Organizational Learning Culture's Influence on Job Satisfaction, Organizational Commitment, and Turnover Intention among R&D Professionals in Taiwan during an Economic Downturn

A DISSERTATION

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Hsiu-Yen Hsu

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Gary N. McLean, Advisor

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ABSTRACT

With new technology and workforce changes, a dynamic and innovative R&D environment is increasingly being required in a knowledge-based economy. HRD needs to have a better understanding of its practices in facing a variety of challenges for R&D professionals. This study investigated the relationship between organizational learning culture and job-related behaviors of job satisfaction, organizational commitment, and turnover intention. A total of 418 of 77 5 (53.9% response rate) R&D professionals in the high-tech industry in Taiwan participated and completed the survey, comprised of 71 questionnaire items related to these four constructs. Confirmatory factor analysis (CFA) was used to verify the construct validity of the instrument, while Cronbach's alphas confirmed its reliability. The data analyses used correlational analysis and structural equation modeling (SEM) to examine the research hypotheses and hypothesized model.

The results of the study indicated that R&D professionals' perceptions of a high level of organizational learning culture has a positive effect on job satisfaction and organizational commitment, and job satisfaction has a negative effect on turnover intention and a positive effect on organizational commitment. However, the results showed no significant relationship between organizational learning culture and turnover intention, or between organizational commitment and turnover intention. Further, the present study suggests that there is an indirect impact of organizational learning culture

on turnover intention when job satisfaction or organizational commitment is considered as a mediator. Finally, the implications for HRD theory and practice are discussed, and limitations and the directions of future research are provided.

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CHAPTER 1

INTRODUCTION

This chapter presents the background and the importance of organizational learning culture in the R&D environment in Taiwan. Then, the problem statement, purpose and research questions, and significance of the study are discussed. Finally, the major terms of this study are defined.

Background and Importance

In today's economy, globalization, innovation, and technology have greatly influenced the business environment. In order to face a variety of challenges, organizations need to build their core competencies and sustain their competitive advantage. Specifically, knowledge generation and dissemination are more critical than they have been in the past (Powell & Snellman, 2004; Wilson & Gattell, 2005). Thus, finding effective methods to manage, upgrade, and retain research and development (R&D) professionals are a top priority so they can achieve a high level of innovation performance (Beheshti, 2004; Graversen, Schmidt, & Langberg, 2005). Rothwell (1992) and Parikh (2001) indicated that an efficient and effective R&D management highly relies on knowledge and professionals. Specifically, as an organization becomes more focused on technology, there is increased importance on having competent R&D professionals and effective deployment or management of R&D professionals in the

organization (Petroni, 2000). Pegels and Thirumurthy (1996) and Petroni (2000) have proposed that development of technology strength and accumulation of knowledge resulting from R&D efforts determine organization performance in high-tech industries.

In the early 1980s, Taiwan faced challenges of rising wages, appreciating currency values, and a shortage of skilled labor, dramatically increasing the price of real estate and increasing pressure on environmental protection (Kang & Lin, 2001; Lin & Hsu, 2006; Shyu & Chiu, 2002). As a result, the business environment lost its competitive advantage, and the majority of the more labor-intensive industries in Taiwan began to relocate to China and Southeast Asia where operating costs were lower. In order to enhance global competitiveness, the government started to promote the development of strategic industries characterized by a high level of technology, high value added, and low energy consumption. With the establishment of the Hsinchu Science Park (HSP) to facilitate the development of high-tech industries in 1980, enterprises were encouraged to intensify their R&D activities to improve productivity and quality (So, 2006).

Taiwan joined the World Trade Organization (WTO) in January, 2002. Since then, the business environment has become more liberalized, making Taiwan a part of the global industrialized system. Thus, the government has introduced a number of policies aimed at developing high-tech industries and helping them to flourish. The objective of these policies led enterprises towards a high value-added industrial era featured by

innovation, invention, and R&D (Chen, Chang, & Yeh, 2006; Wang, Lin, & Tsai, 2007). Taiwan's high-tech industries depend on the continuing innovative spirit of their R&D professionals in order to improve their profits and their competitive advantage.

