group orientation. In the context of Taiwan's high technology industry, the employee ownership bonus programme was widely adopted by Taiwanese-owned high technology firms and the availability of employee ownership bonus was firstly decided by the whole organisation's performance (Chen and Huang, 2006). Thus, considering the adopted business strategy and the group orientation in national culture, the hypothesis was devised to test whether the employee ownership bonus was more attractive for knowledge workers in Taiwanese-owned firms.

Hypothesis 3.1b: The employee ownership bonus programme was more important to knowledge workers in Taiwanese-owned firms than those in the other two groups of organisations when they selected their employers.

Schuler and Jackson (1987) suggested that a flexible package in the compensation strategy was suitable for the organisations adopting innovative strategies. The empirical research found that benefits, especially tailor-made benefits plans (such as childcare facilities), would affect knowledge worker's employment decisions (Amaram, 2005; Lockwood and Ansari, 1999). In Taiwan's high technology industry, the non-private organisations were particularly well-known for their attractive benefits programmes utilised to attract overseas professionals. Therefore, the hypothesis was devised to test whether benefits would influence knowledge worker's decision to join the non-private organisations.

Hypothesis 3.2: Benefits were more important to knowledge workers in the non-private organisations than those in the other two groups of organisations when they selected their employers.

Linking the innovative strategies with human resource strategies, Schuler and Jackson (1987) suggested that organisations should conduct a planned and systematic training

and development programme. Since the value of knowledge workers is mostly determined by the knowledge/skills they possess, a number of researchers have also suggested that the organisations should keep investing in training programmes to continuously enhance the knowledge workers' knowledge/skills and employability (Amaram, 2005; Horwitz et al, 2003; Kalra, 1997). As the non-private organisations were renowned as knowledge-intensive institutes that offered well-planned training programmes in Taiwan's high technology industry, the hypothesis was devised to test whether the practice of offering good training programmes was helpful for non-private organisations to successfully recruit knowledge workers.

Hypothesis 3.3: Good training programmes were more important to knowledge workers in the non-private organisations than those in the other two groups of organisations when they selected their employers.

Based on the Harvard framework, Beer et al (1984) argued that the workforce characteristics could influence the organisational human resource flow. The literature reviews suggested that knowledge workers are considered as an 'elite' or a 'golden collar' group who need a good working environment and good employment conditions (Alvesson and Robertson, 2006; Kelley, 1990; Newell et al, 2002). For example, Horwitz et al (2003) suggested that the organisation should create a working environment which allows the employees to work in a flexible manner. Similarly, Lockwood and Ansari (1999) also found that the practices of a flexible work environment (e.g. flexible work schedule), telecommunications and good work conditions (for example, good physical work environment) attracted applicants. As western culture is more individual-oriented (Hofstede, 1980) and the organisation's HRM policies and practices could be influenced by the headquarters, it may be possible that foreign-owned firms would adopt more flexible management practices for their knowledge workers. Thus, the hypothesis was devised to test:

Hypothesis 3.4: Flexible management practices were more important to knowledge workers in the foreign-owned firms than those in the other two groups of organisations when they selected their employers.

Drawing from a strategic human resource perspective, Schuler and Jackson (1987) adopted a behavioural approach, suggesting that the HR practices should encourage their employees to have highly creative and innovative behaviours when the organisations adopt an innovative strategy. The non-private organisations adopted a highly innovative strategy as their key mission was to facilitate Taiwan's technological development and industrial innovation, under the support of the Taiwanese government. Therefore, their policies and practices were designed to encourage their knowledge workers to behave independently and autonomously to conduct the research the workers were interested in. Thus, the hypothesis was devised to test whether the HR policies and practices of encouraging innovative activities in non-private organisations were helpful to their recruitment of knowledge workers.

Hypothesis 3.5: The organisation's encouragement of innovation with supported practices was more important to knowledge workers in non-private organisations than those in the other two groups of organisations when they selected their employers.

In view of the knowledge workers' characteristics, Newell et al (2002) indicated that knowledge workers were considered as a 'golden collar' group who need a good working environment. Under the support of the Taiwanese government, the non-private organisations created a very comfortable physical work environment in Hsinchu Scientific Park to attract highly capable knowledge workers, particularly overseas professionals. Therefore, the hypothesis was devised to test whether the good working environment was helpful for non-private organisations to recruit knowledge workers.

Hypothesis 3.6: A comfortable physical working environment was more important to knowledge workers in non-private organisations than those in the other two groups of organisations when they selected their employers.

Jackson and Schuler (1995) proposed an integrative framework for understanding HRM in context, suggesting the societal outcomes, such as productivity, quality of life or human capital development, would feedback to influence the organisational HRM practices. Based on previous research, the individual company's characteristics may influence the knowledge worker's employment decisions. For example, a firm's

reputation was found to have positive effects of attracting applicants and perceived applicant quality (Collins and Han, 2004; Orlitzky, 2007). As the foreign-owned firms that could set up subsidiaries in Taiwan may have international brand names, the hypothesis was devised:

Hypothesis 3.7: The company's reputation was more important for knowledge workers in foreign-owned firms than those in the other two groups of organisations when they selected their employers.

Beer et al (1984) suggested that the business conditions were one of the situational factors that could influence the HRM in the human resource flow. Linking HR strategies with the knowledge management systems, Haesli and Boxall (2005) found that the company with advantages in market position and R&D capabilities were more attractive in the recruitment of knowledge workers. As foreign-owned firms that set up subsidiaries in Taiwan may have certain competitive advantages in their capabilities of marketing, finance or research and development, the hypothesis was devised:

Hypothesis 3.8: The company's competitiveness was more important for knowledge workers in foreign-owned firms than those in the other two groups of organisations when they selected their employers.

Lockwood and Ansari (1999) also suggested that the reputation of a company's technological innovation was important to IT recruits. As the non-private organisations had a good reputation in technological innovations, their strong R&D capabilities might attract applicants. Thus, the hypothesis was devised:

Hypothesis 3.9: The organisation's R&D abilities were more important to knowledge workers in the non-private organisations than those in the other two groups by organisations when they selected their employers.

Beer et al (1984) suggested that the workforce characteristics should be one of the situational factors that could influence the adoption of HRM policies and practices. One of the characteristics of knowledge workers is that they are strongly driven by

intrinsic motivation, such as challenging work, learning opportunities and interesting work (Haesli and Boxall, 2005; Horwitz et al, 2003; May et al, 2002). May et al (2002) indicated that knowledge workers desired learning opportunities to further develop their knowledge, strengthen their expertise and enhance their mobility in their career choices, as well as influential powers over work-related decisions. As western culture is more individual-oriented, the foreign-owned firms may pay more attention to work design that provides individual fulfilment of intrinsic rewards to knowledge workers, such as challenging work, personal interests, influential power over work-related decisions and opportunities to strengthen their skills and experiences. Thus, the hypothesis was devised:

Hypothesis 3.10: The intrinsic values that provide individual fulfilment were more important to knowledge workers in foreign-owned firms than those in the other two groups of organisations when they selected their employers.

In addition, the firm's abilities to provide knowledge workers' with opportunities to access new technology were found to be attractive to knowledge workers (Haesli and Boxall, 2005; Lockwood and Ansari, 1999; Strokes, 2000). Being R&D institutes, the non-private organisations should be able to provide their workers with more opportunities to access new technology, enabling their knowledge workers to keep updating their knowledge.

Hypothesis 3.11: The availability of new technology and learning from work were more important to knowledge workers in the non-private organisations than those in the other two groups of organisations when they selected their employers.

In view of the characteristics of knowledge workers, Swart (2008) noted that knowledge workers interacted closely with their colleagues, collaborated frequently and paid attention to the relationships with their colleagues due to the requirements of cooperation in their knowledge work and the long periods of time spent working together. In Chinese society, 'Guanxi', 'Ren-Ching' and harmony are widely rooted concepts to local people. Therefore, it may be possible that the knowledge workers in Taiwanese-owned firms would lay more emphasis on the relationships with their team

members and the opinions of their friends and family when selecting their employers. Therefore, the hypothesis was devised:

Hypothesis 3.12: Relationships were more important to knowledge workers in the Taiwanese-owned firms than those in the other two groups of organisations when they selected their employers.

One of the characteristics of knowledge workers is that they often spend long hours at work, and the distinctions between work life and home life have become blurred (Chen et al, 2008; Davenport et al, 1996; Horwitz et al, 2003). Schuler and Jackson (1997) suggested that organisations adopting an innovative strategy should put the focus on worker's quality of work life rather than the productivity. Chen et al's (2008) research revealed that work-life balance was an important issue for knowledge workers. As the non-private organisations were non-profit research institutes and they pursue a highly innovative strategy, their knowledge workers have less pressure to commercialise their knowledge/technology than those in privately-owned firms and enjoy more autonomy to decide what to do and when to do, when conducting the innovative activities. Therefore, the hypothesis was devised:

Hypothesis 3.13: Work-life balance was more important to knowledge workers in the non-private organisations than those in the other two groups of organisations when they selected their employers.

Hypotheses for knowledge worker retention

Beer et al (1984) suggested that the workforce characteristics should be one of the situational factors that could influence the adoption of HRM policies and practices. Pay, or total compensation, is often found to be the most important item that affects knowledge workers' job satisfaction and commitment (Haesli and Boxall, 2005; Horwitz et al, 2003). Han (2003) indicated that Taiwanese high technology firms popularly adopted the practice of employee ownership bonus programmes, which often resulted in a higher total compensation to knowledge workers in Taiwanese firms than in foreign-owned firms. Based on the previous review, the hypothesis was devised:

Hypothesis 4.1: The employee ownership bonus programme was more important to knowledge workers in Taiwanese-owned firms than those in the other two groups of organisations for knowledge worker retention.

Linking an innovative strategy to human resource management, Schuler and Jackson (1987) suggested the adopted HR practices should encourage the workers to behave highly independent and autonomous. As the non-private organisations took an extremely highly innovative strategy and their HR practices allowed a highly degree autonomy of knowledge workers, the hypothesis was devised to test whether the flexible management practices in non-private organisations helped them to retain knowledge workers.

Hypothesis 4.2: Flexible management practices were more important to knowledge workers in non-private organisations than those in the other two groups of organisations for knowledge worker retention.

Schuler and Jackson (1987) also suggested the HR practices should encourage highly creative and innovative behaviours of workers to facilitate the innovative strategy in the organisations. As the non-private organisations were research-oriented institutes that aimed to research advanced technology to facilitate the industrial development of Taiwan's high technology industry, the non-private organisations were renowned for their innovative policies and activities. Thus, the hypothesis was devised:

Hypothesis 4.3: The organisation's encouragement of innovation with supporting practices was more important to knowledge workers in non-private organisations than those in the other two groups of organisations for knowledge worker retention.

As described earlier, Beer et al (1984) suggested that the workforce characteristics could influence organisation's HR policy choices. Newell et al (2002) argued that knowledge workers were a 'golden collar' group, demanding good employment condition, such as a comfortable working environment. To attract knowledge workers, the non-private organisations created a very comfortable physical work environment in Hsinchu Scientific Park under the support of the Taiwanese government. Therefore,

the hypothesis was devised to test whether the good working environment was helpful for non-private organisations to retain knowledge workers.

Hypothesis 4.4: A comfortable working environment was more important to knowledge workers in non-private organisations than those in the other two groups of organisations for knowledge worker retention.

Beer et al (1984) suggested that the business conditions were one of the situational factors that could influence organisation's human resource flow. Haesli and Boxall (2005) found that the company's competitiveness could influence knowledge workers' employment decisions. As foreign-owned firms that could set up subsidiaries in Taiwan may have certain competitive advantages in their capabilities of marketing, finance or research and development, the hypothesis was devised to test whether the competitiveness of foreign-owned firms was one of the important factors that could influence the intention to stay for knowledge workers.

Hypothesis 4.5: The companies' competitiveness were more important to knowledge workers in foreign-owned firms than those in the other two groups of organisations for knowledge worker retention.

Beer et al (1984) indicated that the organisational long-term consequences, such as organisational effectiveness, would feedback to influence the stakeholders' interests and the organisational human resource flow. Tyson (1997) suggested that the organisations could emphasise the company's values and vision in knowledge worker management. Thus, the hypothesis was devised:

Hypothesis 4.6: The companies' potential was more important to knowledge workers in foreign-owned firms than those in the other two groups of organisations for knowledge worker retention.

Beer et al (1984) suggested that the workforce characteristics were one of the situational factors that could influence an organisation's human resource flow. In view of the knowledge workers' characteristics, Swart (2008) indicated that knowledge itself becomes the focal point to knowledge workers, so they expect to

develop their knowledge and receive feedback about using their knowledge by participating in challenging projects. Haesli and Boxall (2005) revealed in their research that knowledge workers were concerned more about the intrinsic factors than external factors, such as the company's ability to offer interesting jobs, challenging jobs or skill development opportunities. Therefore, the hypothesis was devised:

Hypothesis 4.7: Intrinsic rewards were more important to knowledge workers in foreign-owned firms than those in the other two groups of organisations for knowledge worker retention.

In view of skill development opportunities, Haesli and Boxall (2005) found that one of the most important retention strategies for knowledge workers was the firm's ability to provide leading-edge technology. This may be the case for the non-private organisations that were positioned as research institutes. Thus, the hypothesis was devised:

Hypothesis 4.8: The opportunity to access new technology was more important to knowledge workers in the non-private organisations than those in the other two groups of organisations for knowledge worker retention.

Linking business strategy to HRM strategy, Schuler and Jackson (1987) suggested that the organisations adopting an innovative strategy should adopt HR practices that emphasised the workers' quality of work life. Empirically, Chen et al (2008) found that knowledge workers were concerned about their work-life balance, which was one of the key reasons for the high turnover rates in Taiwan's high technology firms. Being research institutes, the non-private organisations provide a campus-like working environment and practices to facilitate knowledge creation. Unlike the firms in the private sector which are usually pressured into launching new products within certain time limits, their knowledge workers are allowed much more time to work on their projects, which may enable their workers to take better care of their work-life balance. Accordingly, the hypothesis was devised:

Hypothesis 4.9: Work-life balance is more important to knowledge workers in the non-private organisations than those in the other two groups of organisations for knowledge worker retention.

Newell et al (2002) indicated that knowledge workers were an 'elite' group, demanding good employment condition, such as a high pay. Swart (2008) similarly argued that pay was important to knowledge workers as it reflects their status and value of knowledge/skill they possessed. Schuler and Jackson (1987) suggested the compensation strategies for organisations adopting an innovative strategy should include, for example, high base salaries and a flexible package. In Taiwan, Taiwanese-owned firms usually offer high incentives of employee ownership bonuses with a lower base salary. Although Han (2003) indicated that such practices might result in higher total compensation to knowledge workers, Chen et al (2008) questioned about the effectiveness of a lock-in style of employee bonus programme to retain knowledge workers. Chen et al (2008) found in their research that the employees in Taiwanese-owned firms often left the companies after the lock-in employee bonuses were due. It may imply that the effectiveness of a lock-in style of employee ownership bonuses for knowledge worker retention was not as great as the firms expected. To examine the effectiveness of retention practices, the hypothesis was devised to test whether a no lock-in style of employee ownership bonus programme was more effective to retain knowledge workers, from the views of knowledge workers.

Hypothesis 5.1: The no lock-in type of employee ownership bonus programmes was perceived by knowledge workers to be a more effective retention practice for Taiwanese-owned firms than the other two groups of organisations.

Beer et al (1984) suggested that the situational factors, such as the business strategy, business conditions and management philosophy, could influence organisational human resource flow. Strokes (2000) indicated that the company's vision could be one of the competitive differentiators in the recruitment and retention strategies for knowledge workers. Thus, the hypothesis was devised to test whether the organisational emphasis on company's vision could be effective to retain knowledge workers, from the views of knowledge workers.

Hypothesis 5.2: The companies' vision was perceived by knowledge workers to be a more effective retention practice for foreign-owned firms than the other two groups of organisations.

In short, the aim of this research is to identify the vital recruitment/selection and retention human resource practices for knowledge workers, taking the example of high technology organisations in Taiwan. It further attempts to compare whether there were differences existing in different types of organisation ownership group. The methodologies used to collect and analyse the data in an attempt to examine the hypotheses and answer the research questions will be discussed below.

5.2 Research philosophy

Research philosophies are important since they may reflect the assumptions of the researchers, and influence the research approaches selected by the researchers. Basically the different research paradigms take different stances for the issues of ontology and epistemology, concerning the questions of 'what is the reality' (ontology) and 'how we know the reality' (epistemology). Accordingly, the researcher would use different research strategies and methods to conduct the study. In business studies, the epistemological positions are generally positivist or interpretivist and the ontological positions as either objectivist or constructivist (subjectivism) (Bryman and Bell, 2003; Saunders et al, 2009). In short, the two main perspectives that differentiate the nature of research could be identified as positivist research and interpretivist research (Anderson, 2004).

A positivist approach draws attention to an epistemological position that "advocates the application of the methods of the natural sciences to the study of social reality and beyond" (Bryman and Bell, 2003: 14). Ontologically, positivism reflects an ontological position of objectivism, which considers the social phenomena as an external reality that is independent and observable (Bryman and Bell, 2003; Lincoln and Guba, 2003; Saunders et al, 2009). Like natural scientists, positivist researchers

are assumed to play the role of objective analysts, taking a detached manner to collect and interpret the data (Anderson, 2004; Saunders et al, 2009). Thus, quantitative data is usually collected and analysed, based on objective and scientific methods.

By contrast, an interpretivist approach provides a different epistemological position by emphasising that the "human sciences were fundamentally different in nature and purpose from the natural sciences" (Schwandt, 2003: 295). Interpretivism mainly holds an ontological position of constructivism, concerning the social phenomenon or 'facts' as a product of human interaction. It suggests that in order to understand the reality of the social world, it is important to understand individuals' perceptions of the world and gather the meanings that constitute their actions. Compared with the positivist approach, an interpretivist approach is concerned less with numbers but more with words, observations and meanings (Cresswell, 1994). With this stance, qualitative data which show the reasoning and feeling of people are more important for understanding the situation in human resource management. Accordingly, a more subjective interpretation would be involved in data analysis, aiming to provide explanations and arguments in terms of depth, nuance, complexity and roundedness of data (Mason, 2002: 65).

The ontological position in this research is near objectivism, considering there is a reality existing externally which could be observable. Therefore, the data collection and data analysis will be conducted in a detached and objective manner as much as possible. In terms of epistemology of how to understand the reality, the researcher may stand between the two extremes of positivism and interpretivism. On one hand, the researcher shares the viewpoint of positivism that the social science may apply the scientific and objective approaches to collect and explain the data. On the other hand, however, several researchers argued that the distinctions between the positivist and interpretivist approaches might be overstated (Anderson, 2004; Gill and Johnson, 2002; Robson, 2002). For example, while positivism emphasises the importance of the objective and detached manner taken by the researcher, the manner of detachment is argued since the interpretation of observations is still drawn from the researcher's bias and hypotheses (Smith, 2000). In this regard, the researcher shares the view that both the positivist and interpretivist approach provide value in understanding the phenomenon and portraying the reality. Thus, a qualitative research method that lays

an emphasis on collecting in-depth data will be used as a supplement to facilitate the quantitative research method.

5.3 Research strategies

In terms of the relationship between the theory and research, two research strategies can be identified as deductive and inductive strategies. A deductive strategy suggests that a theory should be developed before observation or case studies, whilst an inductive strategy suggests that theory should be the outcome of research (Bryman and Bell, 2003). In view of the research process, a deductive strategy starts from developing a theory, followed by setting up hypotheses derived from the theory and testing the hypotheses. Based on the results of testing, the researcher may confirm, revise or refine the theory accordingly. In addition, a deductive research strategy is usually accompanied by a relatively more objective and scientific research procedure to enhance the possibility of replicating the research.

In contrast to the deductive approach that aims to 'test' the theory, an inductive strategy aims to 'build' the theory (Saunders et al, 2009). A comparison of the deductive and inductive strategies is listed below.

Table 5.1 Comparison of deductive and inductive strategies

Items	Research Strategies	
	Deductive	**Inductive**
Relationship between theory and research	Start with theory and test / refine theory	Theory is the outcome of observation / research
Principle of phenomena analysis	In terms of variables	In terms of issues
Preferred form of data	Quantitative data	Qualitative data
The relationship between the researcher and the research	Data should be collected by 'dispassionate' researchers	Researchers cannot be wholly dispassionate – they are involved and will influence situations to various degrees (often unintentionally).
Research purpose	Casual explanation; Descriptive research	Exploration; Descriptive research
Research concern	Formulating generalisable conclusions	Generating 'rich' data is as important (or more important than) the ability to generalise

Source: based on Anderson (2004), Bryman and Bell (2003); compiled by author

In this research, the researcher chose to adopt a deductive research strategy that has the advantage of a higher capability of generalisation and replication for the research. It helps to portray reality through a relatively objective and scientific procedure and identify the relationship of two variables.

Adopting a deductive strategy suggests that the hypotheses should be devised first and followed by observation (Smith, 2000:9). Based on the literature review that suggested the HRM practises may not be universal but could be 'context-specific', the hypotheses were devised to test whether different organisations within various ownership groups may use different recruitment and retention practices for the management of knowledge workers. In addition, adopting a deductive strategy implies that quantitative data would be collected and analysed as the main source of evidence.

The choice of adopting a deductive strategy is related to the choice of type of research.

In terms of the nature of research, a deductive strategy is suitable for providing descriptions of phenomena or causal relationships. This research will endeavour to discover effective recruitment and retention methods for knowledge workers in Taiwan. This study is based on descriptive research, as it portrays a picture of the effective recruitment and retention practices for knowledge workers in Taiwan.

5.4 Research methods

The research methods include quantitative and qualitative ones. The main distinctions that differentiate quantitative and qualitative research methods draw from the different epistemological positions and techniques of data collection and analysis (Bryman and Bell, 2003). A quantitative research method collects quantitative data, in line with a positivist epistemology and a deductive research strategy. By contrast, a qualitative research method collects qualitative data, in line with an interpretivist epistemology and an inductive research strategy.

In this research, both quantitative and qualitative research methods were employed. Tashakkori and Teddlie (2006) suggested that the reasons for using multiple methods are to provide better opportunities for the researcher to answer the research questions and validate the research findings. Accordingly, a quantitative research method that emphasised the collection of numerical data in a systematic way was used as the main research method, aiming to understand the recruitment, selection and retention practices for knowledge workers from the workers' perspective. The numerical data collected from the questionnaires helps the researcher to portray a picture of the effective recruitment and retention practices for knowledge workers in Taiwan by collecting 'broad' data through scientific procedures. In line with the research philosophy and adopted research strategy, the data analysis was conducted in an objective manner.

However, one of the weaknesses of quantitative research is that the depth of data is sacrificed for the breadth of data (Anderson, 2004: 50). Thus, a qualitative research method was adopted as a supplement to facilitate the quantitative research method.

This multi-methods approach to the data collection helped to corroborate the findings from other sources. The qualitative information was over and above that of the quantitative data, such as the organisation's responses to the recruitment and retention difficulties for knowledge workers. Therefore, it enabled the researcher to collect more insightful comments from the perspective of the employer and offer a better understanding for the research findings.

Three sources of data were collected in this study, which will be described as follows.

5.4.1 Questionnaires

Questionnaires were adopted as the main data collection technique mainly due to the considerations of suitability for the nature of the research. Questionnaires are suitable for descriptive and explanatory research. This research is descriptive in that it aims to identify effective recruitment, selection and retention practices of knowledge workers in Taiwan and further to discover the impact of the organisation ownership type on the organisations' adoption of HR strategies and practices.

Laws et al (2003: 306) describe a questionnaire as a written list of questions, which could be given or posted to respondents who fill them in themselves (i.e. self-completion questionnaire), or used by researchers who ask the questions verbally and then fill in the answers. Anderson (2004) suggested that there were six methods of questionnaire administration, including a postal questionnaire, a delivery and collection questionnaire, a telephone interview, a face-to-face interview, e-mail surveys and web-based surveys. While face-to-face and telephone interviews are administered by a trained interviewer, the remaining four types of questionnaires are self administered (De Vaus, 2002; Saunders et al, 2009). As the process of face-to-face and telephone interviews are conducted like interviews, self-completion questionnaires were used in this study due to the advantages of questionnaires discussed as follows.

Many researchers have discussed the strengths and weaknesses of questionnaires (Bryman and Bell, 2003; De Vaus, 2002; Laws et al, 2003; Oppenheim, 1992). In

terms of the strengths of questionnaires, firstly, a questionnaire is a relatively cheap and quick way to collect large amounts of data. Compared with face-to-face interviews, a questionnaire has lower administrative costs due to savings in travelling expenses and travelling time. In addition, a self-completed questionnaire also saves the time which would be spent in conducting the interview in person. It is especially beneficial to researchers if the research participants are geographically dispersed.

Secondly, it may remove the 'interviewer effect' (Laws et al, 2003: 309) since all respondents receive a standard packaged questionnaire and answer the questions accordingly. Thus, it may help reduce bias or misleading influence generated from direct interaction with the interviewer. In addition, it may be easier for the researcher to analyse the data collected from a questionnaire, if proper questionnaire design and pre-coding (i.e. assigning categories to data) are prepared in advance.

Thirdly, from the research participant's perspective, it is convenient and flexible for the respondents because they can choose the time, place and speed at which they feel comfortable to complete the questionnaire. Moreover, a questionnaire allows a higher degree of anonymity and confidentiality for the respondents, especially if they have concerns about some sensitive issues.

By contrast, questionnaires have certain weaknesses. Firstly, the response rate may be low. Since questionnaires enjoy a greater degree of anonymity, it is difficult to control the responses of the research participants. Secondly, it is difficult to ask a lot of questions because the respondents may feel too tired to complete the whole questionnaire. This may result in a lot of missing data, or further reduce the response rate of the questionnaire. Thirdly, there is a lack of flexibility in view of the nature of 'standard pre-packaged' questionnaires. As a result, it is impossible to probe the respondents for further information or explanation.

To mediate the disadvantages of questionnaires, mainly the concerns about response rates, several actions were taken. For example, pilot tests were conducted to gauge the questionnaire length and the questionnaires were distributed in person or by e-mail, at the convenience of respondents. Although a considerable amount of time was spent

on questionnaire preparation and administration before they were sent out, this helped to ensure the reliability and validity of the questionnaire.

5.4.2 Interview

Interviews were adopted in this research to investigate the current recruitment, selection and retention practices for knowledge workers, from the perspective of the employer. The findings from the interviews could be used to reinforce the results from questionnaires or probe explanations for the statistical results and further information that was not collected through the questionnaires.