As R&D professionals are knowledge workers, their key product is knowledge. In order to improve an organization's innovation and R&D performance, they must ensure that organizational members continuously extend their learning activities (Nonaka & Takeuchi, 1995; Prusak, 1997). In fact, R&D professionals' performance is a joint function of several variables. This study attempts to determine the impact of an organizational learning culture on the outcomes of job satisfaction, organizational commitment, and turnover intention of R&D professionals in Taiwan's high-tech industry.

Statement of the Problem

Organizational learning has been among the most widespread and fastest-growing of interventions in HRD practice to lead organizational effectiveness in the past decade (Cummings & Worley, 2005). Hence, numerous studies have investigated theoretical and operational models of organizational learning culture and its relationship to employee performance, such as innovation, job satisfaction, organizational commitment, and turnover intention. Other studies have been related to increased organizational performance (Kontoghiorghes, Awbery, & Feurig, 2005; Kuchinke, 1995;

Lien, Huang, Yang, & Lin, 2002; Yang, Wang, & Niu, 2007). A summary of research evidence of the relationship between learning organizations and performance is presented in Table 1. A closer look at these studies, however, shows that they have not found strong relationships between organizational learning culture and organizational commitment, job satisfaction, and turnover intention. However, only one study (i.e., Lee-Kelley, Blackman, & Hurst, 2007) has examined the relationship between learning organizations, job satisfaction, and turnover intention for knowledge workers in the information technology (IT) industry.

Table 1

Summary of Research Evidence of the Relationship between Organizational Learning Culture and Performance

Organizational learning culture component	Author
Innovation	Bates and Khasawneh (2005); Calantone, Cavusgil, and Zhao (2002); Hurley and Hult (1998); Kontoghiorghes et al. (2005); Lin (2006); Lopez, Peon, and Ordas (2005); Sta. Maria (2003)
Job Satisfaction	Chang and Lee (2007); Egan, Yang, and Bartlett (2004); Gardiner and Whiting (1997); Lee-Kelley et al. (2007); Lim (2003); Rowden and Ahmad (2000); Wang (2005); Xie (2005)
Organizational Commitment	Lim (2003); Wang (2005); Xie (2005)
Turnover Intention	Egan et al., (2004); Lee-Kelley et al. (2007)
Organizational Performance	Calantone et al. (2002); Davis and Daley (2008); Jamali and Sidani (2008); Kontoghiorghes et al.(2005); Kuchinke (1995); Lien, Huang, Yang, & Li (2002); Yang, et al. (2007); Zhang, Zhang, and Yang (2004)

Drucker (1999a) pointed out that personal know-how and tacit knowledge are not stored within an organization; in contrast, this knowledge is maintained by employees. Intellectual capacity and knowledge capital are assets that R&D professionals possess. As R&D professionals leave an organization and remove their assets, it can lead to discontinuity in a development project and a loss of tacit knowledge that can not be promptly substituted with new recruits. Moreover, according to Kochanski and Ledford (2001), the estimated cost of losing R&D professionals is three to six times the cost of the turnover of an administrative worker. Therefore, in order to support product and service growth, the retention of R&D professionals becomes a top priority for human capital in organizations (Ang, Slaughter, & Ng, 2002; Evans, Gonzalez, Popiel, & Walker, 2000; Kochanski, Mastropolo, & Ledford, 2003).

Based on Garden (1990) and Lazar (2001), R&D professionals have displayed a significantly higher turnover rate in high-tech companies than the general industry average. In Taiwan, effective training, recruitment, and retention of R&D professionals has been recognized as a major issue in developing high-tech industries (Chen, Chang, & Yeh, 2003; Tai & Wang, 2006). For example, Hu, Lin, and Chang (2005) investigated the turnover rate of high-tech workers in Hsinchu Science Park (HSP) in Taiwan. They found that the rate of turnover of engineers and skilled employees exceeded that of all other high-tech personnel in a manufacturing factory, and the second highest rate of turnover

was for skilled workers in the sales and R&D departments. Many factors related to turnover have been identified by previous research to be significantly correlated with job attitudes, namely, job satisfaction, organizational commitment, and turnover intention (Chang, Choi, & Kim, 2008; Lin & Chang, 2005; Moore, 2000). Thus, these issues also become critical in the context of human resource development (HRD) not only in organizations, but also at the national level.