Interviewing involves the researcher gathering data corresponding to the research questions through interactions with people, such as asking them questions, listening to their answers, observing them and analysing their use of language and their construction of discourse (Mason, 2002: 63). There are three types of interviews: structured, semi-structured, and unstructured. Structured interviews are standardised interviews in which the interviewer formulates a set of questions and asks every respondent exactly the same questions in the same order. It is generally considered to be a quantitative research method.

Semi-structured and unstructured interviews are usually regarded as a method of qualitative interviewing. Mason (2002: 62) defined the term 'qualitative interviewing' as "in-depth, semi-structured or loosely structured forms of interviewing". In semi-structured interviews, the interviewer would prepare a list of themes or questions as an 'interviewer guide', and adjust the questions according to the various contexts of organisations and backgrounds of interviewees. Compared with semi-structured interviewing, unstructured interviewing is more informal and loosely structured. There is no list of questions predetermined by the interviewer, enabling the interviewee to respond to the themes or questions freely.

In this research, the researcher plans to interview human resource personnel in various organisations by using semi-structured interviews. There are several advantages for semi-structured interviews. Firstly, compared with unstructured interviews, semi-structured interviews allow the researcher to focus on the discussion of specific themes or questions by providing the interviewees a list of questions that cover specific topics of research interests in advance, while leaving room for interviewees to reply flexibly (Bryman and Bell, 2003: 364; Yin, 2003: 86). Secondly, interviews can generate deep, complex and insightful data, compared with surface data generated from a quantitative questionnaire. Thirdly, it allows the interviewer to reconstruct events by asking the interviewees to think back to events in the past and to describe their impact. In addition, flexibility exists in the option to conduct a telephone interview in addition to the face-to-face interview.

There are some weaknesses involved in interviewing. Firstly, the process of interviewing is hard to rigorously define, which may lead to concerns on reliability due to, for instance, the different sampling of interviewees or different adopted interview forms (i.e. unstructured or semi-structured interview). Secondly, there may be concerns over the issue of generalisation. That is, to which degree the findings from the interviews could be generalised, given the small size of the sample selected in the research. Thirdly, despite the fact that the adoption of interviews is aimed at constructing an authentic reality through the views of interviewees, it is inevitable that the interviewer has to select, judge and interpret what the interviewees talked about and how they behaved, thus possibly creating a bias.

Despite the limitations of interviews, the adoption of semi-structured interviews helped the researcher to answer the research questions more thoroughly. It was considered as a complementary method to investigate the issues from different perspectives. The data analysis was conducted consistently in as detached and objective a manner as possible that the researcher could. In addition, other sources of data, such as the collection of organisational evidence (e.g. documents), were used to examine the reliability and validity of the interviews.

5.4.3 Collection of documents

Multiple sources of evidence help to present rounded and more complete accounts of social issues and processes (Hakim, 1987; Yin, 2003). Anderson (2004: 125) summarised the reasons for the use of documentary evidence. Firstly, it could provide details about relevant events. Secondly, it could corroborate evidence from other sources. Thirdly, it could provide inferences. Bryman and Bell (2003: 403) identified several forms of documents, such as personal documents, public documents, organisational documents and mass media outputs.

In this research, public documents, such as the official statistics from the Taiwanese government, were reviewed to understand the background information of high technology industry in Taiwan. Organisational documents collected from corporate brochures and organisational websites were also used to understand the organisations' background information and human resource policies and practices. Mass media outputs, such as the organisational press releases or news, were used to trace and update the situation of particular events, such as changes in legal requirements for employee ownership bonuses and the selected organisations' responses.

5.5 Sample selections

5.5.1 Questionnaire survey

The chosen research targets were high technology organisations located in Taiwan. As the organisation ownership type was considered a significant variable that might influence the organisational recruitment and retention strategy and practices for knowledge workers, three groups of high technology organisations under various ownerships were selected; namely, Taiwanese-owned (in the private sector), foreign-owned (in the private sector) and non-private organisations (in the public/non-profit sector).

The literature review on organisational theories suggested that management for organisations in the public/non-profit and private sectors differed due to distinctive

contexts and constraints (Ring and Perry, 1985). Despite comparison of public and private organisations' management being discussed extensively (Allison, 1980; Bozeman and Bretschneider, 1994; Williamson, 1999), investigations on the management of knowledge workers between the public/non-profit and private organisations are limited. Thus, one group of organisations was selected from the public/non-profit sector.

Since 1970s, the Taiwanese government has established technology agencies that aimed to assist in the development of high technology industry by transferring technology from advanced countries and recruiting overseas Chinese scientists (Mathews and Cho, 2000). The major selected organisation that participated in the survey from the public/non-profit sector was positioned as a not-for-profit research institute, with funding partially from the government and partially from their cooperation plans with industry. This became a key technology provider that contained six core laboratories and ten application and development centres, covering areas such as electronics, optoelectronics, biomedical engineering, information and communication, energy, materials, and mechanics. The number of total employees was around 6,000 at the time when this research was conducted.

In the private sector, two groups of organisations were chosen based on the firms' national ownership. Research on multinational corporations has suggested that a firm's origin of nation is one of the factors that affect organisational human resource policies and practices (Budhwar and Debrah, 2001; Hsu and Leat, 2000; Schuler et al, 1993). However, few empirical studies have focused on knowledge worker management, particularly in the context of Taiwan. Thus, two groups of organisations including Taiwanese-owned and foreign-owned firms were selected, based on the firm's national origin.

Convenience sampling was adopted because of the data accessibility to the researcher and because the research participants were restricted to knowledge workers working in high technology industry in Taiwan. The use of convenience sampling was also found in academic research for knowledge worker management, such as in the research by Horwitz et al (2003). The biggest group of participants targeted for the questionnaire survey were engineers due to the large demand for them in high

technology industry and the critical role played by them in the firms' technology and product development. The majority of selected organisations for questionnaire distribution were large organisations which had a higher degree of formalisation and resources for the implementation of human resource policies and practices. A snowball sampling technique was used because this was an exploratory study. Because seldom researches studied the HR practices in the non-private owned high technology organisations and further compared the differences between the non-private and private-owned high technology firms, the snowball sampling technique was the easiest method to use for a mapping exercise in an exploratory study.

The researcher recognises that a snowball sampling technique is not an ideal approach due to the limitations in representativeness, which may create a sampling bias. Because of the constraints of time and resources for this PhD thesis, the researcher used the snowball sampling technique to complete the project in time. Nevertheless, the issue of the sampling bias is noted in this research, especially in relation to organisational size. As most of the research participants worked in large organisations, the survey results may mainly apply for large organisations. In addition, because most of the Taiwanese-owned firms that participated in this survey were engaged in manufacturing activities, the survey results in this research reveal the practices adopted by Taiwanese-owned manufacturing firms in the high technology industry. Although the snowball sampling is problematic in terms of its representativeness, this technique is suitable for prompt work. As few researchers have focused on studying the recruitment and retention practices for knowledge workers in Taiwan, the results in this research could be used as a basis for further study of the HR strategies and practices for knowledge workers.

5.5.2 Interview

Ten organisations under various ownerships in the high technology industry were selected, of which five were Taiwanese-owned, three were foreign-owned and two were non-private organisations. The interviewees were the human resource managers in charge of recruitment and selection activities.

Table 5.2 List of selected organisations that participated in the interview

Organisation code	Ownership	Industry sector	Number of employees
T1	Taiwanese-owned	Communications	800
T2	Taiwanese-owned	IC design	115
T3	Taiwanese-owned	Optoelectronics	2600
T4	Taiwanese-owned	Computing and communications	4000
T5	Taiwanese-owned	Computing and communications	7000
F1	Foreign-owned	Semiconductors	650
F2	Foreign-owned	Semiconductors	100
F3	Foreign-owned	Semiconductors	2300
P1	Non-private	Electronics, optoelectronics, mechanic, bioengineering, energy, etc.	6000
P2	Non-private	Information, computing and communications	1300

5.6 Data collection process

A multi-method which uses multiple methods or sources in data collection was adopted in this research. As questionnaire survey was the main method for the collection of empirical evidence, the implementation of questionnaire survey will be discussed first, followed by the implementation of interviews. The method of collection of documents was described in 5.4.3.

Regarding the questionnaire survey, the guidelines and procedures for questionnaire development have been discussed extensively by academic researchers (Churchill and Iacobucci, 2009; Gill and Johnson, 2002; Oppenheim, 1992). To sum up, questionnaire development mainly contains the steps of determining the type of questionnaire and method of administration, questionnaire design and questionnaire validation.

5.6.1 Determining the type of questionnaire and method of administration

Self-completion questionnaires were used in this study. Thus, the content of the questionnaire should be easy to follow and be understandable by the respondents (De Vaus, 2002: 123). In terms of the method of administration, a delivery and collection questionnaire was employed as the primary administration method and an e-mail survey as a secondary administration method.

Anderson (2004: 220) indicated that there are several advantages of a delivery and collection questionnaire, such as a good response rate and clear anonymity. However, it requires conducting the pre-survey contact and obtaining permission for the questionnaire delivery and collection. Therefore, the arrangement of contacting the human resource managers or line managers in selected high technology organisations for their permission and assistance in distributing and collecting questionnaires was scheduled before formally distributing the questionnaires.

Meanwhile, an e-mail based questionnaire was provided as an alternative for respondents who preferred or needed to complete the questionnaires online. As the target participants were knowledge workers working in high technology industry, they were familiar with and sometimes preferred to fill-in an internet-administered survey. The e-mail questionnaire has the advantages of speed in transmission, low cost, no geographical limits, no interviewer bias and convenience for respondents, who can complete the questionnaires at a convenient time for them (Anderson, 2004; De Vaus, 2002). During the data collection period, the online questionnaire enabled the researcher to collect data remotely from the U.K. after completing the collection of paper questionnaires in Taiwan.

However, an e-mail based questionnaire has several disadvantages, such as the requirement for access to the participant's email, an arrangement for respondent anonymity and a poor response rate (Anderson, 2004). To deal with these issues, several actions were taken. Firstly, on-line questionnaires were used as a supplement to paper questionnaires, and were emailed to the targeted participants upon their requests and agreements. Secondly, Google Docs was used to assist in the design and administration of on-line questionnaires. It ensured the respondent's anonymity, as the questionnaire software enabled the respondents to directly submit the completed questionnaires to the researcher without disclosing their e-mail address. In addition,

the on-line questionnaire also had the advantage of reducing the possibility of data error or missing data by enforcing the respondents to answer required questions. Finally, follow-up emails were sent out to participants to either thank them for, or remind them of participation, in an attempt to increase the response rate.

5.6.2 Questionnaire design

The design of the questionnaire is important, as firstly, it may affect the questionnaire's reliability, validity and response rate (Saunders et al, 2009: 371). Secondly, after receiving the responses of questionnaires, it is often difficult to collect additional information from the respondents (De Vaus, 2002). Hence, it is necessary for the researcher to think carefully about questionnaire design and development. Anderson (2004: 212) suggested the questionnaire design in a survey should consider the survey strategy, question structure, questionnaire design and pilot testing.

1. Survey strategy: It is important to specify the key issues to be included in the questionnaire. In other words, the researcher should specify what information will be sought (Churchill and Iacobucci, 2009). In this research, the key issues included the recruitment, selection and retention of knowledge workers.

   Saunders et al (2009) identified three types of data variables, including opinions, behaviour, and attributes. In the first part of questionnaire, attribute data contains the information on respondents' work organisation and their demographic information. It aimed to identify the respondents' profile and the characteristics of knowledge workers. In the second part, data which investigated the workers' behaviour in their job seeking experiences and their opinions for knowledge worker recruitment and selection in their organisations were collected. In the third part, data that investigated their opinions about the factors that influenced their decisions to join and stay in their current employers was collected.

2. Question structure: This involves considerations of question format and the method of response (Anderson, 2004: 213). The question format refers to the type of questions, that is open or closed questions. In this study, closed questions were

mainly used, as they had the advantage of being easy to answer by the respondents. In addition, as the internet was also used as a method of questionnaire administration, De Vaus (2002) suggested that open-ended questions are not suitable for internet questionnaires because they are better answered verbally rather than in writing. One of the disadvantages of closed questions is that the respondent's desired answer may not be listed in the items, therefore an 'other' option was designed for those questions that collected nominal data, allowing respondents to specify their desired answers.

The method of response involves the form of questions (such as single choice or multiple choice) and the form of data (i.e. nominal, ordinal and interval data). In this study, interval data with a five-point scale (e.g. from 1 = extremely unimportant to 5 = extremely important) was the main form of data used to measure the workers' attitudes about the importance of factors that influenced their decision to join/stay in the organisation. They were also used to collect answers for other questions involving the measurement of workers' perceptions of the effectiveness of various recruitment and retention practices. Nominal data that allowed the researcher to classify responses in different groupings were mainly collected for the investigation of respondent's background information and hiring experiences.

3. Questionnaire design: Anderson (2004: 218) suggested an effective survey design should consider the questionnaire's initial request/instructions, layout, question design and final thanks/return arrangements.

   a. In the initial request section, a covering letter was attached at the beginning of this questionnaire to explain the survey purpose, confidentiality statement and the researcher's contact e-mail. For the on-line questionnaire, the submission procedure was also explained in the email.

   b. Layout: The utilisation of questionnaire software, Google Doc, assisted in the questionnaire's layout design to ensure that the questionnaire looked neat and easy for the respondents to read and answer questions. In addition,

in considering questionnaire length, it is commonly suggested that it is best not to make a questionnaire longer than necessary or be overly obsessed with length (De Vaus, 2002; Saunders et al, 2009). Therefore, a matrix of questions that put a set of questions in the form of a table was used to shorten the length of questionnaire and enable the respondents to answer the questions in a more smooth way.

c. Question design: Question design is mainly concerned with the order of questions and question wording.

- Order of questions: Anderson (2004: 218) suggested that it is better to start with 'warm-up' questions. In this study, in addition to the covering letter, the main body of the questionnaire was divided into three parts. In the first part, the respondents started by answering 'warm-up' questions of background information, such as their work organisation, occupation, educational status, gender and marriage status. The second part investigated the respondents' experiences and opinions about the recruitment and selection of knowledge workers in their current work organisations. The third part investigated the respondents' opinions about the factors that influenced their selection and retention in the organisations.

- Question wording: Many researchers have listed guidelines regarding the wording of questions (Bryman and Bell, 2003; De Vaus, 2002; Oppenheim, 1992; Saunders et al, 2009). The main question wording principles used in this research are listed below.

    o Use simple language: The questionnaire was prepared both in English and Chinese, but the version delivered to the selected respondents was in Chinese.
    o Examine whether the question could be shortened.
    o Consider whether the respondents were likely to have the necessary knowledge to answer the questions.
    o Avoid double negative questions.

- o Avoid ambiguous questions, so that only one meaning is possible in each question.
- o Avoid using wording that may generate bias.
- o Avoid incorporating any implicit assumption in the question that may result in a leading question.

d. Final thanks: In the final section, the respondents were invited to provide suggestions/comments regarding this survey to the researcher. A statement which thanked the respondents for taking their time to complete the questionnaire was added at the end of questionnaire.

4. Pilot testing: It is suggested that a pilot test of the questionnaire should be conducted to ensure the validity and reliability of the research (De Vaus, 2002: 54). The details of questionnaire's reliability and validity and the pilot testing procedure will be described in the next section.

5.6.3 Questionnaire validation

The questionnaire validation is undertaken to ensure the reliability and validity of the research. Thus, the concept of reliability and validity will be discussed first, followed by the implementation of the pilot test.

5.6.3.1 Reliability and validity

Reliability

Reliability refers to consistency, concerning whether the measurement of a concept is stable (Bryman and Bell, 2003: 76). In this regard, the study could be repeatable and the same result could be achieved under the same conditions. In other words, if the questions are given to different samples at different times, it should produce consistent findings (Saunders et al, 2009). Bryman and Bell (2003) suggested several methods for testing the reliability of measurements. The first one is test-retest method, which involves asking the same participants the same questions at a different time.

However, the problem is that it is often difficult to conduct the same test to the same participants twice (De Vaus, 2002: 52).

The second method is to examine the internal reliability, which attempts to measure the consistency of the answers from the respondent across a group of questions. One technique to test the internal reliability is the split-half method, which involves dividing the indicators into two groups and calculating the degree of correlation between these two groups. Alternatively, the coefficient of Cronbach's alpha is commonly used to examine the internal reliability. Academics have suggested that a figure of 0.7 or above would be good enough (Litwin, 1995; Nunnaly, 1978; Pallant, 2001; Schutte et al, 2000).

The third method refers to inter-observer consistency, which concerns the consistency of judgements in categorising the observation or answers of participants by two or more researchers. In this research, the coefficient of Cronbach's alpha was used to test the internal reliability, as it is a widely used statistical means to measure the internal consistency of scales in sets of items.

Validity

Validity is concerned with whether the questionnaire can really measure the concept that the researcher intends to measure. De Vaus (2002) suggested three approaches to evaluate validity, including criterion validity, construct validity and content validity. Criterion validity involves comparing the new measures of a concept with the well-established measures. A high correlation means the new measures are valid. However, this approach has problems of assuming the validity of existing measures and hard-to-find well-establish measures for many concepts in the social sciences.

Construct validity and content validity were considered in this research. Construct validity is concerned with how well the measures fit the theoretical expectations. The assessment of construct validity is usually associated with the establishment of hypotheses deducted from a theory. It emphasises the extent to which the findings can be generalised through the measures.

Content validity is concerned with the extent to which the questionnaire can accurately measure what the researcher intends to measure. Thus, it relates to the issue of whether the questions in the questionnaire can provide adequate coverage to fulfil the purpose of investigation in the research. To assess the content validity, the researcher sought guidance through literature review. In addition, the face validity was gauged by discussing with other people who were experienced in high technology organisations (Bryman and Bell, 2003: 77). For example, the feedback of respondents from the pilot test helped to indicate whether the questions were clear to the respondent and whether there were any neglected items or questions that were suggested to be added to the questionnaire.

5.6.3.2 Pilot test

Before formally conducting the survey, a pilot test should be processed first to detect any potential problems in advance, so the questionnaire could be revised accordingly to enhance the reliability and validity of the research. It may be necessary to repeat the circle of revising the questionnaire according to the respondents' feedback, and conduct the pilot test again.

In this study, several items were evaluated in the pilot test. Firstly, the respondents were asked whether they encountered any problems in completing the questionnaire and whether they answered the questions easily. This helps to examine the content validity in view of whether the respondents perceived the questionnaire to be presented in a logical and acceptable way. In addition, it helps to examine whether the questions were clear and meant the same thing to the respondents. Furthermore, it provides guidance about whether the respondents could properly respond to the questions using scales or checklists. Secondly, the respondents were asked how much time they spent on the questionnaire. This helps to shorten the questionnaire by deleting non essential questions. Thirdly, the non-response questions were checked. The non-response questions might imply that the respondents had concerns about filling in such data. On that case, it was wise to remove the sensitive questions. The process of pilot testing is presented below.

1. First pilot test: The first draft of the questionnaire was completed in April, 2007. Two of the researcher's acquaintances who had experience in high technology organisations were invited to assist in the pilot test. Both reported that the questionnaire was too long and that they had problems in answering certain questions. Accordingly, the researcher shortened the length of questionnaire by re-identifying the essential questions and revising the question wording and question format.

2. Second pilot test: The second draft of the questionnaire was revised and sent out for the pilot test by email in December, 2009. The invited participants for the pilot test were the knowledge workers who worked in the high technology organisations with various ownerships in Taiwan. During the period from December 2009 to January 2010, 23 responses were received. According to the feedback from the second pilot test, several amendments were made for the questionnaire as follows:

   a. Delete sensitive questions: After checking the non-response questions, two questions that investigated the participants' monthly salary and annual income were deleted due to the sensitivity of this issue.

   b. Add item of choices: Two respondents suggested that two items should be added in the choices for organisational retention methods. Accordingly, the items of 'lock-in employee ownership bonuses' and 'company's vision' were added in question 34 that investigated the effectiveness of the retention methods adopted by the organisations.

   c. Adjust the layout and question sequences: One participant responded that it was not easy to fill in the questionnaire due to lack of section topics that highlighted the themes for groups of questions in the on-line questionnaire. In response to this comment, the researcher added the section title that specified the investigation topic (i.e. the first part was covered basic information, the second part - job search experiences and the third part - factors that influenced decisions to join and stay in their current organisation). In addition, the order of questions was re-arranged. For example, the factors that influenced the respondent's decision to join the organisation were moved from section two to three. Thus, all the questions

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in the third part of the questionnaire were to measure the attitudes of respondents on a five-point scale, which made it easier for the respondents to answer the questions.

    d. Final questionnaire review: Two acquaintances with experience and expertise in high technology industry assisted in reviewing the refined questionnaire. The feedback was positive, as it was more clear and easy for the respondents to complete the questionnaire. The administration of the questionnaire was successfully tested in the form of both the paper and on-line questionnaire.

3. Final survey: The questionnaires were collected during the period from September 2009 to March 2010. 200 copies of the paper questionnaires were distributed to selected high technology organisations under various ownerships (i.e. Taiwanese-owned, foreign-owned and non-private organisations) and 142 responses were collected. The response rate was 71%. The on-line questionnaire was provided separately by e-mail to the workers who found it convenient to complete and submit the questionnaire via the internet. As a result, an additional 60 responses through on-line questionnaire were received. In total, 202 responded questionnaires were collected, of which 2 were invalid, resulting in 200 valid responses.

5.6.4 Interview

The interviews with the human resource managers from ten selected high technology organisations under different ownership were carried out from September 2009 to October 2010. The profile of the selected organisations is listed in table 5.2 (see page 86). Semi-structured interviewing was conducted, and a list of interview questions was provided to the interviewees before the meeting. The main topics or questions covered in the interview included the organisational background, methods used for recruitment, selection and retention, and the method used to tackle the problems of recruitment and retention, if any.

In principle, the interview started by probing for organisational and personal background information to explore the facts; follow-up questions then explored the details with comments from the interviewees. 'Leading' questions, which may involve the researcher's values or assumptions to direct the interviewees' answers, were restricted to a minimum in line with the principle of objectivity (Bryman and Bell, 2003).

In terms of the form of the interviews, one-to-one interviews were conducted, which allowed the researcher to "explore an individual's opinion in depth" (Stroh, 2000: 199). Most of the interviewees accepted face-to-face interviews, except for one interviewee who requested to use a telephone interview. The interview time ranged from one to two hours. Tape recording and taking notes were both adopted to record the answers of interviewees. Permission for tape recording was obtained from the interviewees before starting the interviews. Tape recording helped the researcher to transcribe the interview data in the later process of data analysis, enhancing the reliability of the research. In addition, the ethical principles of confidentiality and informed consent were explained to the interviewees before the meeting, aiming to attain the interviewees' consent to participate in this research and ensure the quality of data gathering (Bryman and Bell, 2003; Laws et al, 2003: 260).

5.7 Data analysis methods

5.7.1 Quantitative data analysis

The method of data analysis for quantitative data was affected by the number of variables, the level of measurement of the variables (i.e. nominal, ordinal or interval) and the purpose of using the data (i.e. descriptive or inferential purpose) (De Vaus, 2002: 203). In terms of the number of variables, univariate analysis describes one characteristic of the sample at a time and bivariate analysis concerns the analysis of two variables simultaneously.

In this research, both univariate and bivariate analyses were used. A descriptive analysis was used in the univariate analysis that dealt with one variable of the sample, such as the recruitment channels used by the knowledge workers based on their experiences. Nominal data were analysed by frequency tables which counted the frequencies of each item, while interval data were analysed by calculating the mean score of each item.

Inferential statistics were used in bivariate analyses, by testing the statistical significance, in order to determine whether there were significant differences in various variables (for instance, the importance of various factors that influenced the retention of workers) across the three organisation ownership groups. Nominal data were analysed by a Chi-Square analysis and interval data were analysed by one-way ANOVA analysis. The main reason for using bivariate analysis rather than a multi-variable analysis is because it was an exploratory study, attempted to build a map to discover the different practices used in the non-private organisations and private-owned (including foreign and Taiwanese-owned) firms for knowledge workers. Also, the sample size was not big, which precluded the conduct of multi-variable analysis.

Table 5.3 Adopted quantitative data analysis techniques in this research

		Number of Variables	
		One	Two
Type of Data	Nominal	Descriptive analysis Frequency table	Inferential statistics Chi-Square analysis
	Interval	Descriptive analysis Mean analysis	Inferential statistics One-Way ANOVA analysis

The details of analysis results will be discussed in the main findings chapters.

5.7.2 Qualitative data analysis

Anderson (2004: 169-194) suggested that a qualitative data analysis process should contain the following steps: categorising and coding data, exploring key themes and patterns, evaluating explanations and formulating conclusions. Following this guideline, the interview records of each interview were transcribed first. The data in each transcription was categorised in accordance with the research themes of

recruitment, selection and retention of knowledge workers. During the process of data categorising, the data were abstracted and reduced. Furthermore, the data were grouped based on their sources from different organisational ownerships, aiming to compare the similarity and differences in the issues for the recruitment, selection and retention of knowledge workers between different groups.

In the process of evaluating the explanations, other qualitative data of organisational evidence, such as the organisational websites and media output, were taken into account to examine the reliability and validity of the interview findings. Moreover, as the main purpose of the qualitative data was to corroborate the statistical results and offer explanations for the statistical evidence, the analysis of qualitative data was reviewed together with the statistical results to draw conclusions.

5.8 Conclusion

This chapter firstly introduced the research objectives in connection to the research enquiries and devised hypotheses in this study. Next, it discussed theoretical concerns about the methodological issues in this study, including the research philosophy, research strategies and research methods. To sum up, this study adopted a deductive research strategy that started with deducing hypotheses from theory. The research methods used to collect data included both quantitative and qualitative methods, including a self-completed questionnaire, an interview and collection of documents. The use of a multi-method data collection technique helped to corroborate the evidence from different sources, examine the research questions from different perspectives and provide more rounded understanding and explanation for the research questions. In this study, quantitative data was used as the major source of data. The qualitative information did not triangulate with the quantitative data per se, but yielded additional information. Finally, the details of implementation of data collection procedures and data analysis methods were explored, together with the considerations of reliability and validity for this research and the ethical principles of confidentiality and informed consent.

The results of the data analysis will be presented and discussed in the next three chapters.

Chapter 6 : The Recruitment of Knowledge Workers in Taiwan's High Technology Industry – Research Findings

Introduction

This chapter will analyse the recruitment channels used by the high technology firms and, in addition, the impact of organisational ownership on the use of recruitment channels for knowledge workers. Several scholars have suggested that the adoption of human resource practices are affected by the firm's origin of nation (Schuler et al, 1993) and internal organisational factors such as industry characteristics, composition of workers and ownership group (Hsu and Leat, 2000; Jackson and Schuler, 1995). Focusing on the management of knowledge workers in high technology industry in Taiwan, hypotheses were devised to test whether the recruitment channels used by the high technology firms would vary significantly with organisation ownership group. The firm's ownership was different either in its origin of nation, or its organisational characteristic of being privately or non-privately owned. Consequently, three types of organisational ownership were identified: Taiwanese-owned (private sector), foreign-owned (private sector) and non-private (public sector).

The analysis is based on data collected from the survey conducted from September 2009 to March 2010 and filled in by targeted knowledge workers, as well as interviews with human resource managers in selected high technology firms. Firstly, a descriptive analysis of respondents' characteristics will be conducted. Secondly, the chapter will analyse the recruitment channels used by the high technology firms and then comparisons across the three organisation ownership groups.

6.1 Descriptive analysis of respondents' characteristics

200 paper copies of questionnaires were distributed to selected companies in various ownerships from September to October 2009 and 142 responses were received. The response rate was 71%. An electronic copy of the questionnaire was provided separately to workers who asked to fill-in the questionnaire on-line. An additional 60 responses via on-line submission were received. This resulted in an average response

rate of 67%. The total collected questionnaires were 202, of which 2 were invalid, resulting in 200 valid responses.

Of the 200 valid questionnaires, 50.3% of respondents were from the semiconductor sector, followed by 16.6% from the optical electronics sector. The semiconductor sector in this research included foundries, DRAM and other semiconductor product/service providers. The semiconductor and optical electronic sectors are typical of the Taiwanese high technology industry, enjoying leading global positions (Chang, 2005; Mathews and Cho, 2000). In terms of the respondents' professions, 78.8% worked as engineers. The engineers broadly included R&D workers (34.8%), engineers (30.3%), programmers (4.5%) and technical support (8.5%). The remainder of the respondents included sales and marketing, and management and administration staff (such as in finance or legal departments).

The majority of respondents (93%) worked in firms which employed more than 500 employees. 1% of respondents worked in firms which employed at least 250 employees but less than 500 employees and 6% of respondents worked in firms which employed less than 250 employees. In terms of the firms' ownership group, 42% of respondents were from Taiwanese-owned firms, 23% from foreign-owned firms and 35% from non-private organisations. Foreign-owned firms consisted of American-owned (70%), European-owned (17%) and Japanese-owned (13%) firms.

Most of the respondents had a high level educational background - with 98% of the respondents found having at least a college degree. In the foreign-owned and non-private firms, none of the respondents reported a peak educational level of high school or below. There were 44.2% of the respondents with a university degree and 45.8% with a master's degree or above. Workers with a PhD degree were found only in the non-private organisations in this survey. This result echoed some academic researchers' arguments about the characteristics of knowledge workers usually having a high level of educational background (Newell et al, 2002).

In terms of the respondents' demographic analysis, 78% of respondents were male, leaving only 22% female. The number of male workers was 3.5 times that of female

workers, showing there were fewer female workers working in these high technology firms. The average age of respondents was 35.34 years old.

The marital data showed that 60.8% of respondents were married and 51.8% of respondents had no children. The average years of service for the respondents were 6.3 years and in average the respondents had worked in 2.26 companies before they joined their current company.

Table 6.1 shows the comparison of descriptive characteristic of respondents in the three ownership groups. The non-private organisation that participated in this survey was a large research-oriented institute that consisted of 10 research labs and technology / business development centres in various fields. Therefore, the respondents in this group reported a high percentage of doing R&D jobs (69%) and with a higher education level (53.5% of respondents had a master's degree and 29% had a doctorate degree).

Table 6.1 Comparison of the descriptive characteristics of respondents in the three organisation ownership groups

Variable	Item	Taiwanese-owned N=84 (42%) % / mean	Foreign-owned N=46 (23%) % / mean	Non-Private N=70 (35%) % / mean	Total N=200 (100%) Total (%/mean of per item)
Engaged products/ service (% of ownership)	Semiconductor	91.6%	24.5%	13.0%	50.3%
	Optical electronics	0.0%	0.0%	47.8%	16.6%
	Information, Computer and Telecommunication (ICT)	7.1%	45.7%	1.4%	14.0%
	IC design	1.2%	10.9%	1.4%	3.5%
	Precision mechanism	0.0%	0.0%	13.0%	4.5%
	Energy	0.0%	0.0%	11.6%	4.0%
	Other	0.0%	0.0%	11.6%	7.0%
Job nature (% of ownership)	R&D	9.6%	28.3%	69.6%	34.8%
	Engineer, programmer, tech support	73.4%	45.6%	11.6%	43.4%
	Sales & Marketing	0.0%	15.2%	8.7%	6.6%
	Management	12.0%	2.2%	2.9%	6.6%
	Other	4.8%	8.7%	7.1%	8.6%
Number of employees (% of ownership)	>500	100%	73.9%	100%	93%
	250-499	0%	4.3%	0%	1%
	<250	0%	21.7%	0%	6%
Age (Mean)		32.73	35.89	38.22	35.34
Gender (% of ownership)	Male	69%	84.8%	85.5%	78.4%
	Female	31.0%	15.2%	14.5%	21.6%
Education (% of ownership)	High school or below	4.8%	0.0%	0.0%	2.0%
	College	13.1%	4.3%	4.3%	8.0%
	University	67.9%	50.0%	11.6%	44.2%
	Master	16.9%	29.6%	53.5%	35.7%
	PhD	0.0%	0.0%	29.0%	10.1%
Marital status (% of ownership)	Single	53.6%	32.6%	24.6%	38.7%
	Married	45.2%	67.4%	75.4%	60.8%
	Divorce/separate	1.2%	0.0%	0.0%	0.5%
Child (% of ownership)	Yes	39.3%	52.2%	56.5%	48.2%
	No	60.7%	47.8%	43.5%	51.8%
Service years in the current firm (Mean)		5.6	5.08	9.84	6.96
Number of serviced companies (exclude current firm) (Mean)		2.15	2.91	1.96	2.26

6.2 Recruitment channels

In the survey, the section on recruitment channels focused on the methods used by the firms for external sourcing, considering that external recruitment was the first stage in the hiring process (Marsden, 1994). Several scholars have found that the firm's recruitment methods varied with the firm's size, industrial sector, ownership, job position of entry-level, and professional or managerial openings (Hsu and Leat, 2000; Zheng et al, 2008). However, these researchers did not focus on high technology firms or knowledge workers. The argument here is that the recruitment channels used by the high technology firms to recruit knowledge workers would vary with the firms' ownership. The ownership group considered the firm's origin of nation (Taiwanese or foreign-owned) and its organisational identity of private or non-private organisation. In addition, this study attempted to find out whether the utilisation of the recruitment channels were related to the positions of the vacancies or the targeted applicants of fresh graduates or experienced workers. In contrast to most previous research that has investigated recruitment channels from the employer's viewpoint, this research attempts to incorporate the workers' experiences and perceptions on effective recruitment channels, in addition to interviews with human resource managers highlighting the employers' perspective.

6.2.1 Effective recruitment channels for knowledge workers in the high technology industry

The first research question in this research aimed to discover the effective recruitment channels for knowledge workers and further to identify whether the use of recruitment channels may vary among the three different organisation ownership groups. In the questionnaire, the respondents were asked how they found their jobs in their current companies. The results are shown in table 6.2.

Table 6.2 Effective recruitment channels used by workers based on their actual experiences

Rank	Recruitment Channels	Frequencies	Percentage
1	Personal connections	69	34.70%
2	On-line agents	64	32.20%
3	Traditional media	11	10.10%
4	Company website	19	9.50%
5	Head hunters	9	4.50%
6	Campus	7	3.50%
7	Intern	4	2%
8	Job fair	2	1%
9	Public agency	1	0.50%
10	Other	4	2%
Total		199	100.00%

The results reveal that personal connections (34.7%) were the most effective recruitment channel, followed by on-line agents (32.2%). Personal connections meant that the workers found their current jobs through the referrals of acquaintances including friends, relatives or people who worked for the prospective employer. The results confirm the findings of Huo and Von Glinow (1995) and Hsu and Leat (2000), who also found that personal connections were the most popular method.

On-line agents were the second most effective recruitment channel after personal connections. In the Taiwanese context, Zheng et al's (2008) research indicated that high technology manufacturers in Taiwan have adopted more innovative recruitment methods of on-line recruitment to recruit managers and professionals than firms in other Asia countries. However, on-line recruitment might not be a distinctive channel for the recruitment of knowledge workers, because one particular online HR service company dominates more than 80% of the market share in on-line recruitment services (Hong , 2007) [8]. Unlike Zheng et al's (2008) research, the interviews indicated that online recruitment was more widely used in recruiting junior engineers who had either no, or less than two years, working experience.

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[8] The figure of market share is based on the report by ECtimes.
http://www.ectimes.org.tw/shownews.aspx?id=9970

6.2.2 Comparison analysis of effective recruitment channels in the three groups

To further examine whether different organisation ownership groups have preferences in the use of recruitment channels, table 6.3 shows the comparison of the top three recruitment channels used by the workers to find their current jobs. A Chi Square analysis was conducted to further examine the significance of the recruitment channels for knowledge workers. The results are revealed in table 6.4.

Table 6.3 Top three recruitment channels based on workers' actual experience in their current companies across the three organisation ownership groups

Taiwanese-owned (n=84)			Foreign-owned (n=46)			Non-Private (n=69)		
Rank	Recruitment channels	%	Rank	Recruitment channels	%	Rank	Recruitment channels	%
1	On-line agents	50	1	Personal connections	45.7	1	Personal connections	30.4
2	Personal connections	32.1	2	On-line agents	30.4	2	Company website	20.3
3	Traditional media	6	3	Head hunters	13.0	3	On-line agents	11.6
	Company website	6						

Table 6.4 Comparative analysis of recruitment channels based on workers' actual experiences in their current companies across the three organisation ownership groups[9]

	Ownership							
	Taiwanese-owned		Foreign-owned		Non-Private			
Recruitment channels	count	% of recruitment channel	count	% of recruitment channel	count	% of recruitment channel	Chi-Square	P
Company website	5	26.3%	0	0.0%	14	73.7%	15.332	0.000***
On-line agents	42	65.6%	14	21.9%	8	12.5%	25.692	0.000***
Head hunters	1	11.1%	6	66.7%	2	22.2%	10.316	0.006**
Personal connections	27	39.1%	21	30.4%	21	30.4%	3.233	0.199
Other	0	0.0%	0	0.0%	4	100.0%	7.691	0.021*

*p<0.05
**p<0.01
***p<0.001

- On-line agents for Taiwanese-owned firms

The results supported hypothesis 1.1 that Taiwanese-owned firms used on-line agents more frequently than the other two groups of organisations to recruit knowledge workers, with a statistical significance (X^2 = 25.692, p<0.001). This finding echoed the results in the researches by Hsu and Leat (2000) and Zheng et al (2008), suggesting that Taiwanese-owned firms preferred to use formal methods (e.g. advertisement in the media) than informal methods (e.g. personal connections) to recruit knowledge workers. In terms of the formal recruitment methods, the result also confirmed the findings in Zheng et al's (2008) research that revealed the internet was significantly used by Taiwan's high technology industry. This may mean, firstly, that both the high technology firms and knowledge workers were more fluent in using web-based technology to find candidates and jobs. Secondly, the internet (i.e. on-line agents) has become more important than the traditional media in knowledge worker recruitment in Taiwan's high technology industry.

The interviews revealed that Taiwanese-owned firms had a greater concern with recruitment costs, and that on-line agents were the cheapest recruitment method that

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[9] Total items of recruitment channels were listed in appendix 3.

also allowed the employer to reach a large pool of applicants within a short period of time. In addition, on-line agents were particularly successful in attracting applicants who applied for entry-level openings. The more senior the vacancies, the harder the firms found it to recruit qualified applicants through on-line agents. Compared with the survey data, it was found that 71.6 % of the respondents from Taiwanese-owned firms were classified as engineers or assistant engineers in terms of their job titles. This supported the argument that the utilisation of recruitment channel was associated with the type of vacancies in terms of seniority.

- Head hunters for foreign-owned firms

The results supported hypothesis 1.2 that head hunters were of significant importance ($X^2 = 10.316$, p< 0.01) for foreign-owned firms in the recruitment of knowledge workers. This finding echoed the study of Amaram (2005) who found 'recruiting firms' were most popularly used to recruit the IT workforce and the findings in Hsu and Leat's (2000) study that found western-owned firms in Taiwan preferred to use recruitment consultants to recruit professional/technical workers. Just as Yuen and Kee (1993) have suggested, that the organisation's headquarter may influence the adoption of its HRM policies and practices, this result supports the argument that the use of recruitment method for knowledge workers in foreign-owned firms may be influenced by their headquarters.

Head hunters are disadvantaged by a higher cost but advantaged by greater effectiveness. The evidence from interviews supported this finding that foreign-owned firms placed a greater emphasis on recruitment effectiveness, which was in contrast to Taiwanese-owned firms which emphasised recruitment cost. The emphasis on recruitment effectiveness also led to a preference in adopting the practice of employee referral programmes that offered financial rewards to internal employees for a successful referral. In addition, drawing from the consideration of cost-effects, head hunters were often used for senior vacancy recruitment or hard-to-find special expertise (for example, the legal consultants who specialised in patent law). In other words, the utilisation of head hunters was in line with the preference in hiring experienced workers for foreign-owned firms.

Information confidentiality was another reason for foreign-owned firms to use head hunters. For instance, the human resource manager in foreign-owned company F1 highlighted that they used head hunters for vacancies where they did not want to disclose information to internal employees, because the disclosure of such information might leak the company's new business plan to other competitors, or because it would cause internal turmoil or even affect employees' morale when a new hiring resulted from the loss of a current employee.

- Company websites and other recruitment channels for non-private organisations

The results supported hypothesis 1.3 that company websites were of significant importance ($X^2 = 15.332$, p< 0.001) for non-private organisations in the recruitment of knowledge workers. The result echoed the finding by Lockwood and Ansari (1999) who indicated that specific company websites were more effective than other on-line employment websites in their study of IT specialists.

In table 6.3, it showed that the company website was ranked as the second most effective recruitment channel for non-private organisations. 20.3% of respondents found their current jobs via specific company websites while only 11.6% via on-line agents. It means that workers in non-private organisations are more selective in choosing who they prefer to work for and which job they are interested in. As over 80 percent of knowledge workers in the non-private organisations had at least a master's degree and the majority work in the non-private organisations were R&D jobs, this result may show the characteristics of knowledge workers as autonomous and highly concerned about the intrinsic value of work (Haesli and Boxall, 2005).

Other recruitment channels were also found to be significantly different ($X^2 = 7.691$, p<0.05) for the non-private organisations. One respondent specified that he was recruited through the Research and Development Substitute Service programme, which is part of a national policy in Taiwan that allows the men with a master's degree or above to apply for a three-year Research and Development Substitute

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Service instead of a one-year mandatory military service[10]. The human resource manager in the non-private organisation P1 pointed out that the Research and Development Substitute Service programme was a regular recruitment channel for fresh graduates. This channel was also highlighted in their company website. The institute considered this programme to be more effective than campus recruitment for fresh graduate recruitment, as most of the knowledge workers in the high technology industry were males who would serve compulsory military service after graduating.

In addition, interviews found that overseas recruitment was another distinctive recruitment channel for the non-private organisations. They normally had an independent section in their websites for overseas recruitment and held overseas recruitment campaigns looking for experienced researchers and development specialists in advanced technology fields. In contrast to the Taiwanese and foreign-owned firms, the non-private organisations actively sought technology specialists from overseas in specific technology fields as they played a crucial role in transferring technology from overseas to support the national policies on industrial development (Mathews and Cho, 2000).

- Personal connections – the most effective recruitment channel

Personal connections were ranked as the most, or second most, effective recruitment channel across the three groups of organisations. The interviews revealed that the personal connections were effective in various positions ranging from junior to senior openings. Several human resource managers highlighted that employee referrals were very effective because the knowledge workers, particularly engineers, had closed social networks, which reflects one of the key characteristics for knowledge workers who closely interact in their social networks to share and create collective knowledge (Swart, 2008). Despite the fact that personal connections did not attract large pool of candidates, the firms considered it as an effective recruitment channel due to a higher hiring rate.

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[10] Men in Taiwan who've reached conscription age are required to serve a one-year compulsory military service. Men with a master's degree or above can also apply for a three-year Research and Development Substitute Service. The companies / institutes could apply to the authorities for workers from the Research and Development Substitute Service programme, upon the authority's approval.

The interviews also revealed that the Taiwanese-owned firms and non-private organisations particularly emphasised the importance of personal connections in recruiting senior professionals and managers. One of the reasons was that the managers had a greater trust in candidates that they knew before or who were referred by someone they trusted. This finding echoed the importance that guanxi (networking of relationships) played in Chinese society, as guanxi was the foundation for trust in business relationships (Huang et al, 2005), and interpersonal trust based on personal connections was considered as one of the key elements in the employer-employee relationship (Chen et al, 2005).

6.3 Knowledge workers' perceptions of the effectiveness of recruitment channels

The knowledge workers' perceptions of the effectiveness of recruitment channels might be related to their prior experiences, not limited to their latest experience with their current employers, and their understanding of how other knowledge workers (such as their classmates, friends or ex-colleagues) found their jobs. This study attempted to find out whether the knowledge workers' perceptions of the effectiveness of recruitment channels were consistent with the results in the previous section which was based on their latest actual experience.

In the survey, the respondents evaluated their perceptions of the effectiveness of various recruitment channels on a 5-point rating scale. An internal consistency reliability test of Cronbach's alpha test was conducted first. The nine items exhibited a Cronbach's alpha coefficient of 0.8, which was above the acceptance level of 0.7 (Nunnaly, 1978; Pallant, 2001; Schutte et al, 2000). The results of the descriptive analysis and one-way ANOVA test are presented in table 6.5.

Table 6.5 Employees' perceptions of the effectiveness of different recruitment channels across the three organisation ownership groups

	Ownership									
	Taiwanese-owned (n=84)		Foreign-owned (n=46)		Non-Private (n=70)		Total N=200			
Recruitment Channels	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	Sig
Personal connections	4.01	1.012	4.15	0.894	4.07	0.111	4.07	0.95	0.32	0.726
On-line agents	4	0.875	4	0.73	4	0.911	4.00	0.852	0	1
Internship	3.25	0.888	3.2	1.1128	3.68	0.97	3.38	0.995	4.569	0.012*
Company websites	3.27	0.956	3.3	0.916	3.55	0.958	3.37	0.952	1.82	0.165
Head hunters	3.07	1.003	3.57	0.91	3.44	0.93	3.31	0.967	4.473	0.01*
Campus	3.17	0.858	3.26	0.976	3.41	0.859	3.27	0.889	1.325	0.268
Job fair	3.22	0.93	3.04	1.01	3.27	0.921	3.2	0.946	0.84	0.433
Public agency	3.12	0.894	2.70	1.093	3.03	0.944	2.99	0.971	2.988	0.053
Traditional media	2.84	1.048	2.63	1.019	2.79	1.052	2.77	1.041	0.617	0.541

* $p < 0.05$

In the total sample, knowledge workers perceived personal connections and on-line agents as two of the most effective recruitment channels, with high mean scores of 4.7 and 4.0, respectively. This result was consistent with the findings based on the employees' actual experiences. Noticeably, the traditional media was perceived by knowledge workers as the least effective recruitment channel with the lowest mean score of 2.77, whereas it was ranked as the third effective recruitment channel based on the employees' experiences. This discrepancy might be because some of the respondents' experiences happened an extremely long time ago[11]. This was in the trend of using on-line agents, which had replaced the role of the traditional media played in firm's recruitment in high technology industry in Taiwan.

To further compare the perceptions of effectiveness of recruitment channels among the three organisation ownership groups, a one-way ANOVA analysis found there were significant differences in the mean scores on internship (F= 4.569, p<0.05) and head hunters (F= 4.473, p<0.05). Internships were found to be statistically significant (F= 4.569, p<0.05) for the non-private organisation. This result echoed other researchers' findings that suggest that firms from a country culture with a higher uncertainty preferred to utilise low-risk recruitment methods, such as internships (Jeanquart-Barone and Peluchette, 1999; Lin, 2006). Because the non-private organisations were controlled by the Taiwanese government, they showed a higher tendency for the utilisation of internships than Taiwanese private and foreign-owned firms. The interviews revealed that the non-private organisations offered more internship opportunities to the graduate students. This was in line with their recruitment strategy that attempted to move earlier in the labour market by identifying and tying high quality and high potential knowledge workers within their firms.

Head hunters were found to be statistically significant (F= 4.473, p<0.05) for foreign-owned firms. This result was consistent with the workers' experiences in the foreign-owned firms. Thus, both the employees' perceptions and their experiences showed that foreign-owned high technology firms were more willing to utilise head hunters than the other two groups of organisations. It illustrated the influence of the firm's

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[11] 12% of respondents participated in this survey served in their companies for at least 15 years (i.e. they were hired 15 years ago).

original national ownership, as foreign-owned firms placed a greater emphasis on recruitment effectiveness.

6.4 Recruitment difficulties and the firms' responses

The literature review suggested that skill shortages were one of the main reasons resulting in the recruitment difficulties for knowledge workers (Causer and Jones, 1993). To examine whether the high technology firms in Taiwan encountered recruitment difficulties for knowledge workers and why, the researcher interviewed the human resource managers in ten technology firms, including five Taiwanese-owned firms, three foreign-owned firms and two non-private organisations. The main argument here was that firms with various ownership groups would respond to recruitment difficulties for knowledge workers, if any, by different methods. In addition, because the interviews were conducted during an economic down time (during the period from September to October 2009), it was also interesting to investigate whether the economic recession caused any impact on knowledge worker recruitment.

6.4.1 Recruitment difficulties

The interviews showed that the high technology firms in Taiwan commonly considered the limited talent pool as the main reason that caused recruitment difficulties for knowledge workers. This supported the argument of Causer and Jones (1993) who indicated that skill shortages were the main reason for knowledge worker recruitment difficulties. More precisely, the human resource manager from the non-private organisation P1 highlighted that the key issue was the candidates' quality. This issue particularly concerned the non-private organisations as they demanded a large amount of high quality workers who had attained higher educational backgrounds and specialised in research, technology application and development. This echoed the research by Chien (2007), who suggested that high technology industry in Taiwan faced challenges due to a decline in the quality of higher education and the inability to attract high-level overseas Chinese professionals to return to Taiwan.

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The high technology firms under different ownership groups encountered different degrees of recruitment difficulties. The non-private organisations seemed to encounter less recruitment difficulties than the private organisations, especially when the economic outlook was uncertain or conservative. However, the non-private organisations faced more difficulties in recruiting experienced professionals, as they were generally less able to offer highly competitive compensation packages than the private organisations (both Taiwanese and foreign-owned firms).

Foreign-owned companies were in competition for knowledge workers with Taiwanese-owned firms. Interviewees noted that the practice of stock bonuses under employee ownership bonus plans implemented by Taiwanese-owned firms put them at a disadvantaged position to recruit knowledge workers. This echoes the findings of the research by Han (2003) which indicated western multinationals faced the problem of 'brain drain' because Taiwanese-owned firms that implemented a Taiwan-style employee stock bonus plan offered a higher total compensation to workers than those firms without such a programme.

The selected Taiwanese-owned companies identified a variety of factors that led to recruitment difficulties for knowledge workers, including the company's brand name, financial performance that related to the capability of offering stock bonus, working location and daily workload. The company's brand name had a direct impact on the pool size of applicants, in terms of the amount of received resumes and accepted interviews by the candidates. Daily workload was a particular factor in recruitment difficulties. Compared to the foreign-owned companies, the practices in Taiwanese-owned companies laid less emphasis on work-life balance, with a perceived norm of long working hours and compulsory overtime without overtime payment. Because a large portion of the total payment came from the incentives of employee ownership bonuses, the workers were expected to 'work hard' in pursuit of productivity.

6.4.2 The firm's responses to the recruitment difficulties for knowledge workers

Non-private organisations

Due to the nature of their work, the non-private organisations were most concerned about the quality of workers. In response to recruitment difficulties, the non-private organisations cooperated extensively with universities to attract high-quality workers. The programmes included scholarships, research project funding, internships or holding seminars. This was consistent with the findings of Causer and Jones (1993), who found that high technology firms attempted to ensure the quality of graduates through a control mechanism such as student sponsorship. In addition, the interviews revealed that the battle for the recruitment of knowledge workers had extended from current graduates studying for a master's degree to a younger group: seniors in the university. The human resource manager in the non-private organisation P1 indicated:

> "It is too late to cooperate with the professors and students in the graduate school now. … We selected potential sophomores or seniors in the university and discussed their career paths with them. They would continue to study in the graduate schools in the future with our sponsorship."

Another solution aimed to recruit overseas experienced professionals by holding overseas recruitment campaigns. Due to the university-like working environment and management practices, the interviewee from the non-private organisation P1 indicated that their main competitors for the technology specialist recruitment came from universities rather than private organisations.

Foreign-owned companies

In response to recruitment difficulties, foreign-owned firms focused on the adoption of various human resource strategies to attract the candidates. Financial incentives included a high base salary and signing-on bonuses. In addition to these financial incentives, the foreign-owned companies were considered to have more flexibility in the management practices with less control than local companies. For example, the firms allowed flexible working hours and did not impose mandatory check-in and

check-out practices. Moreover, the foreign-owned companies conducted policies and practices that yielded a better work-life balance to the employees, such as a reasonable workload. The foreign-owned companies were generally more generous in their annual leave policy, providing more days of annual leave than the Taiwanese-owned companies which usually followed the minimum standard required by the Labour Law.

Taiwanese-owned companies

Taiwanese-owned high technology firms used diversified approaches in response to recruitment difficulties for knowledge workers. The Taiwanese-style of employee ownership plans, centred on stock bonuses, was a typical tool used by Taiwanese-owned companies to attract candidates. Small and unlisted companies emphasised the company's vision and future outlook. Signing-on bonuses had limited use in high-level or specific openings.

In addition, several interviewees indicated that they considered internal recruitment by promoting employees who had been trained by the companies themselves internally, to overcome recruitment difficulties. This was consistent with the statistical results that showed head hunters were less used by Taiwanese-owned firms, based on the workers' experiences and perception. Drawing from the perspective of internal training, Taiwanese-owned firms cooperated with universities in an industrial master's programme[12] in which the universities helped to train workers for high technology firms. The companies signed contracts with the candidates (students), and the firms agreed to pay the full amount of their tuition fees and provide a monthly scholarship to the students. In exchange, the students had to do research projects approved by the company and agreed to work for the company for two to four years, depending on the policy of their sponsoring company. The emphasis on internal recruitment ensured that the knowledge and abilities of the workers matched the company's business needs and could be utilised effectively by the company.

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[12] Each student in this programme was required to attain a sponsorship from a high technology firm; otherwise the student was not admitted to study in this programme. The students who successful finished the programme would be awarded a master's degree.