In sum, according to past research, the perception of a learning organization culture, job satisfaction, organizational commitment, and turnover intention can affect one's motivation and efforts that result in individual and organizational performance. All of these factors have been the focus of a considerable amount of research over the past decades. However, relatively few empirical studies have been conducted on these factors specifically for R&D professionals in high-tech industries.

Purpose and Research Questions

The purpose of this study was to investigate the relationship between organizational learning culture and three outcomes: job satisfaction, organizational commitment, and turnover intention of R&D professionals in the high-tech industry in Taiwan. This study should be useful to HRD scholars and practitioners by providing empirical evidence for the development of an organizational learning culture that meets

the needs and improves the performance of R&D professionals and also enhances HRD professionals' contributions to the organization.

To accomplish this purpose, the main research question was: What are the influences of organization learning culture on the retention of R&D professionals in Taiwan? Several sub-questions guided this study in the context of R&D professionals in Taiwan:

1. To what extent does organizational learning culture influence job satisfaction?
2. To what extent does organizational learning culture influence organizational commitment?
3. To what extent does organizational learning culture influence turnover intention?
4. To what extent does job satisfaction influence organizational commitment?
5. To what extent does job satisfaction influence turnover intention?
6. To what extent does organizational commitment influence turnover intention?

Hypotheses associated with these research questions, based on the literature review, are presented in Chapter 2, after reviewing the literature supporting each hypothesis. Based on the hypotheses, a hypothesized structured equation model is also presented at the end of Chapter 2.

The theoretical framework of this study is based on two constructs. The first is focused on the role of the learning organization in the R&D environment. The second includes the impact of specific attributes of R&D professionals' performance regarding job satisfaction, organizational commitment, and turnover intention. Combining these two concepts supported the testing of the research questions through a survey focused on these specific factors, namely, organizational type, organizational size, and industry category.

Significance of the Study

The conceptual framework defined by this study could contribute to the HRD field in at least three ways: (1) studying the factors that affect on job satisfaction, organizational commitment, and turnover intention; (2) presenting a theory and practical implications related to the factors being studies; and (3) focusing on global high-tech R&D personnel issues.

First, to date, few studies have focused on the effect of organizational learning culture on job satisfaction, organizational commitment, and turnover intention. According to Watkins and Marsick (1993), high-performing and self-directing teams are needed in a learning organization so employees can effectively manage projects. The characteristics of R&D professionals are autonomy and a high level of intrinsic motivation (McCall, 1988; McMeekin, 1999). While there is a strong assumed link between a learning

organization culture and the retention of R&D professionals (Lee-Kelley et al., 2007), little empirical evidence has been found to establish a relationship between organizational learning culture and the three variables of organizational commitment, job satisfaction, and turnover intention.

Second, with new technologies and workforce changes, a dynamic and innovative R&D environment is increasingly being required in a knowledge-based economy. HRD needs to have a better understanding of their practices so they can face a variety of challenges for R&D professionals. Numerous studies have been conducted using R&D professionals as the subjects in human resource management (HRM). However, the context of R&D professionals in HRD has not been explored extensively. Thus, this empirical study will contribute to theory and application in HRD to provide further insights into the organizational learning culture on R&D professionals' performance.

Third, the high-tech industry has become the forefront of global economic growth. Establishing a high-tech industrial foundation has become a strategic policy for many developing countries (So, 2006). Moreover, the lack of highly skilled personnel is a global issue, and developed countries are concerned that this issue will forfeit their competitive advantages (Holland, Sheehan, & De Cieri, 2007; Kraak, 2005, Powell & Snellman, 2004; Wang et al., (2007). Thus, the effective attraction, retention, and development of R&D professionals in the high-tech industry have become critical in both

developed and developing countries within an HRD context. The participants in this study were R&D professionals in the high-tech industry in Taiwan; thus, the framework and results of this study may well have implications for other countries, including developed and developing countries, thus broadening the theory and applications within an international HRD context.