Another method used was a regular intake of fresh graduates, which was a common approach adopted by firms in response to the recruitment difficulties for knowledge workers (Causer and Jones, 1993; Chen et al, 2008; Haesli and Boxall, 2005). Similar to non-private organisations, some large Taiwanese-owned firms that had leading positions in their fields often offered scholarships to students (usually at master's level) in selected universities or provided research funding. For example, one case company T4 explained in detail this process:

> "We offered second year master's students NT$30,000 each month for their scholarship and a signing-on bonus of around NT$300,000 after the student graduates. If the student doesn't join the company, he/she must pay back all the money he/she received from the company. The service contract is 3 to 4 years."

Employee referrals were another common method for recruiting experienced workers, in view of the closed and interactive personal networks between knowledge workers. Moreover, contractors were used in response to not only skill shortages as indicated by Causer and Jones (1993), but also because of higher turnovers for workers who performed low-skill jobs. The latter was more often the case.

6.5 Conclusion

The descriptive analysis identified an important characteristic of knowledge workers as having a high educational background, which was particularly apparent for the research-oriented non-private organisation. The results, in the main, examined the practices adopted in large organisations, which 93% of the respondents worked for. The respondent's profile showed that male workers (78%) were dominant in high technology firms. This influenced the high technology firm's recruitment channels, such as encouraging employee referrals. In addition, because the new male graduates are usually required to serve a one-year military service in Taiwan, recruiting from career fairs on campus was less effective due to the unavailability of qualified new male graduates. The marital status showed that a higher percentage of workers in foreign-owned firms (67.4%) and non-private organisation (75.4%) reported being married than those in Taiwanese-owned firms (45.2%). The differences in workers'

demographic profiles were associated with the recruitment practices adopted by the firms within different ownership groups, where the practices adopted by foreign-owned and non-private organisation were perceived to be more humanised and allowed their workers to take care of their work-life balance.

The statistical analysis supported the hypothesis that high technology firms under different ownership groups utilised different recruitment methods for knowledge worker recruitment. Based on the workers' actual experiences in their current companies, it found significant differences for on-line agents in Taiwanese-owned firms, for head hunters in foreign-owned firms, and for company websites and other recruitment channels in non-private organisations. The different focus on the utilisation of recruitment methods related to the preferred candidates groups of fresh graduates or experienced workers and the concern over recruitment cost versus efficiency.

Interestingly, the knowledge workers' perceptions of the effectiveness of recruitment channels were not always consistent with their experiences. For the total sample, personal connections were identified as the most effective recruitment channel, which was consistent with both the experiences and perceptions of knowledge workers. The result of a significant difference in the use of head hunters for foreign-owned firms was also consistent. However, traditional media was found to be a popularly used recruitment channel, based on the workers' experiences, but was perceived to be less effective now. The empirical evidence found that the role of traditional media on recruitment had been replaced by on-line agents. In addition, internships were perceived to be an effective recruitment method for non-private organisations, after personal connections and on-line agents. Nevertheless, the workers experiences showed that only a limited number of workers were hired through this channel. It showed that an effective recruitment channel might not be a popular one.

The interviews revealed that the high technology firms under different ownership groups adopted different practices and methods in response to the recruitment difficulties for knowledge workers. In terms of practices, foreign-owned firms laid an emphasis on both compensation (i.e. pay and welfare) and management practices that were more flexible and humanised than Taiwanese-owned firms. Taiwanese-owned

firms placed a greater emphasis on stock bonuses. The non-private organisations focused on the management practices that provided the greatest degree of freedom and autonomy to their knowledge workers of the three groups. The practices in the non-private organisations showed that the firm's practices were influenced by not only the firm's origin of nation but also the organisational characteristics. Given the nature of being research-oriented institutes under non-private ownership, the management practices and reward policies in the non-private organisations were closer to those in foreign-owned firms; despite their origin of national ownership being Taiwan. However, in view of the recruitment strategies used to overcome recruitment difficulties, the non-private organisations were found to be more like the Taiwanese-owned firms, such as the preference for new graduate recruitment, internal recruitment and close cooperation with universities. It meant that the firm's origin of nation also influenced the firm's recruitment strategy to a certain degree. In summary, in view of the adopted recruitment strategies and practices, Taiwanese-owned and foreign-owned firms represented two poles at the extremes and the non-private organisations stood in the middle.

Moving to the next chapter, the research findings for the selection of knowledge workers in Taiwan's high technology industry will be discussed. The section on knowledge worker selection is comprised of two parts. The first part will reveal the selection criteria and selection method used by high technology firms in Taiwan, based on their organisational ownership. The second part will examine the factors that influenced knowledge workers' selection of an employer in Taiwan's high technology industry and compare the differences across high technology firms under various ownership groups. The investigated factors include compensation and benefit practices, career development and training, work practices and working environment, corporate development, intrinsic work value and interpersonal relationships and personal values. The details of the analysis will be presented in the next chapter.

Chapter 7 : The Selection of Knowledge Workers in Taiwan's High Technology Industry – Research Findings

Introduction

This chapter will, firstly, investigate the impact of organisational ownership on the use of selection criteria and selection methods for the high technology firms. Following the same logic described in the previous chapter, hypotheses were devised to test the various selection criteria and selection methods used by the high technology firms across the three organisation ownership groups, namely Taiwanese-owned (private sector), foreign-owned (private sector) and non-private organisations. The analysis was mainly based on the survey which investigated the respondents' experiences in finding their current jobs, supplemented by the interviews with human resource managers in selected high technology firms within different ownership groups.

In the second part, drawing from the perspective of mutual selection (i.e. both employers and employees choose), the factors that influenced the employees' selection of their current employers will be examined. Hypotheses regarding to the various factors which may affect knowledge workers' selection of an employer in the three ownership groups were examined. To support the argument that the high technology firms with different ownership groups adopt different strategies and practices to attract knowledge workers, the findings from the survey on the important factors that influenced the knowledge workers' decision of selecting their current employers will be analysed.

7.1 Knowledge worker selection criteria

The discussion of knowledge worker selection criteria contains two parts. The first part will examine the pre-requisites required by the organisations for a qualified applicant. The second part will examine the selection criteria required by the organisations for knowledge workers. The results from the survey will be discussed together with the findings from the interviews.

7.1.1 Pre-requisites of selection criteria

The term pre-requisites refers to the required qualifications of the applicants. The pre-requisites might show the organisations' preference for applicants (i.e. fresh or experienced workers) and the basic required knowledge or skills for knowledge workers. The argument here is that the organisation ownership group would have an impact on the applicants' pre-requisites in the recruitment and selection process. Thus, the respondents were asked about the pre-requisites required by their current employers when they applied for their current jobs. The frequencies of each item were counted and a Chi-Square test was conducted to examine the significant differences in pre-requisites across the three groups of organisations with different ownerships. The results are shown in table 7.1.

Table 7.1 Comparison of the pre-requisites for applicants across the three organisation ownership groups

Pre-request	Taiwanese-owned n	% of ownership	Foreign-owned n	% of ownership	Non-Private n	% of ownership	Total n	% of total	Chi-Square	Sig
Educational status	72	85.7	29	63	62	88.6	163	81.5	13.704	0.001**
Working experiences	43	51.2	43	93.5	52	74.3	138	69	26.256	0.000***
English	37	44	32	69.6	27	38.6	96	48	11.59	0.003**
Computer professional skills	22	26.2	19	41.3	14	20	55	27.5	2	0.04*

*p < .05
**p < .01
*** p < .001

In the total sample, the results showed that educational status (81.5%) was the most important pre-requisite for high technology firms. It was consistent with the respondent's profile where 87.9% of respondents had at least a university's degree. Several private-owned firms indicated that they even considered a university degree not enough and preferred a master's degree.

In the comparative analysis, a Chi-Square analysis showed that there were significant differences in educational status (X^2=13.704, p<0.01) for non-private organisations, related working experience (X^2=26.256, p<0.001) and English language ability (X^2

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=11.59, p<0.01) for foreign-owned firms, and professional computer skills for Taiwanese-owned firms (X^2 =2, p<0.05). These results support the argument that the organisation ownership group had an impact on the selection pre-requisites for knowledge workers.

The results supported hypothesis 2.1a that educational status was more important for the non-private organisations. It was consistent with their respondents' profile that had the highest percentage (91.6%) of respondents with at least a university degree among the three groups. As most of the jobs in the non-private organisations were research-related, this finding echoed the argument by Alvesson (1993) who indicated that well-educated employees formed the majority of the workforce in knowledge-intensive firms where most of the work was intelligence-based. In addition, this finding agreed with the argument that emphasised the importance of a formal education channel through which the knowledge workers acquired the theoretical knowledge and skills required for their work (Alvesson, 1993; Drucker, 1994). The interviewee from the non-private organisation P1 indicated that they usually required the applicant to have a master's degree, as they considered it enhanced the worker's capability through the two-year training of a master's programme. In short, the finding from the non-private organisations highlighted the perception of a positive relationship between the required technological capability and the knowledge workers' educational status.

The results supported hypothesis 2.1b and 2.1c that the applicants' working experiences and English language ability were more important for the foreign-owned firms. This was consistent with the findings by Lin (2006) who found American-owned firms lay an emphasis on these two pre-requisites. As Snell and Dean (1992) have suggested, human capital should include the skills, experiences and knowledge of workers, and this result may indicate that foreign-owned firms particularly emphasised knowledge workers' tacit knowledge in the form of experience to enhance the organisation's human capital. The interviews revealed that foreign-owned firms preferred to recruit experienced workers as they were considered to be efficient. Experienced workers were expected to have a short learning period and to be able to perform their jobs quickly. In addition, English language ability was emphasised due to the need for communication with the head quarters and regional offices.

Taiwanese-owned firms, significantly, required the pre-requisite of computer skills, which was a different result from the findings in Lin's (2006) research that found no significant difference in this pre-requisite for Taiwanese-owned firms.

7.1.2 Knowledge worker selection criteria

The literature review in Chapter 3 indicated that firms evaluated the candidate's competency by work-related personal attributes, values, experiences, knowledge and skills (Beardwell and Wright, 2004; Boam and Sparrow, 1992; Roberts, 1997). The argument is that the high technology firms with different ownerships would place different focal points on the candidate's competency in their knowledge worker selection process. Accordingly, hypotheses were devised to examine whether the selection criteria used by the high technology firms for knowledge worker selection would vary significantly depending on the firms' ownership group.

The respondents were investigated on their views of selection criteria both of the workers and of their organisations. A Chi-Square analysis was conducted and the results were exhibited in table 7.2. The findings support the argument that knowledge worker selection criteria in high technology firms vary significantly with the organisation ownership group.

The results supported hypothesis 2.2, suggesting that foreign-owned firms were concerned about the individual capabilities of knowledge workers in the selection criteria. The significant differences were found in professional ability (X^2=45.887, p<0.001), working experiences (X^2=26.203, p<0.001), team work ability (X^2=6.812, p<0.05), independent working ability (X^2=8.048, p<0.05), problem-solving ability (X^2=10.59, p<0.01), English ability (X^2=9.177, p<0.05) and the attitude of willingness to work long hours (X^2=6.809, p<0.05).

The findings suggested that the foreign-owned firms emphasised enhancing their human capital through accumulating the required skills, experiences and knowledge of knowledge workers (Snell and Dean, 1992). Both the survey and interviews found that the applicants' professional ability (80.4%) was the most critical selection criterion for foreign-owned firms. This shows that knowledge is still the focus for the

organisations in the process of knowledge worker recruitment (Swart, 2008). In addition to explicit knowledge, the importance of tacit knowledge (i.e. worker's experiences) was also valued, as suggested by Nonaka (1994). Moreover, the emphasis on the workers' team work abilities echoed the collaborative feature of knowledge work and characteristics of knowledge workers (Newell et al, 2002), as knowledge workers are usually involved in a collaborative work environment with close interactions between each other through their work (Swart, 2008). In addition to the workers' teamwork abilities, the foreign-owned firms were also concerned with the workers' individual capabilities, such as independent working abilities, problem-solving and the attitude of willingness to work long hours. It may reveal the impact of the origin of the firms' national ownership on knowledge worker selection criteria. As the western countries were often found to have a higher tendency toward individualism (Hofstede, 1980), the selection practices in terms of selection criteria in the foreign-owned firms may be influenced by their head-quarters' emphasis on individual capability (Yuen and Kee, 1993).

Table 7.2 Comparison of employees' perceptions on selection criteria across the three organisation ownership groups[13]

| Selection criteria | Taiwanese-owned | | Foreign-owned | | Non-Private | | Total | | | |
	n	% of ownership	n	% of ownership	n	% of ownership	n	% of total	Chi-Square	Sig
Educational background	55	65.5	24	52.2	55	78.6	134	67	8.901	0.012*
Development potential	14	16.7	20	43.5	32	45.7	66	33	17.539	0.000***
Working experiences	28	33.3	36	78.3	42	60	106	53	26.203	0.000***
Professional ability	21	25	37	80.4	47	67.1	105	52.5	45.887	0.000***
Team work ability	18	21.4	18	39.1	27	38.6	63	31.5	6.812	0.033*
Independent working ability	14	16.7	18	39.1	19	27.1	51	25.5	8.048	0.018*
Problem-solving	13	15.5	19	41.3	19	27.1	51	25.5	10.59	0.005**
English ability	17	20.2	19	41.3	13	18.6	49	24.5	9.177	0.01*
Willingness to work long hours	16	19	11	23.9	5	7.1	32	16	6.809	0.033*
Interpersonal skills	25	29.8	16	34.8	20	28.6	61	30.5	0.542	0.762

*p < .05
**p < .01
*** p < .001

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[13] Total items of selection criteria were listed in appendix 3.

The results supported hypothesis 2.3. In addition to the educational background (X^2=8.901, p<0.05), the non-private organisations paid attention to the applicants' development potential (X^2=17.539, p<0.05). It echoed the finding by Baron and Hannan (2002), who indicated that employees' long-term potential could be another selection criterion for high technology firms. The interviews further revealed that the emphasis of applicants' development potential was connected with the organisation's internal transfer policy that encouraged the possible transfer to other business units or spin-off start-ups. Moreover, the significance of workers' educational background may, again, indicate the important characteristic of knowledge workers being well-educated (Alvesson, 1993). The interviews revealed that the organisations perceived a positive relationship between the applicant's educational status and his/her knowledge. It echoed the argument that suggested the importance of theoretical knowledge that was usually acquired through a formal educational channel (Alvesson, 1993; Drucker, 1994).

As for Taiwanese-owned firms, the statistical analysis found no significant differences for knowledge worker selection criteria, although the workers' educational background (65.5%) was considered as the most important selection criterion for Taiwanese-owned firms. In addition, although some scholars have suggested that interpersonal skills should be an important skill for knowledge workers due to the increasing interaction with their customers (Causer and Jones, 1993; Swart and Kinnie, 2003), interpersonal skills (30.5%) were found to have a median degree of importance with no significant difference in the three groups of organisations. The interviews found that interpersonal skills were more emphasised for the workers whose jobs involved interactions with external clients. Generally, the workers' professional ability and team working ability were more important than their interpersonal skills for high technology firms. The former confirmed the importance of knowledge workers' knowledge and skills to organisations during the process of knowledge worker selection, from the perspective of human capital (Snell and Dean, 1992). The latter echoed the organisation's emphasis of social capital in knowledge worker selection, in view of the collaborative characteristic of knowledge work and the close interactions between knowledge workers in their work environment (Swart, 2008).

7.1.3 Knowledge worker selection methods

In association with the firms' selection pre-requisites, the respondents were investigated over which information they provided to the firms to demonstrate their qualifications at the recruitment stage. The frequencies in each item were counted and a Chi-Square analysis was conducted to compare the differences across the three organisation ownership groups. The results are shown in table 7.3.

Table 7.3 Comparison of information given by applicants to organisations in the recruitment and selection process across the three organisation ownership groups

	Taiwanese-owned		Foreign-owned		Non-Private		Total			
Information provided by applicants	count	% of ownership	count	%% of ownership	count	% of ownership	count	% of total	Chi-Square	Sig
Self-prepared resume	80	95.2	43	93.5	67	97.1	190	95.5	0.858	0.651
Biographical information	59	70.2	35	76.1	60	87	154	77.4	6.108	0.047*
Company app form	25	29.8	16	34.8	32	46.4	73	36.7	4.595	0.1
Working sample	12	14.3	12	26.1	12	17.4	36	18.1	2	0.243
Reference	7	8.3	11	23.9	10	14.5	28	14.1	5.983	0.05

*p < .05
**p < .01
*** p < .001

The result supported hypothesis 2.4 that biographical information was also found to have a statistical significance (X^2=6.108, p<0.05) for non-private organisations. In the total sample, a self-prepared resume (95.5%) was the most popular means for the firms to collect information that assisted them in understanding the applicants' qualifications, followed by the provision of applicants' biographical information (77.4%). These findings were consistent with the study by Hsu and Leat (2000) who found that application forms were widely used in Taiwan for professional selection. In particular, biographical information was more important to the non-private organisations. This was in line with the significant utilisation of company websites as a recruitment method in the non-private organisations, as biographical information was a compulsory item required by the organisations to fill-in during the completion of an application submission. The interviews revealed that the use of a biographical

information was related to the emphasis on personal attributes and the fit of personal quality to the job requirement.

In addition, the results in table 7.4 supported the argument in previous research that that high technology firms used a variety of sophisticated selection techniques to select qualified knowledge workers (Causer and Jones, 1993; Chien and Chen, 2007; Thite, 2004). It further revealed that the use of selection techniques significantly varied with the high technology firms' ownership group. Different from Hsu and Leat's (2000) study that found no significant difference in selecting professionals and managers for manufacturers in Taiwan, this survey found that the high technology organisations in the three groups used different techniques to select knowledge workers.

Table 7.4 Comparison of selection techniques across the three organisation ownership groups based on workers' experiences in finding their current jobs

	Taiwanese-owned (N=84)		Foreign-owned (N=46)		Non-Private (N=70)		Total (N=200)			
Selection Techniques	n	% of ownership	n	% of ownership	n	% of ownership	n	% of total	Chi-Square	Sig
Interview	82	97.6	46	100	59	84.3	187	93.5	15.322	0***
Aptitude test	39	46.4	9	19.6	33	47.1	81	40.5	10.873	0.004**
English test	48	57.1	19	41.3	12	17.1	79	39.5	25.646	0***
IQ test	48	57.1	4	8.7	19	27.1	71	35.5	33.753	0***
Personality test	19	22.6	5	10.9	21	30	45	22.5	5.827	0.054
Working sample	7	8.3	15	32.6	12	17.1	34	17	12.415	0.002**
Reference check	3	3.6	10	21.7	5	7.1	18	9	12.432	0.002**
Presentation	0	0	4	8.7	10	14.3	14	7	12.233	0.002**
Role play	1	1.2	1	2.2	4	5.7	6	3	2.825	0.244

$*p < .05$
$**p < .01$
$*** p < .001$

- Impact of organisational ownership on the selection techniques for knowledge workers

The result of a Chi-Square analysis illustrated that Taiwanese-owned firms used an English test (X^2=25.646, p<0.001) and an IQ test (X^2=33.753, p<0.001) for knowledge worker selection. Foreign-owned companies used interviews (X^2=15.322,

p<0.001), working sample tests (X^2=12.415, p<0.01) and reference checks (X^2=12.432, p<0.001). Non-private organisations used aptitude tests (X^2=10.873, p<0.01) and presentations (X^2=12.233, p<0.01).

The result supported hypothesis 2.5. Both the Taiwanese-owned and non-private firms used cognitive tests (either an IQ test or an aptitude test) more frequently than foreign-owned firms to select knowledge workers. It was consistent with the finding by Chien and Chen 92007) who found cognitive tests to be one of the main selection tools for the large Taiwanese high technology firms in their study. The use of cognitive tests may be in view of interpersonal harmony, as the Taiwanese companies highly valued the Confucian values of harmony and cooperativeness in the process of selection (Chen et al, 2005; Hsu and Leat, 2000; Huang et al, 2005; Huo and Von Glinow, 1995). This evidence proved the influence of national culture through the firm's origin of nation on the firm's selection method. The use of aptitude tests showed that the non-private organisations also placed an emphasis on applicant's personality fit to the organisation and job requirement. It echoed Robertson and Hammersley's (2000) study that suggested a cognitive test was an important selection tool used by knowledge-intensive firms. The interviews revealed that they developed several tailor-made aptitude tests that were suitable for their organisations and required most of the candidates to do the test.

In addition, the result supported hypothesis 2.6 that Taiwanese-owned firms used a formal written test to evaluate the applicant's English ability. To a certain degree, this echoed the findings by Hsu and Leat (2000) who found a skill/knowledge test was widely used as a selection technique in Taiwan. The interviews revealed that although the candidates' English ability was not a required qualification, the organisations still tested the candidates' English ability with different standards in line with the job requirement. Non-private organisations used the method of presentations to evaluate the applicant's professional ability. It allowed several experts in the organisation to examine the candidate's professional ability simultaneously whilst having the opportunity to interact with the candidate.

The results supported hypotheses 2.7 and 2.8. The significant use of interviews and reference checks may support the argument that the organisation's practices would be

influenced by its headquarters (Yuen and Kee, 1993), as interview and references were identified as common selection tools used in the western context (Cook, 2004; Millmore, 2003; Newell, 2005). The use of an interview was in line with the emphasis on an open and mutual communication policy that applied to the selection activities as well, based on the interviews in foreign-owned firms. The use of reference checks confirmed the importance of social capital in the selection of knowledge workers, as it also echoed the importance of personal connections that were found to be the most popular recruitment channel for knowledge workers in foreign-owned firms. Compared with Taiwanese-owned firms, the foreign-owned firms placed a greater attention to the candidates' professional ability rather than interpersonal harmony. This study found foreign-owned firms used working sample tests to examine the candidates' qualifications, which differed from the study by Lin (2006) who found no significant difference in the use of working sample between Taiwanese and foreign-owned firms. In short, the findings in this study broadly agreed the argument by Hsu and Leat (2000) who suggested a knowledge/skill test was widely used in Taiwan during the process of selecting professionals, but it further revealed that organisations with different ownership types preferred to use different forms of knowledge/skill tests during the process of knowledge worker selection.

- The interview as a dominant selection technique

As expected, the descriptive analysis showed that an interview was the most popular selection technique for all types of high technology firms (Beardwell and Wright, 2004; Newell, 2005). This was consistent with the findings of Hsu and Leat (2000), who found interviews to be a dominant selection technique used by manufacturers in Taiwan to select managers and professionals. A Chi-Square test further found that foreign-owned firms were statistically significant (X^2= 15.322, p<0.001) on the utilisation of interviews, which was, however, different from the findings in the research conducted by Lin (2006) who found Taiwanese-owned firms had a significant difference in their use of interviews. The interviews with the human resource managers in foreign-owned firms revealed that they used various forms of interview skills flexibly, including face-to-face interviews, telephone interviews, and behavioural interviews. One interviewee, from foreign-owned firm F2, highlighted

that they adopted a systematic and structured interview by providing a 'question bank' of interview questions to the managers in charge of interviews from the hiring unit.

In view of the importance and popularity of interviews, the respondents were further investigated about the frequencies of interviews when they applied for their current jobs. Certain researchers have highlighted that an interview could be used as an opportunity to exchange mutual expectations and desired information between the organisations and applicants, drawing from the perspective of mutual selection (Huo and Von Glinow, 1995; Iles and Salaman, 1995). Thus, this research also examined to which extent the respondents understood company and work-related information through interviews, and to which extent such information influenced the respondents' decisions to accept the job offer, by using a 5-point rating scale. The results are presented in table 7.5.

Table 7.5 The frequencies of interviews and the effectiveness of interviews that helped the respondents to collect information and make the decision to join one of the three organisation ownership groups

Item	Taiwanese -owned (N=84) Mean	Foreign -owned (N=46) Mean Scores	Non- Private (N=70) Mean Scores	Total (N=200) Mean/ Mean Scores	Chi- Square	Sig	F-value	Sig
Frequencies of interviews	1.43	1.93	1.55	1.59	21.947	0.08		
Information gathered during the process of interview helped me understand the firm and the job	3.57	3.8	3.59	3.63			0.942	0.392
The information gathered from the interviews positively influenced my decision to accept the job	3.77	4.11	3.9	3.89			2.129	0.122

There were no significant differences found in the three investigated items across the three ownership groups, despite foreign-owned firms having the highest frequencies of interviews and the highest mean scores for the usefulness of information collected from the interviews. In the total sample, the results showed that the workers

considered interviews to have positive effects on helping them to understand the company (mean=3.63) and to decide to join the company (mean=3.89).

7.2 Factors that influenced workers' selection of their employers from different high technology organisation ownership groups

As discussed in chapter four, a mutual selection perspective drew attention to the exchange and matching of mutual expectations for both applicants and organisations (Iles and Salaman, 1995). The matching of mutual expectations even influenced the success of the hiring activity, in terms of whether the worker could successfully stay in the organisation after they passed the probation. It is argued here that the factors which attracted the knowledge workers to join the organisation significantly varied with the organisations' ownership groups. In other words, the organisations under different ownerships adopted different strategies and practices to attract knowledge workers. Accordingly, hypotheses were devised to examine various factors which might affect knowledge workers' selection of their employers in the three groups.

In the survey, the respondents were investigated about their views on the importance of various factors that influenced their decision to join their current company. Based on the literature review and pilot test feedback, six dimensions of factors were measured by using a five-point rating scale (from 1 = extremely unimportant to 5 = extremely important) to evaluate the worker's views on a variety of items that affected their selection of current employers. A one-way ANOVA test was conducted to compare the impact of different items across the three organisation ownership groups. The measurements of items in each variable are described below. The internal consistency reliability tests showed that all of the Cronbach's alpha coefficients in each variable were above 0.7, which was considered to be acceptable (Nunnaly, 1978; Pallant, 2001; Schutte et al, 2000), and thus led to the conducting of further analysis.

1. Compensation and benefit practices. Seven items were measured here, including "base salary", "bonus (i.e. flexible payment such as a performance bonus)", "employee ownership bonuses" (i.e. bonuses under the employee ownership scheme that directly linked with the firm's performance), "entitled days of annual leave",

"child-care", "housing allowance" and "other benefit package". The seven items exhibited an internal consistency reliability (Cronbach's alpha) of 0.86.

2. Career development and training. Five items were measured, including "the firm offering a higher position", "potential promotion opportunity", "internal transfer opportunities to other fields (such as R&D to marketing)", "internal transfer opportunities to affiliated companies in the consortium" and "good training system". The five items exhibited an internal consistency reliability (Cronbach's alpha) of 0.843.

3. Work practices and working environment. Six items were assessed, including "flexible working hours", "additional day-off for over time", "convenient long-distance working practices (such as video conference, work-at-home)", "good information and technology support (such as library and data base)", "comfortable physical working environment" and "firm's encouragement of employee's innovation". The six items exhibited an internal consistency reliability (Cronbach's alpha) of 0.843.

4. Corporate development. Seven items were measured, including "good company outlook/development potential", "good R&D capabilities", "a leading position in the market", "ability to respond quickly to the market change", "good financial status", "good company reputation" and "agreed with the corporate culture". The internal consistency reliability coefficient of Cronbach's alpha for the seven items was 0.927.

5. Intrinsic work value. Eight items were measured. These eight items were "challenging work", "jobs met my personal interest", "opportunity to access new technology", "authorisation from supervisor to be autonomous to a certain degree", "influential power over work-related decisions", "learning opportunities from work", "accumulated professional experiences" and "strengthened professional skills". The eight items exhibited an internal consistency reliability (Cronbach's alpha) of 0.901.

6. Interpersonal relationships and personal values. Eight items were measured, including "team members in the working group", "Ren-Ching" (a favour to someone due to personal relationship), "friend's and family's opinions", "work-life balance",

"working location near home", "smaller working pressure", "reasonable working hours" and "stable job". The eight items exhibited an internal consistency reliability (Cronbach's alpha) of 0.866.

7.2.1 Compensation and benefit

Table 7.6 presents the results of a one-way ANOVA test for the impacts of compensation and benefit practices on the workers' selection of their current employers, in line with the organisations' ownership groups. In the total sample, base salary scored the highest mean of 3.96. This finding was consistent with the research findings of several researchers who identified pay as the most important factor to attract knowledge workers (Haesli and Boxall, 2005; Horwitz et al 2003; May et al, 2002).

Table 7.6 The impacts of compensation and benefit practices on workers' selection of their current employers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Compensation & Benefit	Mean	Mean	Mean	Mean	F	Sig
Base salary	3.83	4.39	3.82	3.96	7.015	0.001**
Bonus	3.73	3.87	3.46	3.67	2.533	0.082
Employee ownership bonuses	3.82	3.61	3.11	3.53	7.009	0.001**
Days of annual leave	3.23	3.15	3.62	3.35	4.513	0.012*
Childcare welfare	2.73	2.15	2.58	2.55	4.419	0.013*
Rental allowance	2.79	2.22	2.56	2.58	3.523	0.031*
Other welfares	3.3	3	3.38	3.26	1.779	0.172

*p<0.05
**p<0.01
***p<0.001

In the comparative analysis, the results indicated that there were significant differences in base salary (F=7.015, p<0.01), employee ownership bonuses (F=7.009, p<0.01), days of annual leave (F=4.513, p<0.05), childcare welfare (F=4.419, p<0.05) and rental allowance (F=3.523, p<0.031). The results supported hypothesis 3.1a, suggesting that base salary was more influential to knowledge workers' employment decisions to those knowledge workers in foreign-owned firms. This finding was

consistent with the previous studies that suggested that pay was an important item in knowledge worker recruitment (Lockwood and Ansari, 1999; May et al, 2002). The results also supported hypothesis 3.1b, suggesting that the employee ownership plan was more influential to those knowledge workers in Taiwanese-owned firms. It echoed the argument that a competitive compensation package was one of the most effective recruitment strategies for knowledge worker recruitment (Horwitz et al, 2003; Stokes, 2000), and the employee ownership plan was found to have positive effects on enhancing the workers' total compensation in Taiwanese high technology firms in recent decades (Han, 2003). This study partially supported the hypothesis 3.2 that benefits were more important for knowledge workers in the non-private organisations. In the benefits items, only days of annual leave (F=4.513, p<0.05) was found to have a significant importance to the non-private organisations. Thus, the results were not strong enough to support the argument by Lockwood and Ansari (1999) who suggested that benefits could help the organisations to attract knowledge workers effectively. In fact, the findings may better support the argument by Swart (2008), who emphasised the importance of pay to knowledge workers because it may reflect the value of possessed knowledge/skills possessed by knowledge workers and determine their status in the organisations.

Structural difference in reward policy between Taiwanese and foreign-owned high technology firms

In view of the reward policies and practices, the knowledge workers who joined Taiwanese-owned firms were attracted by the practice of employee ownership bonuses, while the workers in foreign-owned firms were attracted by the practice of a higher base salary. The interviews with the human resource managers from the high technology firms confirmed that the compensation policy was the most distinctive human resource practice which differed between Taiwanese and foreign-owned companies.

A considerable amount of literature has indicated the importance of financial rewards for knowledge workers (Horwitz et al, 2003; May et al, 2002; Stokes, 2000; Swart, 2008). The compensation policy in foreign-owned firms mainly comprised of a base salary and cash bonus, such as a performance bonus. The bonuses were distributed

based on individual performance at the year-end or at another time according to the company's policy.

Compensation in the Taiwanese-owned high technology firms mainly included base salary, a year-end bonus and an employee ownership bonus (Chen and Huang, 2006: 371). The employee ownership bonus programme[14] was considered as a distinctive compensation practice that was popularly used by Taiwanese-owned high technology firms (Han, 2003). Most of the Taiwanese high technology firms offered their employees a lower base salary with a lucrative employee bonus that was dependent on the firm's year-end profitability. While the employee ownership bonuses could be distributed in the form of stock, cash or mix of stock and cash, the Taiwanese high technology firms mostly distributed a stock bonus which was more attractive to the employees. Since the stock bonus was given to the employees free, the potential profit of a stock bonus might be very high if the firm's share price climbed to a high level.

The findings on the significant differences in the use of high base salaries by foreign-owned firms and high employee bonuses by Taiwanese-owned firms showed the impact of the firm's national ownership group on compensation practices. It was consistent with several scholars' findings on the preference of the adopting of profit sharing schemes for Taiwanese-owned high technology firms (Chang and Chen, 2002; Han, 2003; Huo and Von Glinow, 1995; Lin, 2006). The adoption of an employee bonus scheme that was linked to the firm's performance was in line with a collectivist-oriented culture and the relatively high-risk avoidance culture in Taiwan. The employee ownership bonus programme allowed Taiwanese-owned firms to control their operational risk by offering a lower-level of fixed payment to individuals and encouraging the employees to work toward a collective goal. It has contributed to the development of high technology industry in Taiwan, as Han (2003) found that the employee stock ownership bonuses had positive effects on organisational productivity and employees' total compensation.

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[14] Because Taiwan Company Law did not permit the firm to grant employees stock options that the foreign-owned firm might do, the regulation allowed firms to distribute employee ownership bonuses from a certain percentage of the firm's net income in the form of either cash or stocks (Chen and Huang, 2006).

By contrast, foreign-owned firms scored a high mean of 4.36 for base salary. The interviews confirmed that foreign-owned firms with a national origin of an individualist-oriented culture were more likely to pay a higher fixed payment to knowledge workers, based on their individual knowledge/skills, experience and performance. This finding was consistent with the results of Yuen and Kee's (1993) research.

In addition, benefits could be considered as part of a total compensation package. The workers in non-private organisations were attracted by a significant importance in days of annual leave, with a high mean score of 3.62 next to the base salary. Taiwanese-owned firms were found to be significantly different in the benefit plans of childcare welfare and rental allowance (for example, offering single workers a dormitory). While some researchers have suggested that the workers desired a more creative benefit plan that was not taken-for-granted (Lockwood and Ansari, 1999; Stokes, 2000), the statistical results showed that direct pay played a more crucial role than side benefits did to influence knowledge workers' decisions about their selection of employers, given generally lower mean scores in benefit items than those in remuneration items.

7.2.2 Career development and training

Knowledge workers were perceived to have better mobility in the labour market due to their capability to transfer their embrained and tacit knowledge, and to utilise them within and across organisations. Because career ladders for knowledge workers were not limited to one organisation, this research attempted to find out whether the firms that owned more resources to offer promotion and internal transfer opportunities to their workers had more advantages in attracting knowledge workers. In addition, in view of the importance of knowledge/skills possessed by knowledge workers, the respondents were also asked about their views on the importance of the organisations' training practices that attracted knowledge workers to join the company. The results of a one-way ANOVA test are shown in table 7.7.

Table 7.7 Comparison of the influence of career development and training factors to knowledge workers' selection of their current employers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Career development & Training	Mean	Mean	Mean	Mean	F	Sig
Offering a higher position	3.05	3.22	3	3.07	0.768	0.466
Potential promotion opportunity	3.3	3.41	3.32	3.34	0.201	0.818
Internal transfer opportunities to other fields (e.g. R&D to Sales & Marketing)	3.4	3.26	3.55	3.42	1.323	0.269
Internal transfer opportunities to the affiliated companies in the consortium	3.27	3.09	3.39	3.27	1.415	0.245
Good training programmes	3.41	3.7	3.8	3.61	3.55	0.031*

*p<0.05

In the total sample, the item of good training programmes scored the highest mean of 3.61. It proved that the firm's investment in good training programmes was positive to the recruitment of knowledge workers. Furthermore, the one-way ANOVA analysis showed that there was a significant difference in good training programmes (F=3.55, p<0.05) for the non-private organisations. Thus, the result supported hypothesis 3.3, suggesting the importance of good training programmes to knowledge workers, particularly in the non-private organisations. This finding echoed the argument by Stokes (2000) who suggested training is a differentiator in knowledge worker recruitment strategy to effectively attract knowledge workers. The human resource manager in the non-private organisation P1 indicated that, being a research-oriented organisation, comprehensive multi-dimensional training programmes and convenient on-line learning systems were a focal strategy used to attract knowledge workers. The attractiveness of good training programmes to knowledge workers may suggest that knowledge itself is still the highest concern for knowledge workers. Therefore, the findings in this study supported the argument that training had a positive effect on knowledge worker recruitment, especially for knowledge-intensive firms, and the organisations should keep investing in training programmes to continuously enhance

knowledge workers' knowledge/skill and employability (Amaram, 2005; Causer and Jones, 1993; Horwitz et al, 2003; Kalra, 1997; May et al, 2002; Stokes, 2000).

7.2.3 Work practices and working environment

One of the features of high technology industry is a short product cycle, which indicates the importance of technology and product innovation to these firms and the critical role played by knowledge workers in the innovation process (Causer and Jones, 1993; Newell et al, 2002). The items in this section placed an emphasis on examining the importance of physical facilities and work practises that give greater flexibility to the workers, thus helping the workers to enhance their productivity and stimulate innovative activities. It is argued that the organisations under different ownerships would focus on different work practices to attract their knowledge workers. Six items examined the degree to which these items affected the employees' decisions to join their current companies, in line with the organisations' ownership groups. The results are shown in table 7.8.

Table 7.8 Comparison of the influence of work practices and working environment to knowledge workers' selection of their current employers across the three organisation ownership groups

Work practices and working environment	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
	Mean	Mean	Mean	Mean	F	Sig
Flexible working hours	3.18	3.7	3.63	3.46	5.231	0.006**
Additional day-off for O/T	3.05	3.3	3.25	3.18	1.048	0.353
Convenient long-distance working practices (e.g. video conference, work-at-home)	2.56	3.11	2.71	2.74	3.367	0.037*
Good information and technology support (e.g. library & database)	2.96	3.35	3.57	3.26	6.71	0.002**
Comfortable physical working environment	3.28	3.7	3.9	3.59	8.911	0.000***
Firm's encouragement of employee's innovation	3.24	3.39	3.78	3.46	5.967	0.003**

*p<0.05
**p<0.01
***p<0.001

The results supported hypothesis 3.4, revealing the importance of flexible management practices to knowledge workers in foreign-owned firms. Foreign-owned firms were found to have significant differences in flexible working hours ($F=5.231$, $p<0.01$) and convenient long-distance working practices ($F=3.367$, $p<0.05$). The findings were consistent with the study by Lockwood and Ansari (1999) who suggested the practices of flexible work schedules and telecommunications would attract knowledge workers. The attraction of flexible management practices to knowledge workers echoes the characteristics of knowledge workers who desire autonomy in their work (Davenport et al, 1996; Newell et al, 2002). In addition, the results may support the argument that suggested knowledge workers should be managed by a 'soft' approach centred on trust (Alvesson, 1993; Newell et al, 2002), drawing from the perspective of social capital that emphasises the close interactions and relationships between knowledge workers. Moreover, the interviews found that these practices were influenced by the firms' headquarters, which was consistent with the findings of Yuen and Kee (1993). As the culture in western countries is more individual-oriented, the practices in foreign-owned firms were more flexible to respect and trust individuals.

The results supported hypotheses 3.5 and 3.6, suggesting that knowledge workers in non-private organisations were more attracted by an organisation's emphasis on technological innovation and good work environment. The non-private organisations were found to have significant differences in good information and technology support ($F=6.71$, $p<0.01$) and in the firm's encouragement of innovation ($F=5.967$, $p<0.01$). The significant importance of the firms' encouragement of innovation was consistent with the previous researches that suggested that organisations' emphasis on technological innovations helped to attract knowledge workers (Haesli and Boxall, 2005; Lockwood and Ansari, 1999; Stokes, 2000). The interviews revealed that good information and technology support in the non-private organisations facilitated innovative activities in the organisations, in connection to their research-oriented organisational feature. It echoed the extensive application of ICT-based knowledge management systems in public organisations and the importance to knowledge-intensive firms (Fuller et al, 2002; Girard and McIntyre, 2010; Syed-lkhsan and Rowland, 2004).

A comfortable physical working environment (F=8.911, p<0.001) was another significant important factor that attracted knowledge workers in the non-private organisations. This echoed previous studies that have argued that knowledge workers are considered to be an 'elite' group and thus require good work environments and employment conditions (Alvesson and Robertson, 2006; Kelly, 1990; Newell et al, 2002). The interviews revealed that the firms provided a comfortable physical working environment in an attempt to facilitate the knowledge workers' innovative activities. This echoed the argument by Horwitz et al (2003) who suggested a fun, flexible and resourceful work environment could motivate knowledge workers.

7.2.4 Corporate development

The companies' reputation and competitiveness, such as technological innovation, were identified to have positive relationships for the recruitment of knowledge workers (Haesli and Boxall, 2005; Horwitz et al, 2003; Lockwood and Ansari, 1999). The results of a one-way ANOVA test were exhibited in table 7.9. In the total sample size, good company reputation was found to have the highest mean score of 3.98. This echoed the previous researches that suggested the firm's reputation was a positive way to attract applicants (Collins and Han, 2004; Orlitzky, 2007).

Table 7.9 Comparison of the influence of corporate development factors to knowledge workers' selection of their current employers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Corporate development	Mean	Mean	Mean	Mean	F	Sig
Good company outlook/development potential	3.83	4.17	3.77	3.89	3.033	0.05
Good R&D capabilities	3.63	3.96	3.99	3.83	3.699	0.027*
A leading position in the market	3.73	4.09	3.61	3.77	3.764	0.025*
Ability to respond quickly to the market change	3.57	3.87	3.58	3.64	1.642	0.196
Good financial status	3.85	4	3.65	3.82	2.061	0.13
Good company reputation	3.79	4.17	4.09	3.98	3.416	0.035*
Agreed with the corporate culture	3.63	3.8	4	3.8	2.934	0.056

*p<0.05

The results support hypothesis 3.7, suggesting that the firm's reputation (F=3.98, p<0.05) was more important for knowledge workers in the foreign-owned firms. It was consistent with previous researches that suggested the company's brand name was positively associated with the recruitment of knowledge workers (Haesli and Boxall, 2005; Horwitz et al, 2003). The findings from the interviews also supported the argument by Friedman (2010) who suggested that the human resource function could positively influence corporate reputation, which in turn benefits potential recruits (Edwards, 2005). The reasons that knowledge workers in foreign-owned firms were concerned about the firm's reputation may be because, firstly, it implied the firms have more experience in adopting systematic human resource practices to manage their workers; secondly, working in well-known multinationals looks good for 'mianzi' (face) in Taiwanese society. The results partially supported hypothesis 3.8 that suggested the importance of a company's competitiveness to knowledge workers. It revealed that knowledge workers in foreign-owned firms were particularly concerned about the company's market position ((F=3.764, p<0.05). This echoed the study by Haesli and Boxall (2005) who found the good reputation of products was advantageous for attracting potential employees in their cases. The significant difference in the firm's market position meant that it was important for the firms to commercialise their R&D ability into products and gain in the market (Bell, 1973; Scarbrough, 1999; Yakhlef and Salzer-Morling, 2000).

The result supported hypothesis 3.9, revealing that there was a significant importance in good R&D capabilities (F=699, p<0.05) for knowledge workers from the non-private organisations. This was consistent with the study by Haesli and Boxall (2005) who found the company's R&D capabilities were helpful to attract knowledge workers. As the non-private organisations were typically knowledge-intensive firms, this result highlighted that knowledge workers were concerned about the degree of knowledge intensiveness of the company when they chose their employers.

7.2.5 Intrinsic work value

Non-financial rewards that result from intrinsic factors, such as the nature of work, were found to be the second most important factor after pay, that affected knowledge

workers' job satisfaction and the workers' decision to select an employer (Haesli and Boxall, 2005; May et al, 2002). To examine whether the employee's views on the importance of intrinsic reward varied with the organisations' ownership group, and to what extent it influenced the workers' decision on selecting their current employers, eight items were investigated. The results of the analysis are exhibited in table 7.10.

Table 7.10 Comparison of employees' views on the importance of intrinsic work values that affected their selection of current employers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Intrinsic work value	Mean	Mean	Mean	Mean	F	Sig
Challenging work	3.6	4.17	3.88	3.83	7.843	0.001**
Job met my personal interest	3.54	4.13	4.04	3.85	10.223	0.000***
Opportunity to access new technology	3.64	3.98	4.17	3.9	7.661	0.001**
Authorisation from supervisor to be autonomous to a certain degree	3.42	3.76	3.68	3.59	2.426	0.091
Influential power over work-related decisions	3.29	3.8	3.49	3.48	5.133	0.007**
Learning opportunities from work	3.79	4.2	4.25	4.04	7.864	0.001**
Accumulated professional experiences	3.85	4.28	4.2	4.07	6.291	0.002**
Strengthened professional skills	3.76	4.26	4.2	4.03	8.131	0.000***

$**p<0.01$
$***p<0.001$

In the total sample, there were three items with high mean scores of above 4, measured by the 5-point rating scale. These three items were learning opportunities from work (mean=4.04), accumulated professional experiences (mean=4.07) and strengthened professional skills (mean=4.03). It supported the argument that knowledge workers emphasised the chance to enhance their competencies by continuous learning, which helped the knowledge workers' mobility in career development across the organisations (Lockwood and Ansari, 1999; May et al, 2002).

The results supported hypothesis 3.10, revealing that knowledge workers in the foreign-owned firms were concerned more about the intrinsic factors for individual

fulfilment, such as challenging work (F=7.843, p<0.01), job meeting personal interest (F=10.223. p<0.001), influential power over work-related decisions (F=5.133, p<0.01), accumulated professional experiences (F=6.291, p<0.01) and strengthened professional skills (F=8.131, p<0.001). The importance of challenging work was also revealed in the researches by Horwitz et al (2003) and May et al (2002). The emphasis on job's fit to personal interest echoed the findings of Haesli and Boxall (2005). The significant difference in influential power over work-related decisions supported the argument by Swart (2008) who suggested knowledge workers desired autonomy in their work. Moreover, the significant importance in the accumulation of professional experience and skills meant the knowledge workers in foreign-owned firms emphasised the importance of developing their professional abilities to enhance their career mobility (Lockwood and Ansari, 1999; May et al, 2002), as the applicant's individual abilities and work experiences were important selection criteria in foreign-owned firms.

The one-way ANOVA results supported hypothesis 3.11, revealing the importance of access to new technology (F=7.661, p<0.01) and learning opportunities from work (F=7.864, p<0.01) for the non-private organisations. The findings echoed the argument that suggested the availability of new technology was an effective recruitment strategy for knowledge workers (Haesli and Boxall, 2005; Stokes, 2000). The importance in learning opportunities from work not only highlighted the attractiveness of opportunity to access new technology but also echoed the significance of the chance to learn new skills to knowledge workers (Lockwood and Ansari, 1999).

There were no significantly important items found among the Taiwanese-owned firms, despite the fact that the item "accumulated professional experiences" showed the highest mean score of 3.85 according to the evaluation of knowledge workers in Taiwanese-owned firms.

7.2.6 Interpersonal relationships and personal values

Relationships with team members and other knowledge workers have caught the attention of the researcher, given the intensive interaction between knowledge

workers and their long working hours (Swart, 2008). However, in addition to the co-workers' relationship, the importance of Guanxi, which refer to the personal connections or relationships in Chinese society, has also been recognised in academic research (Chen et al, 2005). Therefore, the respondents were investigated as to whether or not the consideration of interpersonal relationships, such as their relationships with team members, friends' or family's opinions and concerns on Ren-Ching (favour to another person) affected their decisions to join their current companies, and to what extent. In addition, knowledge workers in high technology industry often work long hours with considerable pressure in an attempt to cope with the fast changing industrial environment which features a short product cycle and fast technological development (Chen et al, 2008; Swart, 2008). Thus, the impacts of personal values on the workers' selection of their employers were also examined by using the items of work-life balance, working location, working pressure, working time and job security.

A one-way ANOVA analysis was conducted to examine whether the workers' views on interpersonal relationships and personal values affected their selection of their current employers according to the organisations' ownership groups. The results are shown in table 7.11.

Table 7.11 Comparison of the impact of interpersonal relationships and personal values on knowledge workers' selection of their current employers across the three organisation ownership groups

Interpersonal relationship and personal value	Taiwanese-owned (N=84) Mean	Foreign-owned (N=46) Mean	Non-Private (N=70) Mean	Total (N=200) Mean	F	Sig
Team members	3.63	3.78	3.60	3.65	0.463	0.63
Ren-Ching (favour to another person)	2.94	2.87	2.54	2.78	2.537	0.082
Friends' and family's opinions	3.16	2.63	2.85	2.93	3.642	0.028*
Work-life balance	3.38	3.83	3.87	3.65	4.909	0.008**
Working location near home	3.10	3.00	3.19	3.11	0.339	0.713
Smaller working pressure	2.82	2.91	3.14	2.95	1.542	0.216
Reasonable working hours	3.15	3.39	3.65	3.38	3.409	0.035*
Stable job	3.62	3.70	3.93	3.74	1.762	0.174

*$p<0.05$

**$p<0.01$

In the total sample, the item "stable job" scored the highest mean of 3.74, without a significant difference between the three groups of organisations. The emphasis on job stability by knowledge workers might be related to the national culture of Taiwan, which had a medium to high degree of uncertainty avoidance culture in Hofstede's (1980) study. In addition, the items "team members" scored the second highest mean score of 3.65, again, without a significant difference between the three groups of organisations. This result supported the argument by Swart (2008) who suggested the importance of relationships in social networks to knowledge workers as they usually work in a collaborative work environment and spend long hours together with their co-workers. It was interesting to reveal that the traditional social reciprocated behaviour of Ren-Ching (favours to another person), which is closely interwoven with the guanxi connection, was found to be a negative influence, with the lowest mean score of 2.54. It echoed the argument that suggested Taiwanese employees in the high technology industry were increasingly expecting an open and fair hiring process based on the individuals' abilities rather than based on guanxi (Hempel and Chang, 2002). This result suggested that knowledge workers in Taiwan's high technology industry made their employment decisions more based on a logical rationale rather than simply based on interpersonal relationships.

The results partially supported hypothesis 3.12, suggesting the influence of relationships on knowledge workers' selection of employers has been weakened, or is not as strong as traditionally perceived in Chinese society. The one-way ANOVA analysis found that there was a significant importance in friends' and family's opinions (F=3.642, p<0.05) for knowledge workers in Taiwanese-owned firms. The emphasis on friends' and families' opinions meant that the knowledge workers in Taiwanese-owned firms respected, to a certain degree, traditional values that emphasised non-conflict and group-based social relations in Chinese society (Huang, 2001; Huang et al, 2005). However, Ren-Ching (favours to another person) was found to be not important to the knowledge workers' employment decisions. This supports the study of Chen et al (2005) who suggested the influence of traditional culture seemed to be declining in Taiwan.

The results supported the hypothesis 3.13, suggesting that work-life balance was an important differentiator that influenced knowledge workers' employment selection in non-private organisations. There was found to be significant importance in work-life balance ($F=4.909$, $p<0.01$) and reasonable working hours ($F=3.409$, $p<0.05$) for knowledge workers in the non-private organisations. The findings supported the argument that suggested work-life balance was an important issue to knowledge workers, as a result of long work hours and the blurred distinctions between work life and home life (Chen et al, 2008; Davenport et al, 1996; Horwitz et al, 2003). Chen et al (2008) highlighted the direct impact of unsatisfactory work-life balance to the high attrition rate of knowledge workers in Taiwan's high technology industry. The results further revealed that the organisation's efforts to support the achievement of work-life balance could help to attract knowledge workers. The site visit and interviews for the non-private organisations found that the institutes managed their knowledge workers in a campus-like way, granting a greater flexibility to their knowledge workers to arrange their working schedule and preferred working style.

7.3 Conclusion

The empirical evidence supports the argument that high technology firms emphasise different selection criteria and selection methods for knowledge workers, depending on their ownership group. In addition, it also supports the argument that the high technology firms would adopt different strategies and practices to attract knowledge workers to join their organisations, depending on their ownership group.

The main findings identified the influence of the firms' origin of nation on the selection criteria and selection methods for knowledge workers. For example, both the Taiwanese-owned and non-private organisations emphasised the candidates' educational background. This reflected the emphasis on credentialism and was connected to traditional values in Chinese culture that respect people who are highly educated. In addition, they both adopted cognitive tests as a selection technique to recruit the 'right' person in an attempt to pursue the harmony in the organisations. However, the non-private organisations adopted sophisticated selection methods, such as tailor-made aptitude tests and presentations, which showed that they laid an

emphasis on recruiting qualified workers through careful selection. By contrast, foreign-owned firms placed greater attention on candidates' working experience and individual abilities. The selection methods that they adopted were often used in a western context, such as interviews and references. Since 87% of participants from foreign-owned firms in this survey worked in American or European-owned firms, the results showed the influence of the firms' origin of nation on the adoption of selection criteria and selection methods for knowledge workers.

The findings on the factors that influenced knowledge workers' selection of their employers found that the items of "accumulated professional experiences" (mean=4.07), "learning opportunities from work" (mean=4.04) and "strengthened professional skills" (mean=4.03) were the three most important factors that affected the knowledge workers' selection of their employers. This indicates the importance of knowledge (especially tacit knowledge) to knowledge workers, which enhances their career mobility across organisations in high technology industry.