Definition of Terms

The following terms are used in this study and are defined as follows.

High-tech Industry

The high-tech industry is unique because of its "near-total reliance upon individual brain power and technical ingenuity is mirrored nowhere else in the business world" (Goman, 2000, p. 2). A high-tech industry is an industry that deals "with emerging, high risk, while often unproven, products and technologies" (Parikh, 2001, p. 30). Amabile (1997) pointed out that the high-tech industry is characterized by rapid change, intense competition, and a highly uncertain environment. Additionally, the high-tech industry was described as an industry that uses three criteria: the ratio of R&D expenses to yield; the speed of technological innovation; and the weight of the number of technology personnel to R&D personnel (Chakrabarti, 1991; Gould & Keeble, 1984; Von Glinow, 1988). Based on Hsinchu Science Park (2005a), the high-tech industry can be divided into six major categories: (1) integrated circuits (IC) industry; (2) PC and

peripherals industry; (3) telecommunication industry; (4) optoelectronics industry; (5) precision machinery industry; and (6) biotechnology industry.

High-tech Industry Clusters

Another term to describe the characteristics of high-tech industry is high-tech industry clusters. The basic definition of an industry cluster is "geographical concentrations of industries that gain performance advantages through co-location" (Doeringer & Terkla, 1995, p. 225). Baptista and Swann (1998) defined an industry cluster as "a strong collection of related companies located in a small geographical area, sometimes centered on a strong part of a country's science base" (p. 525). Porter (1990, 2000) emphasized the key components of an industry cluster as including suppliers, consumers, peripheral industries, governments, and supporting institutions like universities in a geographic cooperative group. Moreover, according to a study of the Silicon Valley industry cluster by Bahrami and Evans (1995), success in an industrial environment is due largely to universities and research institutes, venture capital, support infrastructure, talent pool, and entrepreneurial spirit. The benefits of clusters lead to increased levels of productivity, growth, and employment (Porter, 1990).

Job Satisfaction

Hoppock (1935) defined job satisfaction as applying to the mental, physical, and environmental satisfaction of employees. Locke (1976) contended that job satisfaction is a "pleasurable or positive emotional state, resulting from the appraisal of one's job experiences" (p. 1300). Moreover, job satisfaction can be used as a broad assessment of "an employee's attitudes of overall acceptance, contentment, and enjoyment in their work" (Lee-Kelley et al., 2007, p. 206). In general, job satisfaction has been defined and measured both as a global feeling about the job and as a concept with various dimensions or facets (Locke, 1969; Scarpello & Campbell, 1983; Spector, 1997).

Learning Organization

The concept of the learning organization was popularized by Senge in 1990. Senge (1990) defined a learning organization as all individuals in the organization working together to learn, to solve problems, and to create innovative solutions. Watkins and Marsick (1993) contended that a "learning organization is one that learns continuously and transforms itself" (p. 8), and the learning occurs at all levels, such as individual, team, organization, and community. Garvin (1993) described a learning organization as being good at knowledge creation, knowledge acquisition, knowledge transformation, and behavior modification to "reflect new knowledge and insights" (p. 80). From different perspectives, the essential features of a learning organization include

open communications, shared goals and visions, systems thinking, support and rewards for learning, team learning, learning culture, and knowledge management (Garvin, 1993; Gephart, Marsick, Van Buren, & Spiro, 1996; Marquardt, 1996; Pedler, Burgoyne, & Boydell, 1991; Senge, 1990; Watkins & Marsick, 1993).