The comparative analysis found that the recruitment strategies and human resource practices adopted by the organisations were influenced by the mixed effects of the organisations' origin of nation and organisational features. Taiwanese-owned firms, for example, were found to be strongly influenced by the Taiwanese culture characterised by a collectivist-orientation, shown in the compensation policies that focused on employee ownership bonuses and the workers' concerns about their friends' and families' opinions about their selection of an employer. However, the human resource practices adopted in the non-private organisations were influenced significantly by their organisational features of being an R&D-oriented business. As a result, despite the non-private organisations having the same national ownership as the Taiwanese-owned firms, the management practices were more flexible and individually-oriented, which were more similar to the practices adopted in foreign-owned firms. Foreign-owned firms used a job design that provided intrinsic work based rewards for their knowledge workers. The practices were influenced by their parent companies and the individualism-oriented culture in line with the firm's origin of nation.

In the next chapter, the research findings for knowledge worker retention in Taiwan's high technology industry will be presented. The next chapter will consist of three parts. The first part will analyse the factors that influenced employees' retention for the high technology firms under different ownership groups. The second part will reveal the recruitment difficulties of knowledge workers in Taiwan's high technology industry. Finally, it will examine the retention practices used by the high technology firms in response to the recruitment difficulties of knowledge workers.

Chapter 8 : The Retention of Knowledge Workers in Taiwan's High Technology Industry – Research Findings

Introduction

This chapter will discuss the retention practices used by the high technology firms in Taiwan and will examine the impact of organisational ownership on the adoption of retention practices. In the previous literature review chapters, the importance of the retention of knowledge workers was reviewed. The review suggested that firm's human resource practices are affected by the firm's national ownership and internal organisational factors (Budhwar and Debrah, 2001; Jackson and Schuler, 1995; Schuler et al, 1993; Shen, 2006). Hypotheses were devised and contended that the retention practices used by the high technology firms would vary significantly with the firm's ownership group. The firms' ownership was considered to be their organisational attribute of business sector (private or non-private) and the firms' original national ownership (Taiwanese-owned or foreign-owned). As a result, three types of ownership group were identified: Taiwanese-owned, foreign-owned and non-private.

This chapter will discuss firstly the findings from the survey on the key factors that affect the retention of knowledge workers by the firm's ownership group. Secondly, the retention difficulties encountered by the high technology firms will be reviewed. Finally, the workers' views on the firm's retention practices will be examined.

8.1 Factors that influenced employee retention for high technology firms in different organisation ownership groups

The literature review suggested that the job satisfaction of knowledge workers is positively related to the reasons for knowledge worker retention (Haesli and Boxall, 2005; May et al, 2002). Similarly, in this survey, the respondents were asked about the importance of a variety of practices that resulted in their decision to stay in their

current companies. The higher the score in the item meant a greater degree of importance (or satisfaction) for the worker concerning this factor. Six aspects of human resource practices were measured using a five-point rating scale (from 1 = extremely unimportant to 5 = extremely important) to evaluate the workers' views on the importance of items that influenced their retention. An internal consistency reliability test of Cronbach's alpha test was conducted firstly for items in each aspect. All the Cronbach's alpha coefficients examined in the variables were above 0.7, which was considered to be acceptable (Nunnaly, 1978; Pallant, 2001; Schutte et al, 2000) enabling further analyses. A mean analysis was used to examine the common practices that were generally implemented by the high technology firms and a one-way ANOVA analysis was conducted to compare the variances of different items across the three ownership groups.

The details of the measured items are described as follows.

1. Compensation and benefit practices: seven items were measured here, including "base salary", "bonus (i.e. a flexible payment such as a performance bonus)", "employee ownership bonuses (i.e. a bonus under the employee ownership scheme [15] directly linked with the firm's performance; for example, a stock option)", "entitled days of annual leave", "child-care", "housing allowance" and "other benefit package". The seven items exhibited an internal consistency reliability (Cronbach's alpha) of 0.851.

2. Career development and training: five items were measured, including "satisfied with my current position", "potential promotion opportunities", "internal transfer opportunities to other fields (such as R&D to marketing)", "internal transfer opportunities to affiliated companies in the consortium" and "good training system". The five items exhibited an internal consistency reliability (Cronbach's alpha) of 0.865.

3. Work practice and working environment: seven items were assessed, including "flexible working hours", "additional day-off for over-time", "convenient long-

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[15] The Taiwan Company Law allows firms to distribute employee bonuses from a certain percentage of the firm's net income in the form of either cash or stocks.

distance working practices (such as video conference, work-at-home)", "good information and technology support (such as library and data base)", "comfortable physical working environment", "firm's encouragement of employee's innovation" and "fair performance appraisal". The seven items exhibited an internal consistency reliability (Cronbach's alpha) of 0.891.

4. Corporate factors: seven items were measured. The seven items were "good company outlook/development potential", "good R&D capabilities", "a leading position in the market", "the company could respond quickly to changes in the market", "good financial status", "good company reputation" and "agree with the corporate culture". The internal consistency reliability coefficient of Cronbach's alpha for the seven items was 0.920.

5. Intrinsic work factors: nine items were measured. These nine items were "challenging work", "jobs met my personal interest", "opportunity to access new technology", "authorisation from supervisor to be autonomous to a certain degree", "influential power over work-related decisions", "supervisor/manager's praise", "learning opportunities from work", "accumulate professional experiences" and "strengthen professional skills". The nine items exhibited an internal consistency reliability (Cronbach's alpha) of 0.928.

6. Relationships and personal factors: eight times were measured, including "good relationship with supervisor/manager", "good relationship with team members", "Ren-Ching" (a favour to someone due to personal relationship), "work-life balance", "working location near home", "smaller working pressure", "reasonable working hours" and "stable job". The eight items exhibited an internal consistency reliability (Cronbach's alpha) of 0.729.

8.1.1 Compensation and benefit

The respondents were investigated about their opinions about the degree to which the compensation and benefit practices adopted in their firms affected their willingness to stay. The results are presented in table 8.1.

Table 8.1 Comparison of the importance of compensation and benefit practices for the retention of knowledge workers across the three organisation ownership groups

Compensation & Benefit	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
	Mean	Mean	Mean	Mean	F	Sig
Base salary	4.17	4.46	4.11	4.22	2.775	0.065
Bonus	4.11	4.02	3.79	3.98	2.192	0.114
Employee ownership bonuses	4.08	3.57	3.13	3.63	12.295	0.000***
Days of annual leave	3.4	3.35	3.71	3.5	2.416	0.092
Childcare welfare	2.57	2.02	2.42	2.68	2.072	0.129
Rental allowance	2.47	1.96	2.26	2.58	1.697	0.186
Other welfares	3.06	2.87	3.12	3.34	0.161	0.851

*** $p < 0.001$

The results indicated that the knowledge workers generally considered pay as the most important factor for knowledge worker retention, in the variable of compensation and benefit, with the highest mean score of 4.22 in the total sample. This finding was consistent with previous research that identified pay as either the most, or second most important factor related to the knowledge workers' job satisfaction and their retention (Horwitz et al, 2003; May et al, 2002). The interviews with the human resource managers in the companies indicated that the base salary increase was based on the workers' individual performance. Several interviewees indicated that an increased percentage in base salary was considered to be both an internal equity and external equity, based on the high technology firms within the same group of national ownership (i.e. Taiwanese-owned or foreign-owned firms).

The result supported hypothesis 4.1, suggesting that employee ownership bonuses (F=12.295, p<0.001) were more important to knowledge workers in Taiwanese-owned firms. It supported the argument by Han (2003) who suggested that the employee ownership bonus was the main incentive to retain workers in Taiwanese-owned high technology firms. It also echoed the argument by Horwitz et al (2003)

and Stokes (2000) who suggested performance-based bonuses were effective to retain knowledge workers.

The interviews found that the distribution of employee ownership bonuses in Taiwanese-owned firms was usually associated with the workers' seniority, grade and job function, in addition to the workers' individual performance. For example, one interviewee from Taiwanese-owned firm T1 explained their bonus distribution principle:

"60% of the pool will be distributed based on the employee's seniority and his grade which is associated with the worker's job nature and his professional ability, 20% to the key managers and the remaining 20% to the key talents who we would like to cultivate. …. Engineers usually get a bigger slice of the pie because of the intensive competition from the external labour market."

This quote illustrates that the Taiwan-owned firms place a greater emphasis on retaining engineers who play a crucial role in the firms' product innovation, and on the skills that are strongly in demand in the labour market. Seniority was another consideration in employee ownership bonuses distribution, despite several companies reporting that worker performance took the priority over seniority. One of the key features in a Taiwanese-style employee ownership bonus programme was the high portion of employee ownership bonuses in the workers' total compensation. As the human resource manager from Taiwanese-owned firm T5 indicated:

"For a senior worker, the employee ownership bonuses, either cash or stocks, might contribute to 2/3 of his total compensation. Only 1/3 came from his fixed salary."

Thus employee ownership bonus plans are important to knowledge workers because they markedly increase their total compensation. This echoes the findings of Han (2003:18) who indicated that the employee ownership bonus leaded to a higher total compensation for the workers who work in a firm with a Taiwanese-style employee stock ownership plan, than those who work in firms without them.

8.1.2 Career development and training

The respondents were investigated about their views on the importance of human resource practices related to promotions, internal transfers and training with their current employers. The results are presented in table 8.2.

Table 8.2 Comparison of the importance of career development and training factors to the retention of knowledge workers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Career development & Training	Mean	Mean	Mean	Mean	F	Sig
Satisfied with my current position	3.46	3.83	3.51	3.56	2.76	0.066
Potential promotion opportunities	3.35	3.65	3.38	3.43	1.524	0.221
Internal transfer opportunities to other fields (e.g. R&D to Sales & Marketing)	3.46	3.3	3.49	3.44	0.572	0.565
Internal transfer opportunities to the affiliated companies in the consortium	3.36	3.15	3.48	3.35	1.524	0.22
Good training programmes	3.14	3.43	3.32	3.52	1.564	0.212

There were no significant differences found from the one-way ANOVA analysis. However, the item of satisfied with worker's current position showed the highest mean scores across the three groups of firms.

Examining the mean scores of the individual items in each group, foreign-owned firms scored a higher mean in potential promotion opportunities than the other two groups. This result echoes the finding of Lin (2006), who found that knowledge workers in American-owned firms had more potential promotion opportunities due to quicker promotion.

- Internal transfer

Compared to the foreign-owned firms, the Taiwanese-owned firms and non-private organisations had higher mean scores in the items of internal transfer opportunities to other fields and to the firms' affiliated companies. The interviews revealed that non-private organisations held a more open and positive attitude about internal transfers, in line with the close mean scores of 3.49 and 3.48 respectively for items of internal transfer opportunities to other fields and to affiliated companies. For example, the non-private organisation P1 had an internal transfer platform, which made the internal post more transparent and the application of internal transfer easier. Internal transfer was regarded as a source of internal recruitment in response to recruitment difficulties of qualified workers and also as a retention solution. Their human resource manager pointed out:

"We believe in the quality of our workers, who were carefully selected during the hiring process. Although the underlying technology or knowledge in the specific field is different, the basic technology and knowledge is the same or similar. We would give them some time to improve their performance or learn new knowledge. If the employee could transfer and adjust themselves to the new job well, we may benefit from it by tackling the problems of retention and recruitment at a same time."

For the foreign-owned firms, while the interviewees from the companies indicated that they had internal transfer policy and procedures, the lower mean scores in the items related to internal transfer opportunities meant that it was not easy for the workers to transfer internally. This is perhaps because the foreign-owned firms emphasised workers' professional abilities and had a shorter grace period for workers to learn new skills and bring their performance up to speed in the new working unit.

8.1.3 Management practices and working environment

In addition to the physical working environment, management practice items, such as flexible working arrangements, the encouragement of innovation, and performance appraisal were measured. The results are presented in table 8.3.

Table 8.3 Comparison of the importance of management practices and working environment factors to the retention of knowledge workers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Work practices and working environment	Mean	Mean	Mean	Mean	F	Sig
Flexible working hours	3.35	3.78	3.81	3.61	4.616	0.011*
Additional day-off for O/T	3.28	3.37	3.3	3.31	0.1	0.905
Convenient long-distance working practices	2.88	3.5	2.93	3.04	4.854	0.009**
Good information and technology support	3.07	3.41	3.71	3.38	6.998	0.001**
Comfortable physical working environment	3.43	3.91	3.87	3.7	4.995	0.008**
Firm's encouragement of innovation	3.33	3.54	3.8	3.54	3.922	0.021*
Fair performance appraisal	3.8	3.87	3.9	3.85	0.179	0.839

*p < 0.05

**p < 0.01

In general, a fair performance appraisal appeared to be the most important practice that affected the knowledge workers' willingness to stay in their current firms, with the highest mean score of 3.85. This is consistent with the suggestion by Ulrich (1998) who highlighted that a fair performance appraisal helped firms to 'bind' valuable workers by indicating internal equity for knowledge workers. This also echoed the argument by Stokes (2000) who suggested a performance-based culture in connection with frequent performance appraisal and rewards could effectively retain knowledge workers. The interviews revealed that the firms generally conducted performance appraisals once or twice a year, which was directly linked with the worker's salary increase, bonus distribution and promotion. A 'bottom five' principle that released 5% of workers with unsatisfactory performance was implemented in

several cases. However, workers who achieved a lower rating in the performance appraisal were normally given a grace period for improvement but dismissed if there was no improvement. The interviews found that Taiwanese firms usually granted more time and opportunities for workers to improve themselves.

A one-way ANOVA analysis partially supported hypothesis 4.2, suggesting flexible management practices were more important to knowledge workers in the non-private organisations and foreign-owned firms than Taiwanese-owned firms. Flexible working hours (F=4.616, p<0.05) were found to have significant importance to knowledge workers in the non-private organisations, while convenient long-distance working practices (F=4.854, p<0.01) were found to be significantly import to knowledge workers in the foreign-owned firms. The results suggested that the non-private organisations and foreign-owned firms tended to adopt a 'soft' HRM approach that highlighted autonomy and trust in their knowledge worker management (Thompson and Harley, 2008; Von Krogh et al, 2000). This echoed the argument by Amaram (2005) who suggested that the retention practices should facilitate mutual loyalty and the practice of flexible work hours helped to retain knowledge workers.

The results supported hypothesis 4.3, suggesting that organisation's encouragement of innovations with supported practices was more important to the retention of knowledge workers in non-private organisations than the other two groups of organisations. There was a significant importance in the firms' encouragement of innovation (F=3.992, p<0.05) and good information and technology support (F=6.998, p<0.01) in non-private organisations. This echoed the finding by Haesli and Boxall (2005) who revealed the organisation's innovative reputation was helpful to retain knowledge workers.

The results also partially supported hypothesis 4.4, as the item of comfortable physical working environment was found to be of significant importance (F=4.995, p<0.01) to foreign-owned firms. It revealed that the work environment is more important to retain knowledge workers in the non-private organisations than in the Taiwanese-owned firms, but less important than in the foreign-owned firms. It

suggested that foreign-owned firms and non-private organisations more carefully treated their knowledge workers as an 'elite' group by emphasising the physical work environment and work condition, as suggested by Newell et al (2002). It also echoed the argument by Lockwood and Ansari (1999) who suggested that good work conditions were an effective strategy for knowledge worker retention.

In short, compared with Taiwanese-owned firms, both non-private organisations and foreign-owned firms placed more emphasised the adoption of flexible management practices and good physical work environment in their retention strategies for knowledge workers. These practices echoed the suggestions in previous research which highlighted the characteristics of knowledge workers who desire autonomy in their work and require careful management by providing good work conditions and trust to knowledge workers (Alvesson, 1993; Newell et al, 2002). For foreign-owned firms, the emphasis on convenient long-distance working practices and worker's comfortable working environment was not only a part of their humanised management policy but also an attempt to enhance the workers' efficiency and productivity when their workers travelled outside the office. As to the non-private organisations, the human resource manager in the non-private organisation P1, for example, indicated that one of their retention strategies focused on flexible management practices by granting a greater freedom to their workers in both time and project management. For example, they had four shifts available, so the workers could choose when they preferred to work and workers were not required to sign-in and sign-out[16]. The firm encouraged innovation by granting a greater authority to their workers in deciding their research topics. Because they had a less concerns (or pressures) on profit, their workers could select a research project and develop their creativity without the tight constraints of a product's commercialisation value. She concluded:

> "Those who prefer to have more flexibility in utilising their time and who place more values on developing personal knowledge (or knowing) would choose us."

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[16] Many Taiwanese-owned firms adopted a traditional management practice that required their workers to clock-in and clock-out as a working record.

In brief, the non-private organisations managed their knowledge workers based on the principle of trust, which was consistent with the researchers' suggestion on the importance of trust in the management of teamwork (Newell et al, 2002).

8.1.4 Corporate characteristics

Seven items related to the firms' corporate characteristics were measured to understand their importance to the retention of knowledge workers. The results are presented in table 8.4.

Table 8.4 Comparison of the importance of corporate factors to the retention of knowledge workers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Corporate development	Mean	Mean	Mean	Mean	F	Sig
Good company outlook/development potential	4.07	4.35	3.89	4.07	3.625	.028*
Good R&D capabilities	3.84	4.13	4.06	3.98	2.094	0.126
A leading position in the market	3.92	4.2	3.64	3.88	5.338	.006**
Ability to respond quickly to changes in the market	3.76	4.07	3.67	3.8	2.395	0.094
Good financial status	4.01	4.24	4.04	4.03	4.083	.018*
Good company reputation	4.01	4.24	4.04	4.08	1.048	0.353
Agreed with the corporate culture	3.73	3.93	4.04	3.89	2.107	0.124

*p<0.05

**p<0.01

The results show that good company reputation scored the highest mean of 4.08 in the total sample. This was consistent with the suggestions in the previous researches that indicated creating and maintaining an employer's brand name was an effective

retention strategy for knowledge workers (Haesli and Boxall, 2005; Horwitz et al, 2003; Stokes, 2000). This is, perhaps, related to Chinese culture which paid attention to 'Mianzi' (Face), with working in a decent company perceived to have a higher social status.

The result supported hypothesis 4.5, suggesting that the company's competitiveness was more important to knowledge worker retention in foreign-owned firms than the other two groups of organisations. It revealed that knowledge workers in foreign-owned firms were particularly concerned about the company's market position (F=5.338, p<0.01) and financial status (F=4.24, p<0.05) when they decided to stay in their organisations. It echoed the argument by Amaram (2005) who suggested the firm's competence in management was important to the retention of knowledge workers. The result also supported the hypothesis 4.6, indicating the importance of the company's potential/outlook (F=3.625, p<0.05) to the retention of knowledge workers in foreign-owned firms. This was consistent with the suggestion by Tyson (1997) who highlighted the importance of the company's vision to knowledge worker retention.

8.1.5 Intrinsic work factors

The items for this aspect evaluated the employees' views of intrinsic rewards, related to the nature of the work or the process of doing the work. Nine items were listed to examine the employees' views on the importance of these factors to knowledge worker retention. The results are presented in table 8.5.

Table 8.5 Comparison of the importance of intrinsic work factors to the retention of knowledge workers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Intrinsic work factors	Mean	Mean	Mean	Mean	F	Sig
Challenging work	3.88	4.26	4.25	4.1	5.028	0.007**
Job met my personal interest	3.68	4.17	4.16	3.96	7.217	0.001**
Opportunity to access new technology	3.69	3.89	4.13	3.89	4.971	0.008**
Authorisation from supervisor to be autonomous to a certain degree	3.68	3.87	3.83	3.85	2.727	0.068
Influential to the work-related decisions	3.68	3.87	3.83	3.78	0.904	0.407
Supervisor/manager's praise	3.67	3.96	3.88	3.81	2.084	0.127
Learning opportunities from work	3.89	4.15	4.2	4.06	2.998	0.052
Accumulate professional experiences	3.93	4.37	4.26	4.15	5.93	0.003**
Strengthen professional skills	3.93	4.35	4.29	4.15	5.925	0.003**

**p<0.01

The results show that the items of "accumulate professional experiences" and "strengthen professional skills" both scored the highest mean of 4.15, with statistical significance. It echoed the argument by Amaram (2005) who suggested skill development was an effective retention strategy for knowledge workers.

The results supported hypothesis 4.7, suggesting knowledge workers in foreign-owned firms were more concerned about the intrinsic rewards that would affect their willingness to stay in their organisations. The one-way ANOVA found that there were significant differences in challenging work (F=5.028, p<0.0), job met my personal interest, accumulate professional experiences (F=5.93, p<0.01) and strengthen professional skills (F=5.925, p<0.01) for foreign-owned firms. This was consistent

with the findings by Haesli and Boxall (2005) who suggested that intrinsic factors, such as the company's ability to offer interesting jobs or challenging jobs, were more important than the external factors in knowledge worker retention. The results also echoed the argument of Swart (2008) who indicated that knowledge itself was the focal point to knowledge workers, and they expect to develop their knowledge and receive feedback on using their knowledge by doing challenging work. As Amaram (2005) suggested, skill development was important for knowledge worker retention, the results further revealed that knowledge workers in foreign-owned firms particularly emphasised learning tacit knowledge. One interviewee from a foreign-owned firm indicated that they preferred to hire workers who showed aggressiveness in their attitude. This echoed the finding by Horwitz et al (2003) who found the offering of challenging jobs to knowledge workers was an effective retention strategy for knowledge workers.

The findings supported hypothesis 4.8, suggesting the "opportunity to access new technology" (F=4.971. p<0.01) was more important for non-private organisations. The finding echoed the suggestions in previous researches that suggested the availability of new technology was important to knowledge workers (Haesli and Boxall, 2005; Stokes, 2000). This result was also consistent with the strategy and characteristic of non-private organisations that focused on R&D activities.

8.1.6 Relationships and personal factors

In view of the close interaction between knowledge workers in teamwork and knowledge sharing, three relationship-related items were investigated on their importance in retention. In addition, the respondents were also asked five items of personal factors that influenced their decision to stay in their company. The results are presented in table 8.6.

Table 8.6 Comparison of the importance of relationships and personal factors that affect the retention of knowledge workers across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Relationships and personal values	Mean	Mean	Mean	Mean	F	Sig
Good relationship with supervisors/managers	4.14	4.15	4.28	4.19	0.457	0.634
Good relationship with team members	4.3	4.33	4.26	4.29	0.098	0.907
Ren-Ching	2.88	2.74	2.64	2.76	0.769	0.465
Work-life balance	3.52	3.98	3.99	3.79	4.861	0.009**
Working location near home	3.35	3.15	3.4	3.32	0.602	0.549
Smaller working pressure	3.08	3	3.12	3.08	0.138	0.871
Reasonable working hours	3.38	4.17	3.58	3.63	1.57	0.211
Stable job	3.81	4.02	3.93	3.9	0.723	0.486

**p<0.01

A good relationship with team members scored the highest mean of 4.29 in the total sample without significant differences between the three ownership groups. In general, the knowledge workers considered that having good relationships with their team members had a greater effect on their retention than having a good relationship with their supervisors or managers. It echoed the argument that indicated the characteristics of knowledge workers to usually be involved in a collaborative work environment and spend long hours with their colleagues, so the relationships with team members are important for knowledge workers (Swart, 2008). This finding was also consistent with that of Haesli and Boxall (2005) who found that working relationships between engineers contributed to a higher level of job satisfaction than relationships with managers did. The traditional Chinese relationship of Ren-Ching (favour to another person) drawing from the concept of guanxi (relationship), was found to have little influence over workers decisions to remain in their company. It echoed the finding by Chen et al (2005) who indicated that the influence of traditional culture in Taiwan seemed to be declining with a tendency towards more individuality. In addition, the results supported hypothesis 4.9, suggesting that a good work-life balance (F=4.861, p<0.01) was more important to knowledge worker retention in the

non-private organisations. This echoed the study by Chen et al (2008) who indicated work-life balance was an important factor that influenced the retention for knowledge workers in Taiwan's high technology industry.

8.1.7 Summary

The evidence from the survey revealed that the high technology firms focused on different human resource policies and practices to retain their knowledge workers. The results show that Taiwanese-owned firms relied on employee ownership bonus plans to retain their knowledge workers. The employee ownership bonus plan was the only distinctive retention practice found with statistical significance in this research. Non-private organisations made efforts in shaping an R&D oriented environment which enabled their workers to share information, to access new technology and to conduct innovative activities. They also placed attention on the adoption of flexible management practices that allowed their workers to pursue a work-life balance.

Foreign-owned firms appeared to use a bunch of human resource policies and practices to retain knowledge workers. For example, the practices of convenient long-distance working practices and a comfortable physical working environment enabled workers to work efficiently. Work assignments, meanwhile, provided intrinsic work rewards to workers who were satisfied by a challenging work environment and by work that fitted their personal interests and could strengthen their skills and experiences. The foreign-owned firms that had market advantages, a good financial status and a promising company outlook were also in an advantaged position to retain their knowledge workers.

In summary, the firm's retention strategies and practices varied with the firms' organisational ownership and that was related to both the firm's origin of nation and their business sector (profit or non-profit). For example, despite non-private organisations being Taiwanese, their management practices appeared to be more like those adopted in foreign-owned firms. Nevertheless, the firm's national ownership still influenced their retention practices. Taiwanese-owned firms emphasised group

performance, with a consideration of both individual performance and the workers' seniority. By contrast, the human resource practices in foreign-owned firms demonstrated a stronger individual-oriented style, such as an individual-performance reward policy.

8.2 Knowledge worker retention difficulties in Taiwan's high technology industry

- **Who encountered retention difficulties for knowledge workers?**

Causer & Jones (1993) indicated that knowledge workers have more power than traditional workers in selecting the firms they desired to stay with due to skills shortages in the market. However, Scarbrough (1999) pointed out that knowledge workers still relied on the resources provided by the employers to utilise their knowledge and skills to complete the work. The former point of view placed knowledge workers in an advantageous position regarding the issue of retention, but the latter one suggested that the firm could utilise certain resources or methods to retain their knowledge workers. Thus, it was interesting to find out whether the high technology firms really encountered retention difficulties and whether these varied with the firm's organisation ownership group.

The ability of the firms to retain their workers could be observed through a review of their workers' seniority and turnover rate. Accordingly, the respondents were investigated on two items: "how many years have you stayed in your current company" and "how many companies have you worked for before you joined the company". The first question was to evaluate the workers seniority in their current firm and the second one was to evaluate the knowledge workers experiences of career mobility. The results are presented in table 8.7.

Table 8.7 Comparison of knowledge workers' seniority and job change frequency across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=69)	Total (N=199)		
Item	Mean	Mean	Mean	Mean	Chi-Square	Sig
Service years in the current firm	5.6	5.08	9.84	6.96	105.886	0.013*
	Taiwanese-owned (N=82)	Foreign-owned (N=46)	Non-Private (N=67)	Total (N=195)		
Item	Mean	Mean	Mean	Mean	Chi-Square	Sig
Number of companies worked for before joining the current firm	2.15	2.91	1.96	2.26	26.727	0.021*

*p<0.05

The results found statistical significances for the non-private organisation whose workers had the highest mean of seniority (X^2=105.886, p<0.05) and the lowest mean of job change frequencies (X^2=26.727, p<0.05). The statistical evidence thus indicates that the non-private organisations had the least problems in retaining their knowledge workers. The human resource manager in the non-private organisation agreed that they did not encounter too many retention difficulties. She said:

> "It (retention) used to be a serious problem about ten years ago, especially in ICT (information and communication technology) fields, when the high technology industry was very promising and Taiwanese-owned firms paid lucrative stock bonuses to their employees. The situation is better now. Our average turnover rate per year is around 10%."

By contrast, the results show that foreign-owned firms had more difficulties in retaining their workers, with the lowest mean in worker seniority and the highest mean in job change frequency. The interviews further revealed that pay was the main factor that affected the retention of knowledge workers, but that limitations in career development for the workers caused more retention difficulties for foreign-owned firms. As the human resource manager in foreign-owned firm T2 indicated:

"Sometimes there were limited positions available for promotion. You could not be promoted to a higher position if your boss didn't move. I was lucky that I had the opportunity to transfer (be promoted) to the regional office, but it really depended on chance."

- **Who did the high technology firms want to retain?**

Most of the interviewees from the firms that employed more than 500 employees indicated that their turnover rate was close to, or below, the industry norm. This suggests that the larger firms had more resources or tools to effectively retain their knowledge workers. However, most of the interviewees admitted that the turnover rate of engineers was much higher than that for administrators. The engineers, especially experienced ones, were the main target group of workers that the high technology firms were interested in retaining because they had the knowledge and technology that could be turned into a real product. One interviewee from a Taiwanese-owned firm highlighted the importance of tacit knowledge in R&D work, and that it took two years to train a skilled engineer who could perform his work efficiently in the firm. Based on the interviews, Taiwanese-owned firms had greater concerns about the turnover of experienced engineers because they preferred to recruit and train junior engineers themselves. This mirrored the research finding of Chen et al (2008), who drew attention to the retention difficulties facing high technology firms in Taiwan concerning experienced engineers.

- **The impact of economic recession**

The economic recession that occurred from November 2008 eased retention difficulties for high technology firms. The recession lasted for about one year and the interviews were conducted in September 2009 when the economy was gradually recovering. The interviews revealed that the employee turnover rates in the case companies with more than 500 employees had been dramatically reduced to the range of 2 to 6 percent. The average turnover rate in high technology industry before the recession was about 15% to 25%,

which varied depending on which products/services the case companies made[17]. One explanation was that the economic recession had lowered demand for skills in the labour market, which prevented the knowledge workers from job switching.

During the period of recession, the high technology firms faced the problem of excessive manpower due to the huge drops in orders. The authority in Hsinchu Scientific Park, the government institute providing infrastructure for high technology firms, reported that the number of workers laid-off hit a record high for the past twenty years[18]. In addition, around 100,000 workers, including engineers, were forced to take unpaid leave in the Hsinchu Scientific Park, accounting for 76% of the total workers[19].

The interviews, however, revealed that the three groups of organisations showed different attitudes and actions in coping with the economic turndown. The non-private organisations, for example, were the only type of organisation that was capable of continuously hiring knowledge workers rather than using a hiring freeze or even firing workers. This was because of their ownership structure where the government was the major shareholder. Therefore, they were required to be cooperative with government policy to provide job opportunities, especially for the high quality workers, during a period of economic turmoil.

By contrast, many Taiwanese-owned firms forced their workers to take non-paid leave in an attempt to cut costs. The knowledge workers' power of negotiation over the firms' employment decision was weak. The reason perhaps echoed Scarbrough's (1999) argument for the dependence of knowledge workers on their employers to utilise their knowledge/skills. Han (2003) argued that the Taiwanese style employee ownership bonus plan[20] created a protection mechanism for employees during the economic downturn due to lower labour costs, so that Taiwanese-owned firms were more capable of retaining workers

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[17] For example, one interviewee referred to the average turnover rate for the semiconductor section as around 15% and another interviewee referred to the average turnover rate for the PC peripherals section as around 25%.
[18] Source: http://www.web66.com.tw/web/UPT?UPID=34125 <accessed: 11 June 2010>
[19] Source: http://www.nownews.com/2009/02/10/91-2406151.htm <accessed: 11 June 2010>
[20] Under this plan, the worker's compensation largely came from the employee bonus, especially the stock bonus.

than foreign-owned firms that had higher labour costs. However, as the unpaid leave further cut the workers' fixed payment, some knowledge workers in the high technology industry started to realise that they were still 'workers'[21].

Foreign-owned firms, meanwhile, took a straightforward action to lay-off underperforming workers, with less consideration of a possible compromise solution of compulsory unpaid leave. While the head count was frozen, the foreign-owned firms did not rashly lay-off excessive manpower unless there was a change in the business strategy, such as a drop from a particular market or the dropping of a particular product. The retention decision was consistently based on workers' individual performance. The performance-oriented employment policy was one of the reasons that affected the workers' turnover, which was supported by the statistical result that showed the knowledge workers in foreign-owned firms experienced higher than average frequencies of changing employers.

8.3 Effective retention practices for high technology firms

As discussed in 8.1, the firms used different human resource practices in line with their ownership groups, to retain knowledge workers by focusing on the knowledge workers' actual experiences. To further compare (or ensure) the effectiveness of retention practices used by the high technology firms, the respondents were asked about their perceptions on the effectiveness of various practices. Nineteen items were measured by using a five-point rating scale (from 1 = the least effective to 5 = extremely effective). These nineteen items exhibited an internal consistency reliability (Cronbach's alpha) of 0.895, which was above the acceptance level of 0.70 (Bryman and Bell, 2003). A one-way ANOVA analysis was conducted to compare the differences in mean scores across the three groups. The results are presented in table 8.8.

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[21] Source: http://www.lihpao.com/news/in_p1.php?art_id=35916 <accessed: 11. June 2010>

Table 8.8 Knowledge workers' perceptions of the effectiveness of retention practices across the three organisation ownership groups

	Taiwanese-owned (N=84)	Foreign-owned (N=46)	Non-Private (N=70)	Total (N=200)		
Retention methods	Mean	Mean	Mean	Mean	F	Sig
Increase fixed salary	4.57	4.48	4.38	4.48	1.03	0.359
Increase bonuses	4.55	4.43	4.34	4.45	1.46	0.235
Employee ownership bonuses - no lock-in	4.48	4.07	4.1	4.25	3.717	0.026*
Lock-in employee ownership bonuses	3.18	3.07	3.47	3.25	2.2	0.114
Improve the employee's welfares	4.27	4.07	4.15	4.18	0.84	0.433
Promotion	3.91	4.17	3.99	4	1.341	0.264
Assign different jobs	3.17	3.59	3.38	3.34	2.946	0.055
Provide more training programmes	3.67	3.91	3.78	3.77	0.921	0.4
More authority	3.88	3.87	4.07	3.94	1.151	0.319
Participate in the decision-making process	3.74	3.8	3.91	3.82	0.629	0.534
Flexible working hours practices	3.61	3.78	3.84	3.73	1.036	0.357
Additional day-off for O/T	3.57	3.35	3.71	3.57	1.45	0.237
Enable long-distance working	3.31	3.37	3.49	3.38	0.469	0.626
Improve physical working environment	3.72	4	3.87	3.84	1.316	0.271
Improve internal communication	4.18	4.13	4.12	4.15	0.098	0.907
Supervisor/manager's persuasion	3.23	3.26	3.25	3.24	0.011	0.989
Friends' and families' persuasion	2.67	2.67	2.71	2.68	0.026	0.974
Company's vision	2.93	3.39	3.25	3.15	3.109	0.047*
A period of non-paid leave	3.1	3.22	3.35	3.22	0.938	0.393

* $p < 0.05$

This table indicates that knowledge workers perceived the method of an increase in fixed salary as the most effective retention method, supported by the highest mean score of 4.48. This result was consistent with that in the prior analysis based on knowledge workers' experiences in their current company. The finding supported the argument by Lockwood and Ansari (1999) who suggested raising salaries was one of the most effective retention strategies for knowledge workers. It also echoed the argument in the previous researches that suggested that pay was important to knowledge worker retention, as it indicated the value of their knowledge/skill and determined their status in the organisations (May et al, 2002; Swart, 2008).

Moving to the comparative analysis, the one-way ANOVA analysis supported hypothesis 5.1, suggesting that a no lock-in type of employee ownership bonuses (F=3.717, p<0.05) was perceived to be more effective in retention for knowledge workers in Taiwanese-owned firms. This echoed the study by Chen et al (2008) who questioned the effectiveness of the lock-in type of employee ownership bonus plan that was widely adopted by Taiwanese high technology firms. In addition, the result supported hypothesis 5.2, suggesting that a company's vision (F=3.109, p<0.05) was perceived to be effective for knowledge workers in foreign-owned firms. The perceived effectiveness of the persuasive power of the company vision echoed the suggestion in previous researches that indicated a company's vision could be important in knowledge worker management to effectively retain knowledge workers (Tyson, 1997; Stokes, 2000). One interviewee commented that an open communication policy, such as an open-door policy that allowed the employees to directly communicate with the senior managers, facilitated in reaching consensus about the company's direction, policy and management practices. She further highlighted that the effective retention practices in foreign-owned firms were underpinned by respecting the individuality of each worker. As she explained:

"It is about the atmosphere in the company, a more equal and friend-like working relationship. We call our colleagues and managers by their names rather than titles. The hierarchy is less obvious, and the workers feel more equal to our colleagues and mangers."

- **Employee ownership bonuses – lock-in or not?**

In the prior analysis in section 8.1, the item of employee ownership bonuses was also found to be of significant importance for the retention of knowledge workers in Taiwanese-owned firms. Research on the effects of employee ownership and profit sharing suggested a positive effect on the retention or loyalty of workers (Blasi et al, 2008; Han, 2003; Kruse and Blasi, 1995). Aiming to strengthen the effectiveness of this retention practice, many firms required their workers to lock-in part of their entitled stock bonuses for a certain period, normally two years. Employees who quit

the company would lose their entitlement of the locked-in stock. It was interesting to discover that a non lock-in employee ownership bonus programme was perceived to be a more effective retention method to knowledge workers, since the interviews revealed that some Taiwanese-owned high technology firms considered a lock-in type of employee ownership bonus programme as a powerful retention method. The human resource manager from Taiwanese-owned firm T5 presented a typical logic of a lock-in employee stock bonuses plan from the perspective of firm:

> "The workers received a 1/3 stock bonuses this year. Each year, if they perform well, they will continuously accumulate and receive their entitlement of stocks. This is the way we retain them."

However, the results showed that knowledge workers perceived a non lock-in type of employee ownership bonus programme as a more effective retention method than a lock-in one. In other words, the retention power of lock-in stocks alone was not strong enough to persuade the knowledge workers to stay in their firms. Chen et al (2008) identified a similar issue in their research finding that high technology firms in Taiwan still faced retention problems for engineers after the stock's lock-in period was due.

One interviewee from Taiwanese-owned firm T4 supported the non lock-in style of employee ownership bonus plan, which was regarded as more of a reward tool intended to fairly compensate their workers for their performances in the previous year rather than a retention tool. He indicated:

> "The way to retain our employees was bunches of policies and practices that covered both financial (including salary, stocks, bonuses and options) and non-financial (for example, career development, welfare programmes) aspects. We developed our retention plan, and would put the industrial report of our compensation survey into consideration."

This supports the argument of Horwitz et al (2003), who suggested that firms adopt distinctive 'bundles' of human resource practices to form their effective retention strategies. On the other hand, statistical evidence on the effectiveness of a non lock-in employee ownership bonus programme perhaps supports the argument that

knowledge workers expect more than a purely financial incentive to effectively bind them to the firms.

- **Challenges to Taiwanese-owned firms – a decreased effectiveness of stock bonuses?**

  - Changes in legal regulations

In 2008, the government issued a new accounting principle that required firms to list their distributed employee bonuses under the item of expenses rather than the item of distributed profit. It also required the firms to calculate the number of shares distributed to the employees by the stock's market value instead of its par value. In addition, effective from 2010, the stock bonuses received by the employees will be taxed at the stock market value instead of the par value.

As a result, employees are expected to receive fewer shares worth less after tax under the new regulations. This would have a significantly negative effect on the total compensation for workers in Taiwanese-owned firms, especially for the firms that enjoyed a high share price and where the stock bonuses accounted for a higher percentage of the workers' total compensation. The direct impact is that Taiwanese-owned firms are at risk of losing their knowledge workers to other competitors who offer higher pay, if they continue the same structure of compensation package.

  - Adjustment of reward policies

In response, a number of Taiwanese-owned firms have attempted to adjust their reward strategies to place a greater attention on purely monetary pay. Several leading Taiwanese-owned high technology firms have increased their employees' base pay by 10 to 20 percent. One company additionally planned to distribute employee ownership bonuses in more tranches ahead of its original schedule, in an attempt to reward their workers in time. Such adjustments to the reward policy, with a higher base salary, narrowed the differences in guaranteed payment offered by foreign-owned firms.

- The role of the employee ownership bonuses as a retention tool

However, despite this, several interviewees from the companies indicated that the employee ownership bonuses remained as the main retention tool, and that stock bonuses kept played a vital role in knowledge worker retention. This demonstrated the collectivist-orientation in these Taiwanese-owned firms, which preferred to motivate and reward the employees by group incentive plans. Yet the impact on the workers' total compensation due to the changes of legal requirements and the inconsistent response in compensation strategies among Taiwanese-owned firms might amplify the issue of knowledge worker retention for Taiwanese-owned firms, especially when the economy becomes prosperous again. Thus, it is suggested that Taiwanese-owned firms should develop distinctive retention strategies that differentiated themselves from other competitors, with an expected weaker effectiveness of stock bonuses.

8.4 Conclusion

The empirical evidence supports the argument that the high technology firms would use different retention methods to retain knowledge workers, depending on their ownership groups. The factors that influenced the adoption of retention methods for knowledge workers in high technology firms included the workers' knowledge and technological ability which was related to the workers' educational background, whether organisations were in the private or non-private sector, and the firm's nation of origin.

The adoption of the retention methods for knowledge workers in non-private organisations was related to the knowledge/skill level of knowledge workers and the nature of work. Being R&D oriented institutes, the non-private organisations implemented a focused retention strategy that was centred upon establishing a favourable research environment, which in turn enabled their workers to learn new knowledge and have access to advanced technology. In terms of their workers educational background, over 80% of their workers held a master's or PhD's degree. The nature of work required their workers to possess theoretical knowledge and

advanced technological skills that were believed by the firms to be positively related to their educational background. Consequently, the management practices in the non-private organisations showed the greatest degree of flexibility among the three groups of organisations. They retained their knowledge workers by allowing their workers to have a greater degree of autonomy and freedom in managing their work and enabling their workers to enjoy a decent work-life balance. Lastly, compared with the privately-owned firms, both Taiwanese and foreign-owned, the non-private organisations had the least difficulty in retaining knowledge workers, with the most stable labour force among the three groups of organisations.

Retention strategies in foreign-owned firms included a bundle of HR practices, which were influenced by their parent companies. The survey results showed that knowledge workers in foreign-owned firms were satisfied with the resources provided by the firms to enable them to work comfortably, flexibly and efficiently. Job design provided intrinsic rewards to the knowledge workers through challenging and interesting work, and allowed the workers to strengthen their professional experiences and skills. Compared to the Taiwanese-owned firms, the management practices were more individually-oriented and flexible, with an emphasis on individual responsibility and performance. The survey results also indicated that knowledge workers in foreign-owned firms emphasised the competitiveness of the firms, drawing from the perspective of the company vision, future outlook, market position and financial status. Thus multinationals with a strong market performance had more advantages in retaining knowledge workers.

The Taiwanese-owned firms relied on the utilisation of employee ownership bonus plan as their main retention tool, with a particular focus on stock bonuses. Unlike foreign-owned firms, where the reward policy was guided by individual performance, the workers' seniority was taken into consideration for bonus distribution by several Taiwanese-owned firms in this research. It was common that firms used a lock-in stock bonuses to reinforce the effectiveness of retention, despite the fact that effectiveness of this practice alone was not important in the perception of knowledge workers. The amendment of legal regulations led to an adjustment of reward policies

(e.g. the portion of base pay, cash bonus and stock bonus) for some Taiwanese-owned firms, which were expected to intensify the competition in recruiting and retaining knowledge workers among high technology firms. As a consequence, the importance (or effectiveness) of stock bonuses is likely to be reduced. Nevertheless, inconsistent responses to changes in legal requirements meant the firms need to review their retention strategies including, but not limited to, reward policy, to retain their knowledge workers.

In short, the specific reward policy appears to be the most obvious difference in retention practice among the three ownership groups of high technology firms. The non-private organisations had the least flexibility in offering a highly competitive total compensation package, but the non-profit oriented businesses allowed their workers the greatest flexibility to choose their research topics and take care of their work-life balance. Foreign-owned firms were capable of offering high pay, with a guaranteed income to their workers. Their management practices were influenced by their parent companies, with a greater emphasis on individualism. On the other hand, the intrinsic rewards via individual achievements were also important factors that affected the knowledge worker retention in foreign-owned firms. Finally, the employee ownership bonus programme was a distinctive and crucial retention practice used by Taiwanese-owned firms. Although the dependence on employee ownership bonuses as the main retention practice was not without problems, it was expected that Taiwanese-owned firms would continue to use this practice. This confirms the perception of a collectivist-orientation in Taiwanese culture, which was also demonstrated in the consideration of senior workers for bonus distribution.

In the next chapter, the conclusion section will summarise the main findings in this research. It will also present the contributions and limitations of this research, and the suggestions for further research.

Chapter 9 : Conclusions

This final chapter draws conclusions from this research. Firstly, the main research findings will be summarised and will discuss how organisations with different ownerships recruited, selected and retained their knowledge workers in Taiwan's high technology industry. Drawing from the perspective of knowledge workers, the important factors that influenced knowledge workers' decisions to join or stay in their organisations will also be examined. Secondly, the implications of this research will be presented. Finally, the contributions, limitations and suggestions for further research will be discussed.

9.1 Research findings and discussions

Based on multiple research methods, the data was mainly collected through a survey of questionnaires from knowledge workers and interviews with human resource managers in the high technology organisations under various ownership forms. The responses of 200 valid questionnaires and interviews from 10 organisations were analysed. The empirical evidence supported the argument that organisations with different ownership types laid an emphasis on different human resource practices to recruit, select and retain knowledge workers. Based on Taiwan's situation, this research particularly added the non-private organisations into the research targets, in addition to the Taiwanese-owned and foreign-owned firms in the private sector. This is because, firstly, non-private organisations play an important role in researching and developing leading edge technology in Taiwan's high technology industry; secondly, most of the previous research has focused on comparing the different HRM practices adopted by the firms in the private sector, but seldom included firms in the public/non-profit sector. The reason for focusing on studying the variable of organisation's ownership type was because this research attempted to understand the major relationships between the organisation's ownership type and their adopted HRM strategies and practices for knowledge workers. In addition, due to the use of a snowball survey technique, the results may not be strong enough to support a multi-variable analysis.

Recruitment

This study firstly investigated the recruitment channels popularly adopted by Taiwan's high technology organisations to effectively recruit knowledge workers. The results (in chapter 6) supported the argument that the high technology organisations in different ownership groups preferred to adopt different strategies and practices to recruit knowledge workers. The results supported the hypothesis that on-line agents were more popularly used by Taiwanese-owned firms to recruit knowledge workers. This was consistent with the finding by Zheng et al (2008) who indicated Taiwan's high technology firms adopted more innovative recruitment methods (i.e. internet) for professional workers. The use of on-line agents was in connection with their recruitment strategy that preferred to hire inexperienced or junior knowledge workers and cultivate them internally to overcome recruitment difficulties. The reliance on graduates in the recruitment strategy for Taiwanese-owned high technology firms was also found in the study by Chen et al (2008). The results supported the hypothesis that foreign-owned firms significantly used head hunters to recruit knowledge workers, as foreign-owned firms were concerned about effectiveness more than recruitment costs. This finding was consistent with the researches by Amaram (2005) who identified that recruiting firms were popularly used to recruit the IT workforce. Non-private organisations significantly used company websites. This echoed the argument by Lockwood and Ansari (1999) who indicated company websites could be more effective than on-line agents in knowledge worker recruitment for some large organisations. In short, the results echoed the argument in previous researches that suggested the organisation's human resource policies and practices could be influenced by the organisational ownership (Budhwar and Debrah, 2001; Shen, 2006). Although the organisations with different ownerships preferred to use different recruitment methods for knowledge workers, the results also found that personal connections were the most effective recruitment method used by knowledge workers. It echoed the argument that suggested the importance of social capital for knowledge workers in finding jobs (Granovetter, 1973; 1983).

Selection

Chapter 7 investigated the selection criteria and selection methods for knowledge workers. The results supported the hypothesis that candidate's educational background was more important to non-private organisations. This result echoed the argument that indicated knowledge workers are usually well-educated and form the major workforce in the knowledge-intensive firms (Alvesson, 2001). It also echoed the argument that suggested theoretical knowledge was important to knowledge workers and that knowledge was normally acquired through formal educational channels (Alvesson, 1993; Drucker, 1994). In addition, the results supported the hypothesis that foreign-owned firms emphasised the individual abilities and work experience of knowledge workers. It echoed the argument that suggested knowledge was the focal point to knowledge workers (Swart, 2008). The knowledge worker's professional ability was the most important selection criterion in foreign-owned firms. It suggested that foreign-owned firms emphasise accumulating their human capital through acquiring required skills externally, which was consistent with the finding by Huang (2000). The emphasis on worker's work experience echoed the argument by Nonaka (1994) who indicated the significance of tacit knowledge in the process of knowledge creation or application. Moreover, the emphasis on the workers' team work abilities echoed the characteristic of knowledge workers who have close interactions with their colleagues in their work (Swart, 2008). The emphasis on problem-solving abilities seemed to support the argument by Scarbrough (1999: 7) who suggested knowledge workers are those who involve in work that is relatively unstructured and organisationally contingent, reflecting the changing demands of organisations.

The results about selection techniques for knowledge workers revealed the influence of the organisation's origin of nation over their adoption of human resource practices. For example, the results supported the hypotheses that foreign-owned firms preferred to use selection techniques that were more popular in a western context, such as interviewing and reference checks (Newell, 2005). This was consistent with the study by Yuen and Kee (1993) who found the organisation's headquarter location may influence the adoption of its HRM policies. The non-private organisations and Taiwanese-owned firms preferred to use cognitive tests, such as aptitude tests and IQ

tests. This was consistent with the study by Chien and Chen (2007) who found cognitive tests were one of the major tools for knowledge worker selection. However, there were also dissimilarities between the non-private organisations and Taiwanese-owned firms in the use of selection techniques. For example, the non-private organisations significantly adopted the selection method of presentation which was not found in use by Taiwanese-owned firms in this study. This result revealed that not only the organisations' origin of nation but also the organisation's private or non-private ownership could influence the adoption of selection techniques for knowledge workers.

This study also examined the factors that may influence knowledge workers' selection of their employers in the three groups of organisations. The data supported the hypotheses that base salary was more important for knowledge workers in foreign-owned firms and employee ownership bonuses were more important in Taiwanese-owned firms. The findings supported the argument that suggested pay, or total compensation, was important for knowledge workers in their job expectations (Haesli and Boxall, 2005; Horwitz et al, 2003; May et al, 2002). The different reward practices in the foreign-owned firms and Taiwanese-owned firms might be related to the different cultures in the organisation's home nation. The base salary in foreign-owned firms was mainly decided in connection with the worker's individual professional ability and work experiences, while the employee ownership bonuses in Taiwanese-owned firms were allocated based on, firstly, the group performance, and secondly the individual performance, as well as seniority. It echoed the study by Hofstede (1980) who suggested western countries were more individualism-oriented while Taiwan was more collectivism-oriented. The data did not strongly support the hypothesis about the importance of benefits to knowledge workers. The results partially echoed the argument by Lockwood and Ansari (1999) who indicated that some of the basic benefits were taken for granted by knowledge workers, but the data did not support their argument that suggested outside the box benefits or tailor-made benefits (such as childcare facilities) might be effective to attract knowledge workers to join the organisations.

The data supported the hypotheses about the importance of the organisation's policy that encouraged innovative activities and practices that provided opportunities to

access new technology and supportive learning resources to the knowledge workers in the non-private organisations. The results were consistent with the argument that suggested the organisation's emphasis on technical innovations and the availabilities of new technologies were attractive to knowledge workers in the recruitment process (Lockwood and Ansari, 1999; Stokes, 2000). It also echoed the argument that suggested knowledge workers emphasised the importance of updating their knowledge and skills, so organisations should keep investing in training programmes to enhance knowledge workers' knowledge, skills and employability (Amaram, 2005; Kalra, 1997). In addition, the data supported the hypothesis that indicated the knowledge workers in foreign-owned firms emphasised intrinsic work values, such as a challenging job, an interesting job and the chances to accumulate their experiences and professional knowledge/skills. It echoed the argument that suggested knowledge workers were strongly driven by intrinsic work values (Haesli and Boxall, 2005; Horwitz et al, 2003). The emphasis on the accumulation of work experience and strengthening professional abilities supported the argument by May et al (2002) who indicted knowledge workers paid attention to strengthening their expertise to enhance their mobility in their career choices.

Moreover, the results supported the hypothesis that indicated that the availability of work-life balance attracted knowledge workers to join non-private organisations. It echoed the argument that suggested the issue of work-life balance became more important to knowledge workers as they often spent long hours at work and the distinctions between work life and home life became blurred (Chen et al, 2008; Davenport et al, 1996; Horwitz et al, 2003).

Retention

As to the retention of knowledge workers, the result also found that employee ownership bonus plans were an effective retention strategy for knowledge workers in Taiwanese-owned firms. It was consistent with the findings by Horwitz et al (2003) who identified incentives/bonuses as the most effective retention strategy for knowledge workers. However, this research found that the no lock-in type of employee ownership bonus plan was perceived by knowledge workers to be more effective than the lock-in type of employee ownership bonus plan that was widely

adopted in Taiwanese-owned firms. It echoed the study by Chen et al (2008) who indicated that the lock-in type of employee bonuses could not effectively retain knowledge workers.