Organizational Commitment

Porter, Steers, Mowday, and Boulin (1974) defined organizational commitment as "the strength of an individual's identification with and involvement in a particular organization" (p. 604) and further presented commitment as being characterized by three factors: a belief in and acceptance of goals and values, a willingness to exert effort, and a strong desire to maintain membership. Thus, organizational commitment can be defined as a psychological state that includes an individual's belief in and acceptance of the value of his or her chosen job, and a willingness to maintain membership in that job (Morrow & Writh, 1989). One of the most popular models of organizational commitment was developed by Allen and Meyer (1996; Meyer & Allen, 1991, 1997). This model is characterized by three commitment components: affective, emotional attachment to the organization; continuance, perceived costs associated with leaving the organization; and normative, feelings of obligation towards the organization.

Organizational Culture

Based on Conner (1992), organizational culture can be defined as the "interrelationship of shared beliefs, behaviors, and assumptions that are acquired over time by members of an institution" (p. 164). In fact, culture dominates in a way that impacts employee interaction, organizational functioning, and eventually influences all decision making (Graham & Nafukho, 2007). The difference between organizational success and failure significantly depends on organizational culture to impact organizational operation. There are a number of definitions of organizational culture that refer to norms of behavior and shared values among a group of members in an organization (Conner, 1992; Cummings & Worley, 2005; Deshpande & Webster, 1989; Kotter, 1996; Uttal, 1983). Schein (1992) integrated the concept of assumptions, adaptations, perceptions, and learning and then comprehensively defined organizational culture as

> a pattern of basic assumptions invented, discovered, or developed by a given group as it learns to cope with the problems of external adaptation and internal integration that all works well enough to be considered valid and therefore to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. (p. 9)

Organizational Learning

Although research on organizational learning has been going on for over 30 years, there is a diversity of perspectives that have been used to define organizational learning (Lopez et al., 2005). Because learning is a multilevel concept and learning could be studied at different levels, organizational learning becomes an extensive concept (Rebelo & Gomes, 2008). Argyris and Schön (1996) indicated that organizations have different levels of learning, such as single-loop and double-loop learning, and these two levels of learning are critical for organizations, depending on the specific circumstances requiring organizational learning. Robey, Boudreau, and Rose (2000) clearly outlined five main characteristics that define organizational learning: (a) organizational learning occurs at the organizational level; (b) organizational learning is a process not a structure; (c) organizational learning is both intentional and unintentional; (d) organizational learning requires organizational memory repositories and mental models; and (e) organizational learning guides organizational action. Moreover, Lopez et al. (2005) contended that "organizational learning can be defined as a dynamic process of creation, acquisition and integration of knowledge aimed at the development of resources and capabilities that contribute to better organizational performance" (p. 228).

Organizational Learning Culture

The concept of organizational learning culture is a type of organizational culture that integrates with organizational learning. According to Bate and Khasawneh (2005), organizational learning culture is organizational phenomena that "support the acquisition of information, the distribution and sharing of learning, and that reinforce and support continuous learning and its application to organizational improvement" (p. 99). Thus, organizational learning culture is under constant construction, "moving along an infinite continuum towards a harmonious learning environment" (Graham & Nafukho, 2007, p. 282). By extension, the goal of organizational learning culture is an exchange of valuable knowledge leading to innovation, improved performance, and sustained competitiveness (Lopez et al., 2005).

R&D Environment

The environment of R&D is quite different from those in manufacturing, marketing, finance, sales, and IT departments because the research discipline and departments are not standard; the R&D environment is more structured than what is usually found in an organization (Treen, 1999). Kiella and Golhar (1997) described "the R&D workplace is an arena in which discovery is proprietary. Therefore, invention, innovation and work methods are carefully guarded secrets" (p. 185). In addition, the R&D environment has "a highly regulatory environment, long development cycles, and a

high level of risk and cost in the research process" (Sundgren, Dimenas, Gustafsson, & Selart, 2005, p. 360). This implies that the environment needs to promote more creativity to access relevant knowledge and shared information and knowledge. Moreover, Thompson and Heron (2006) suggested that reciprocity is developed by effective knowledge sharing and innovative performance in R&D. Similarly, Studt (2004) claimed that the major changes in the development of new technology in research and development are cost, quality, and innovation. Overall, Treen (1999) observed that R&D is focused on building uniquely differentiated products, systems, or services that are capable of adding more value to users now than previously.

R & D Professional

As R&D professionals are viewed as inventors, they differ from other groups of employees with respect to their careers, values, and reward preferences (Kim & Cha, 2000). McCall (1988) defined R&D professionals as people who value expertise and autonomy. Moreover, R&D professionals can be defined as "a group of knowledge workers with special technical talent and sophistication for product creation" (Huang & Lin, 2006, p. 969). One characteristic of R&D professionals is that they "can be reasonably expected to exhibit a high level of intrinsic motivation derived from their participation in the professional ethics of science" (McMeekin & Coombs, 1999, p. 1). Manolopoulos (2006) showed that R&D professionals support the organizational goals of

effectiveness, productivity, and profitability with the need for motivation, rewards, and satisfaction. In sum, there are several characteristics that distinguish R&D professionals from other members of the organization: technical expertise, autonomy and flexibility, strong commitment to their profession, collegial maintenance of professional standards, and professional ethics (Miller, 1986; Von Ginow, 1988).

Turnover Intention

Turnover intention is defined as "a conscious and deliberate willingness to leave the organization" (Tett & Meyer, 1993, p. 262). Ongori (2007) contended that the meaning of turnover intention is the plan to leave an organization, and this appears to be the immediate antecedent to actually quitting. Turnover intention is a psychological variable of the tendency to leave that is closely related to turnover (Janseen, 1999). Several researchers have pointed out that turnover intention is commonly endorsed in the literature as a predictor of turnover (Abrams, Ando, & Hinkle, 1998; Lee & Mowday, 1987; Michaels & Spector, 1982, Mobley 1982). In fact, Bluedorn (1982b) indicated that there is a significant positive relationship between leaving intentions and actual leaving behavior.

Summary

In a knowledge-based economy, rapid change in technology and globalization has impacted HRD within the current competitive environment. Thus, knowledge capital and

human capital play critical roles in building an organization's competitive advantage. In particular, when organizations have a main focus on technology, such as the high-tech industry, effective training, development, and retention of R&D professionals become salient issues in organizations. Based on the literature, organizational learning is the most popular intervention in HRD practice because it can assist R&D professionals in building their capability through knowledge. To date, however, there has been limited empirical research on the influence of organizational learning culture on the performance and turnover of R&D professionals.

This research examined the influence of organizational learning culture on the outcomes of job satisfaction, organizational commitment, and turnover intention of R&D professional in Taiwan's high-tech industry; the influence of job satisfaction on organizational commitment and turnover intention; and the influence of organizational commitment on turnover intention. Hypotheses based on these research questions and the hypothesized structured equation model are presented in Chapter 2. The main purpose of this empirical study was to contribute to theory and application in HRD and provide further insight about organizational learning culture on R&D professionals' performance. Finally, the framework and findings of this study have implications for other countries, such as developed and developing countries, and broaden our understanding of theory and application within HRD.

CHAPTER 2

REVIEW OF THE LITERATURE AND HYPOTHESES

This chapter reviews related literature pertinent to the research questions of the study. The literature on the concepts of high-tech industry and R&D professionals is reviewed. Then, the body of literature concerning organizational learning culture and learning organizations is examined. Because this study also examines the influence of organizational learning culture on organizational commitment, job satisfaction, and turnover intention for R&D professionals, literature related to these concepts is addressed. The chapter ends with an examination of the relationship among the research questions examined in the literature review. The hypotheses to be tested in this study and the overall hypothesized model are provided along with the literature supporting each hypothesis.

Context of High-tech Industry and R&D

This section presents literature on: (a) the high-tech industry; (b) R&D professionals; (c) Taiwan's high-tech industry and R&D; and (d) R&D and the learning organization.