The results revealed that the adopted management practices showed more similarity in foreign-owned firms and non-private organisations than in Taiwanese-owned firms. For example, foreign-owned firms and non-private organisations provided a more comfortable work environment and flexible management practices to knowledge workers, whereas Taiwanese-owned firms did so to a lesser extent. It echoed the argument that suggested knowledge workers were a group of 'elite', requiring good working conditions and autonomy to do their work (Lockwood and Ansari, 1999; Newell et al, 2002). However, the foreign-owned firms and non-private organisations placed different focus on their management practices. This study found knowledge workers in foreign-owned firms were more satisfied with the intrinsic work values that provide challenging work, work fitting personal interests and chances to accumulate their experiences and strengthen their professional knowledge/skills. It echoed the argument by Haesli and Boxall (2005) who indicated that intrinsic factors were more important than extrinsic factors in knowledge worker retention. It also supported the argument that suggested knowledge workers desired further development of their knowledge by participating in challenging jobs to enhance their career mobility (May et al, 2002).

The analysis found the management practices in foreign-owned firms more emphasised to respect and satisfied the individual needs and individual development. This echoed the findings by Yuen and Kee (1993) who indicated that the organisation's headquarters location could influence its adoption of HRM practices. In addition, the firm's market position and financial status were found to be important to knowledge workers in foreign-owned firms. This echoed the argument by Amaram (2005) who suggested that competent management helped to retain knowledge workers. In contrast, the practices in the non-private organisations provided their knowledge workers the opportunities to access new technology, allowed them to conduct innovative researches that they were interested in and enabled them to achieve a good work-life balance. The findings supported the argument in this research that the organisation's ownership type in terms of being privately owned or

not privately owned would influence the human resource practices for knowledge workers.

9.2 Implications

Carter and Scarbrough (2001) suggested a knowledge worker approach which highlights such workers, and which should be managed as a separate group due to their distinctive characteristics. Drawing from the perspective of both human and social capital, it is suggested that the organisations should manage knowledge workers in response to the characteristics of knowledge workers. Firstly, HR manager should aware that knowledge workers are usually well-educated and it takes times to develop the special expertise of knowledge workers. Therefore, they demand good pay, a good working environment and flexible management practices that allow them to have more autonomy and authority to have control over their work. Foreign-owned firms were found to implement such practices better than Taiwanese-owned firms in this research. It is suggested that Taiwanese-owned firms should provide a better physical working environment by taking the needs of individual workers into consideration, which would enable their workers to work more comfortably and efficiently. For example, the design of working areas could be more comfortable and have some space and facilities, if affordable, to let the workers to take a break at work. Some of the Taiwanese-owned firms set up rest areas for their workers to take a break during their work time, but these facilities could not be best used in the absence of more flexible management practices that allow their workers to have the freedom to decide when to work and how they do their work.

In addition, knowledge workers can compare the practices between their firms and other organisations in the market. This is a common phenomenon, as the knowledge workers in the high technology industry easily form a community and interact through socially or through on-line approaches. Therefore, the HR managers should also be aware of the practices of their competitors and understand what their employees desire through, for example, communicating with their employees regularly or participating in their on-line communities. Among these practices, pay was found to be one of the most important practices of concern to knowledge workers, especially in

terms of retention. Due to the changes in legal regulations, employees in Taiwanese-owned firms are expected to receive fewer stock bonuses. Therefore, it is suggested that Taiwanese-owned firms should increase the base salaries of their knowledge workers to shorten the gap of fixed pay between foreign-owned and Taiwanese-owned firms. Because pay reflects the value and status of knowledge workers in organisations, a higher base salary would make the knowledge workers feel more respectful, which may help the knowledge workers to act more creatively and autonomously, a behaviour desired in organisations adopting an innovative strategy. Furthermore, previous empirical evidence showed that a lock-up type of bonuses does not effectively retain knowledge workers (Chen et al, 2008) and this research supported the same argument. Therefore, it is suggested that Taiwanese-owned firms should consider to adopt a no lock-up type of employee ownership bonuses rather than a lock-up type of bonuses, in order to their reward their knowledge workers.

The analysis all revealed that knowledge workers were concerned about work-life balance. The non-private organisations and the foreign-owned firms performed better in this regard due to the adoption of flexible management practices and allocation of reasonable workloads. By contrast, the Taiwanese-owned firms should make workers work-life balance a priority of HR policies. In practice, organisations could offer flexitime management practices to knowledge workers, allowing them to adjust their work time which may help them to work more efficiently. However, the flexitime practice alone is not sufficient for knowledge workers to achieve a better work-life balance. What has happened is that knowledge workers often need to work late to meet project deadlines under the system of personal responsibility, and come back to work on-time the next day. A flexitime practice that allows the workers to work late may allow the workers to have a better rest and improve their efficiency on work, but fundamentally the organisations should assess whether the workload and working time is reasonable for their knowledge workers. Therefore, it is suggested that organisations, especially Taiwanese-owned firms, should allocate a reasonable workload to knowledge workers and pay attention to the quality of life. In other words, the organisations should control the excessive overtime of knowledge workers, and encourage them to take a rest timely to have a better work-life balance. By doing so, the organisations may need to hire more people and result in an increase in operational costs. Therefore, the organisations may also need to adjust their business

strategy which aims to develop innovation or a quality product strategy to increase the value-added of their products, rather than focusing on reducing their costs.

9.3 Contributions

This research included the high technology organisations in the non-privately and privately-owned sectors, and it is unique and novel in this regard. The difference in ownership in these two sectors resulted in the different visions, business strategies and product markets. Fundamentally, the non-privately sector complemented, rather than competed, with the privately-owned sector because the non-private organisations research advanced technology and approached innovative products at very early stage. The non-private organisations recruited knowledge workers with a PhD degree, more so than the privately-owned firms who generally required knowledge workers with a masters or bachelors degree. Although the knowledge workers in the non-privately organisations might still move to the privately-owned organisations, the interviews revealed that people movement from the non-private organisations to privately-owned sector has been eased during the past years due to the reduction of bonuses offered by the privately-owned firms.

Empirically, this study revealed the characteristics of knowledge workers. In terms of qualifications, the findings supported the suggestions that considered knowledge workers as a group of people who are well-educated and possess professional knowledge/skills in a particular field (Alvesson, 1993; Newell et al, 2002). In terms of job expectations and satisfaction, knowledge workers emphasised pay, learning opportunities and intrinsic work values (Haesli and Boxall, 2005; Horwitz et al, 2003; Mat et al, 2002). From the view of social capital, the knowledge workers emphasised the relationships with their co-workers as they spent a long time together in a collaborative work environment (Newell et al, 2002; Swart, 2008).

Secondly, this study illustrated the different practices for the recruitment, selection and retention of knowledge workers in different ownership organisations (i.e. Taiwanese-owned, foreign-owned and non-private organisations) in Taiwan's high technology industry. Particularly, this study contributed to revealing the recruitment

strategies and management practices of non-private organisations, as most previous research has focused on comparing the HRM practices in different ownership firms in the private sector. The results revealed that the non-private organisations adopted distinctive strategies and practices to manage knowledge workers due to the characteristics of non-private organisations that were different from the profit-oriented firms in the private sector.

Thirdly, this study used multi-method analysis to examine the practices for knowledge worker management from both the perspectives of workers and organisations to make the findings stronger. Thus, this research contributed to providing a better understanding for knowledge worker management in Taiwan, that is different from a western context in view of the greater emphasis on hierarchy, power distance and group orientation. Particularly, the findings apply to Taiwan's high technology industry. As most of the previous researches concerned about the strategies contributed to the development of Taiwan's high technology industry (Chang and Tsai, 2000; Chen and Huang, 2004; Lin et al, 2007), this research contributed to enriching the empirical evidence about the management of Taiwan's high technology industry from the perspective of HR practices for knowledge workers.

Managerially, it is suggested that the organisations should considered the characteristics of knowledge workers in the adoption of the human resource management practices. In addition to the characteristics of knowledge workers, the organisations should consider the firm's specific factors, such as the organisation's degree of globalisation or the extent of reliance on the input of knowledge worker's knowledge/skills in the work, to adjust their human resource management practices for knowledge workers accordingly. As to the policy side, based on my research findings, it is suggested that the Taiwanese government should maintain the operation of non-private organisations to continue their unique contributions to Taiwan's high technology development. In addition, it was found in this research that the non-private organisations were limited in offering highly competitive pay packages to knowledge workers. It is suggested that the government should allow the non-private organisations to offer higher pay to knowledge workers to more successfully attract professionals and specialists.

Theoretically, this study revealed that the adoption of human resource practices for knowledge workers in the non-private organisations were influenced by the characteristics of non-profit/public organisations. Firstly, because the funding in the non-private organisations largely came from the Taiwanese government, the non-private organisations were restricted in providing highly competitive compensation packages to their knowledge workers. Therefore, they adopted management practices that provided more intrinsic rewards than external rewards to attract knowledge workers. Secondly, because the principle aim of the non-private organisation was to develop and apply new technology rather than pursuing profits, the non-private organisations could allow more autonomy to knowledge workers to undertake the research that they are interested in. Thirdly, the non-private organisations were more capable of providing a work-life balance to their knowledge workers. Being hybrid organisations that sit between the public and private organisations, part of the management practices and management style were influenced by public organisations controlled by the Taiwanese government. In addition, unlike the firms in the private sector which needed to launch new products onto the market fast and frequently within a certain time frame, knowledge workers in the non-private organisations has less time pressure in their projects.

9.4 Limitations

Firstly, the findings in this research only applied to Taiwan. Due to the different historical backgrounds that lead to a different development of political, economic and social systems in China and Hong Kong, it remains unresolved whether the findings could apply to other countries. In addition, due to the distinctive industrial characteristics and economic position of Taiwan's high technology industry, the research findings are applicable only to Taiwan's high technology industry. In other words, the organisations under different categories in other industries, for example, the finance industry, may adopt different strategies and practices.

Secondly, bias may exist due to the use of snowball sampling as the sampling technique in this research. Therefore, this study could be considered as a starting point

providing a reference platform to further studies into knowledge worker management. It is suggested that a probability sampling method should be used in future research to enhance the representativeness of the findings.

Thirdly, this research offered a more broad understanding rather than an in-depth understanding about knowledge worker recruitment and retention in Taiwan's high technology industry. It is suggested that the researcher could conduct in-depth interviews in future research to have a deeper understanding and insight into knowledge worker management in Taiwan.

9.5 Further research suggestions

Based on the findings and limitations in this research, several suggestions for further research are presented. Firstly, a further study may compare the recruitment and retention of knowledge workers in different industries, such as the high technology and finance industries. This will explore whether the industrial characteristics cause any impact on the recruitment and retention of knowledge workers.

Secondly, the sample collection could extend to China's high technology industry and a comparative study could be conducted. China's high technology industry has been growing rapidly during the past decade under Chinese government support. A comparative study will help to understand the international HRM management for knowledge workers in the Greater China area.

Thirdly, social capital plays an important role in the recruitment and retention of knowledge workers. As web-based technology is rapidly developing, the interaction among knowledge workers through web tools in the form of forums, facebook or twitter becomes popular. Therefore, a further study may be conducted to investigate whether the on-line community could be utilised more effectively by organisations in their knowledge worker management.

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Appendices

Appendix 1 Questionnaire (translation of English version)

Dear Sir/Madam,

This research aims to investigate the issues related to the management practices of recruitment and retention of knowledge workers in Taiwan's high technology industry. This questionnaire is divided into three parts. The first part asks for your basic information. The second part asks for your experiences about your company's recruitment practices. The last part asks for your opinions about your company's retention practices. It should take you approximately 10-15 minutes to fill in the questionnaire.

All information collected from the questionnaires will be kept strictly confidential, and used for academic purposes only. Your time and responses will be highly appreciated.

If you have any suggestions, please don't hesitate to contact me via email (anncardiff@googlemail.com).

Thank you very much.

Best Regards,

Yi-Hui Wang
PhD student
CARBS, Cardiff University

Part 1: Basic Information

1. Your company name _____

2. Your title _____

3. The main product/service your company provides is (tick one)

☐ PC or peripherals
☐ Foundry
☐ DRAM
☐ Semiconductor (excluding foundry or DRAM)
☐ Optoelectronics (excluding TFT-LCD）
☐ TFT-LCD
☐ IC design
☐ Energy
☐ Mechanics
☐ IT Services
☐ Entertainment
☐ Telecommunication
☐ Biology and Chemical
☐ Other, please specify _____

4. Please indicate the ownership of your company.

☐ Taiwanese-owned company
☐ American-owned company
☐ European-owned company
☐ Japanese-owned company
☐ State-owned or non-private organisation
☐ Other, please specify _____

5. Please indicate the number of employees in your company.

☐ More than 500   ☐ 250-499   ☐ 10-249   ☐ Less than 10

6. Which of the following best describes the nature of your job? (Please tick one)

☐ R&D
☐ Engineering
☐ Programming
☐ Technical service and support
☐ Procurement
☐ Industrial management
☐ General management
☐ Marketing
☐ Human Resource
☐ Finance
☐ Other, please specify _____

7. How many years have you been working in this company? _____ years

8. How many companies have you worked for? (including the current company) _____ companies

9. Age _____

10. Gender

☐ Male   ☐ Female

11. Education

☐ High school (or below)　☐ College　☐ University　☐ Master　☐ PhD

12. Marital status

☐ Single　☐ Engaged　☐ Married　☐ Divorced/separate　☐ Widowed

13. Children

☐ Yes　☐ No

Part 2: Your Job Application Experience

14. Through which channel did you find your current job? (Please tick only one item)

☐ Press media (e.g. newspapers or magazines)
☐ Company website
☐ On-Line agents
☐ Head-Hunters
☐ Personal connections (e.g. friend, relatives, employee referral, etc)
☐ Internship
☐ Campus recruitment
☐ Job-Fair
☐ Public agency
☐ Other, please specify _____

15. Please rate the degree of effectiveness of the following recruitment channels.

	Highly ineffective 1 ←——————→ 5 Highly effective				
Press media (e.g. newspapers or magazines)	1	2	3	4	5
Company websites	1	2	3	4	5
On-Line agents	1	2	3	4	5
Head-Hunters	1	2	3	4	5
Personal connections (e.g. friends, relatives, employee referrals, etc)	1	2	3	4	5
Internship	1	2	3	4	5
Campus recruitment	1	2	3	4	5
Job-Fairs	1	2	3	4	5
Public agencies	1	2	3	4	5

16. What kind of information did you provide to your company when you applied for your current job?
（Multiple Choices）

☐ Self-prepared resume
☐ Company-prepared application form
☐ Biographical information
☐ Past work sample
☐ Reference letter or referee contact details
☐ Other, please specify _____

17. What were the pre-requested criteria required by your company when you applied for this job?
（Multiple Choices）

- ☐ Educational qualifications
- ☐ Related work experience
- ☐ English language ability/test results
- ☐ Computer skills qualifications
- ☐ Reference letter or referee contact details
- ☐ Other, please specify _____

18. What were the selection methods/criteria that your company used when you applied for this job?
(Multiple Choices)

- ☐ Interview
- ☐ Work sample test
- ☐ IQ test
- ☐ Aptitude test
- ☐ Personality test
- ☐ English language ability test
- ☐ Team role play
- ☐ Presentation
- ☐ Reference(s) check
- ☐ Other, please specify _____

19. How many interviews did you have when you applied for this job?   _____ interviews

20. Please indicate how strongly you agree or disagree with the following statements concerning your interview experience when you applied for this job.

	Strongly disagree Strongly agree
	1 ←――――――――→ 5
Interview helped me to understand the company and content of job.	1 2 3 4 5
The information I acquired from job interview influenced my decision to accept the offer.	1 2 3 4 5

21. What might have been the main reasons why your company hired you? (Multiple choices)

- ☐ Educational qualifications
- ☐ Related working experience
- ☐ English ability
- ☐ Professional ability
- ☐ Interpersonal skills
- ☐ Integrity
- ☐ Ability to work independently
- ☐ Ability to work in a team
- ☐ Learning ability
- ☐ Development potential
- ☐ Problem-solving ability
- ☐ Stability
- ☐ Willingness to work long hours
- ☐ Able to bear pressures
- ☐ Agreeing with corporate culture
- ☐ Others, please specify _____

Part 3: Please indicate the impact of following factors on your decision to join and stay in your current company

Compensation and Benefit

22. Please indicate how important the following factors influenced your decision to join your current company?

	Strongly disagree $1 \longleftrightarrow 5$ Strongly agree				
Basic pay	1	2	3	4	5
Bonus (e.g. performance bonus)	1	2	3	4	5
Employee ownership bonuses (e.g. employee ownership cash bonus, employee ownership stock bonus, stock options)	1	2	3	4	5
Days of annual leave	1	2	3	4	5
Childcare	1	2	3	4	5
Rental allowance	1	2	3	4	5
Others	1	2	3	4	5

23. Please indicate how important the following factors influenced your decision to stay in your current company?

	Strongly disagree $1 \longleftrightarrow 5$ Strongly agree				
Basic pay	1	2	3	4	5
Bonus (e.g. performance bonus)	1	2	3	4	5
Employee ownership bonuses (e.g. employee ownership cash bonus, employee ownership stock bonus, stock options)	1	2	3	4	5
Days of annual leave	1	2	3	4	5
Childcare	1	2	3	4	5
Rental allowance	1	2	3	4	5
Others	1	2	3	4	5

Career Development and Training

24. Please indicate how important the following factors influenced your decision to join your current company?

	Strongly disagree $1 \longleftrightarrow 5$ Strongly agree				
The firm offering a higher position	1	2	3	4	5
Potential promotion opportunities	1	2	3	4	5
Internal transfer opportunities to other fields (e.g. R&D to Sales & Marketing)	1	2	3	4	5
Internal transfer opportunities to the affiliated companies in the consortium	1	2	3	4	5
Good training programmes	1	2	3	4	5

25. Please indicate how important the following factors influenced your decision to stay in your current company?

	Strongly disagree 1 ←→ 5 Strongly agree				
I am satisfied with my current position	1	2	3	4	5
Potential promotion opportunities	1	2	3	4	5
Internal transfer opportunities to other fields (e.g. R&D to Sales & Marketing)	1	2	3	4	5
Internal transfer opportunities to the affiliated companies in the consortium	1	2	3	4	5
Good training programmes	1	2	3	4	5

Work Practices and Working Environment

26. Please indicate how important the following factors influenced your decision to join your current company?

	Strongly disagree 1 ←→ 5 Strongly agree				
Flexible working hours	1	2	3	4	5
Extra day-off for O/T	1	2	3	4	5
Convenient long-distance working practices (e.g. video conference, work-at-home)	1	2	3	4	5
Good information and technology support (e.g. library & database)	1	2	3	4	5
Comfortable physical working environment	1	2	3	4	5
Firm's encouragement of employee's innovation	1	2	3	4	5

27. Please indicate how important the following factors influenced your decision to stay in your current company?

	Strongly disagree 1 ←→ 5 Strongly agree				
Flexible working hours	1	2	3	4	5
Extra day-off for O/T	1	2	3	4	5
Convenient long-distance working practices	1	2	3	4	5
Good information and technology support	1	2	3	4	5
Comfortable physical working environment	1	2	3	4	5
Firm's encouragement of innovation	1	2	3	4	5
Fair performance appraisal	1	2	3	4	5

Corporate Development

28. Please indicate how important the following factors influenced your decision to join your current company?

	Strongly disagree 1 ⟵———⟶ 5 Strongly agree				
Good company outlook/development potential	1	2	3	4	5
Good R&D capabilities	1	2	3	4	5
A leading position in the market	1	2	3	4	5
Ability to respond quickly to the market change	1	2	3	4	5
Good financial status	1	2	3	4	5
Good company reputation	1	2	3	4	5
Agreed with the corporate culture	1	2	3	4	5

29. Please indicate how important the following factors influenced your decision to stay in your current company?

	Strongly disagree 1 ⟵———⟶ 5 Strongly agree				
Good company outlook/development potential	1	2	3	4	5
Good R&D capabilities	1	2	3	4	5
A leading position in the market	1	2	3	4	5
Ability to respond quickly to changes in the market	1	2	3	4	5
Good financial status	1	2	3	4	5
Good company reputation	1	2	3	4	5
Agreed with the corporate culture	1	2	3	4	5

Work

30. Please indicate how important the following factors influenced your decision to join your current company?

	Strongly disagree 1 ⟵———⟶ 5 Strongly agree				
Challenging work	1	2	3	4	5
Job met my personal interest	1	2	3	4	5
Opportunity to access new technology	1	2	3	4	5
Authorisation form supervisor to be autonomous to a certain degree	1	2	3	4	5
Influential power over the work-related decisions	1	2	3	4	5
Learning opportunities from work	1	2	3	4	5
Accumulated professional experiences	1	2	3	4	5
Strengthened professional skills	1	2	3	4	5

31. Please indicate how important the following factors influenced your decision to stay in your current company?

	Strongly disagree 1 → Strongly agree 5				
Challenging work	1	2	3	4	5
Job met my personal interest	1	2	3	4	5
Opportunity to access new technology	1	2	3	4	5
Authorisation form supervisor to be autonomous to a certain degree	1	2	3	4	5
Influential power over the work-related decisions	1	2	3	4	5
Supervisor/manager's praise	1	2	3	4	5
Learning opportunities from work	1	2	3	4	5
Accumulate professional experiences	1	2	3	4	5
Strengthen professional skills					

Interpersonal Relationships and Personal Values

32. Please indicate how important the following factors influenced your decision to join your current company?

	Strongly disagree 1 → Strongly agree 5				
Team members	1	2	3	4	5
Ren-Ching (favour to another person)	1	2	3	4	5
Friends' and family's opinions	1	2	3	4	5
Work-life balance	1	2	3	4	5
Working location near home	1	2	3	4	5
Smaller working pressure	1	2	3	4	5
Reasonable working hours	1	2	3	4	5
Stable job	1	2	3	4	5

33. Please indicate how important the following factors influenced your decision to stay in your current company?

	Strongly disagree 1 → Strongly agree 5				
Good relationship with supervisors/managers	1	2	3	4	5
Good relationship with team members	1	2	3	4	5
Ren-Ching	1	2	3	4	5
Work-life balance	1	2	3	4	5
Working location near home	1	2	3	4	5
Smaller working pressure	1	2	3	4	5
Reasonable working hours	1	2	3	4	5
Stable job	1	2	3	4	5

34. Please indicate how effective you think the following retention methods are?

	Strongly disagree 1 ← → 5 Strongly agree				
Increase fixed salary	1	2	3	4	5
Increase bonuses	1	2	3	4	5
Employee ownership bonuses - no lock-in	1	2	3	4	5
Lock-in employee ownership bonuses	1	2	3	4	5
Improve the employee's welfares	1	2	3	4	5
Promotion	1	2	3	4	5
Assign different jobs	1	2	3	4	5
Provide more training programmes	1	2	3	4	5
More authority	1	2	3	4	5
Participate in the decision-making process	1	2	3	4	5
Flexible working hours practices	1	2	3	4	5
Additional day-off for O/T	1	2	3	4	5
Enable long-distance working	1	2	3	4	5
Improve physical working environment	1	2	3	4	5
Improve internal communication	1	2	3	4	5
Supervisor/manager's persuasion	1	2	3	4	5
Friends' and families' persuasion	1	2	3	4	5
Company's vision	1	2	3	4	5
A period of non-paid leave	1	2	3	4	5

35. Suggestions about this questionnaire _____

Thank you for your valuable opinions and time！

Appendix 2 Interview questions to HR managers

1. What are your company's main recruitment channels? Do you prefer to use different recruitment channels when you recruit employees for different positions/ job types?

2. Do you have a recruitment plan to recruit employees periodically? On average, how many people do you recruit each year? Have you ever encountered any recruitment difficulties? If so, why and how did you respond to them?

3. Which methods do you use to select your employees? According to your experiences, which are the most effective selection methods? What are your selection criteria or considerations when you select your employees?

4. What are your company's main retention strategies and practices (for example, the practices of compensation, training, career development and work management)? Have you ever encountered any retention difficulties? Why and how do you respond to them?

5. How much is the estimated recruitment cost (for example, advertising and agent fee) and turnover cost (for example, replacement cost for covering the job, severance cost, re-hiring and re- training cost) per employee?

6. What's the average turnover rate in your company per year? What's the average service tender per employee in your company? How many percent of the employees in your company are R&D/technical engineers?

7. What the role do you think human resource management should play in the recruitment and retention of knowledge workers in your company?

Appendix 3

1. Total items of comparative analysis of recruitment channels based on workers' actual experiences in their current companies across the three organisation ownership groups

	Ownership							
	Taiwanese-owned		Foreign-owned		Non-Private			
Recruitment channels	count	% of recruitment channel	count	% of recruitment channel	count	% of recruitment channel	Chi-Square	P
Traditional media	5	25%	4	20%	11	55%	4.303	0.116
Company website	5	26.3%	0	0.0%	14	73.7%	15.332	0.000***
On-line agents	42	65.6%	14	21.9%	8	22.2%	25.692	0.000***
Head hunters	1	11.1%	6	66.7%	2	2.9%	10.316	0.006**
Personal connections	27	39.1%	21	30.4%	21	30.4%	3.233	0.199
Internship	1	25%	0	0.0%	3	75%	3.145	0.208
Campus	1	14.3%	1	14.3%	5	71.4%	4.412	0.110
Job fair	1	50%	0	0.0%	1	50%	0.633	0.729
Public agency	1	100%	0	0.0%	0	0.0%	1.376	0.503
Other	0	0.0%	0	0.0%	4	100%	7.691	0.021*

2. Comparison of employees' perceptions on selection criteria across the three organisation ownership groups

Selection criteria	Taiwanese-owned		Foreign-owned		Non-Private		Total			
	n	% of ownership	n	% of ownership	n	% of ownership	n	% of total	Chi-Square	Sig
Educational background	55	65.5	24	52.2	55	78.6	134	67	8.901	0.012*
Working experiences	28	33.3	36	78.3	42	60	106	53	26.203	0.000***
Professional ability	21	25	37	80.4	47	67.1	105	52.5	45.887	0.000***
Learning ability	30	35.7	22	47.8	31	44.3	83	41.5	2.14	0.343
Development potential	14	16.7	20	43.5	32	45.7	66	33	17.539	0.000***
Team work ability	18	21.4	18	39.1	27	38.6	63	31.5	6.812	0.033*
Interpersonal skills	25	29.8	16	34.8	20	28.6	61	30.5	0.542	0.762
Stability	28	33.3	18	39.1	14	20	60	30	5.604	0.061
Integrity	25	29.8	16	34.8	13	18.6	54	27	4.262	0.119
Independent working ability	14	16.7	18	39.1	19	27.1	51	25.5	8.048	0.018*
Problem-solving	13	15.5	19	41.3	19	27.1	51	25.5	10.59	0.005**
English ability	17	20.2	19	41.3	13	18.6	49	24.5	9.177	0.01*
Ability to bear pressure	23	27.4	14	30.4	11	15.7	48	24	4.205	0.112
Willingness to work long hours	16	19	11	23.9	5	7.1	32	16	6.809	0.033*
Recognition of corporate culture	12	14.3	5	10.9	11	15.7	28	14	0.551	0.759

*p < .05
**p < .01
*** p < .001