High-tech Industry

Porter (1990) stated that the traditional high-tech industry is a phenomenon of clustering in several countries, like the US, Germany, Italy, Sweden, and Japan. Indeed,

the examples of high-tech industry clusters around the world include Silicon Valley and Boston's Route 128 in the US, Tsukuba and Kansai in Japan, Cambridge and the M4 corridor in the UK, Sophia-Antipolis in France, Silicon Wadi in Israel, Takdok in South Korea, and Hsinchu in Taiwan (Audretsch, 1998). Due to the success of Silicon Valley, many policymakers around the world are anxious to find tools that can imitate Silicon Valley and create new centers of innovation and high technology. There are two common policy approaches intended to generate regional technology growth: one is to create public venture capital funds for small high-tech firms; the other is to build science parks to attract high-tech firms (Wallsten, 2004) as has been done in the Hsinchu Science Park in Taiwan.

Indeed, the nature of the high tech industry implies change. High-tech organizations themselves create the processes and products that change the industry. Specifically, changes in high-tech industries are usually initiated by the organizations' human resources, such as knowledge workers or highly talented personnel (Miljus & Smith, 1987). Thus, the distinctive features of high-tech industries have a significant impact on their employees and redefine the nature of work, human resource policies, reward systems, and management strategies (Gomez-Mejia & Balkin, 1985).

R&D Professionals

There are six characteristics of R&D professionals as defined by Von Glinow (1988):

- Expertise – normally gained from prolonged specialized training in a body of abstract knowledge
- Autonomy – a perceived right to make choices that concern both means and ends
- Commitment to the work and the profession – known as the "calling"
- Identification with the profession and other professionals
- Ethic – a felt obligation to render service without concern for self-interest and without becoming emotionally involved with clients
- Collegial maintenance of standards – a perceived commitment to police the conduct of other professionals (p. 12)

Moreover, Kochanski and Ledford (2001) identified more explicitly the characteristics of R&D professionals. Their definition excluded administrative staff, customer service, and other job families that might be seen in an R&D environment and includes both individual contributors and lower and middle levels of management. These job positions contain software designers, research scientists, most types of engineers, and product and project managers.

However, R&D professionals' management requires a critical review today because of current trends towards greater investment in both R&D activity and planned management of R&D professionals. In general, these R&D management processes are diverse, and their success is influenced by the following kinds of factors: organizational focus, ownership of the organization, and R&D professionals' characteristics, including personality type and various structural variables of the job situation (Goswami, Mathew, & Chadha, 2007). In the same vein, Kristof (1996) noted that the characteristics of individuals must fit the management systems of their organization for higher performance. Clearly, there is a consensus that personal characteristics and attitudes toward one's job are critical success factors for R&D professionals (Akhilesh & Mathew, 1994).

Taiwan's High-tech Industry and R&D

In the early 1980s, Taiwan's government recognized the limitations of Taiwan's natural resources and the need to develop high-tech industries in order to maintain economic growth (Chang, Lung, & Hsu, 1999). Since then, the government has focused on motivating the development of technology-intensive industries. This has included a variety of policy measures, such as establishing science-based industrial parks and research support, and technology transfer from the U.S. (Chen & Huang, 2004; So, 2006).

In Taiwan, Hsinch Science Park (HSP) has imitated the experiences and model of Silicon Valley and has been constructed in close partnership with Silicon Valley (Saxenian, 2002, 2004; Saxenian & Hsu, 2001). Patterns similar to those in Silicon Valley include Taiwan's Personal Computers (PCs) and Integrated Circuits (ICs), which are geographically clustered; and a high rate of entrepreneurship that is unique among specialized firms, so that small companies can easily expand within a decentralized infrastructure (Saxenian, 2004). Moreover, many R&D professionals are provided by the two universities, National Chao Tung University and National Tsing Hua University, similar to the contributions of Stanford University and the University of California at Berkeley to Silicon Valley (Pister, 1987). A close relationship between firms in the Silicon Valley and HSP include the Original Equipment Manufacture (OEM) relationship for PC and IC products, and an intensive social and professional network (Hu et al., 2005; Saxenian, 2004).

It is useful to analyze the statistics from the National Science Council (2007) that briefly summarize the development of the high-tech industry and R&D in Taiwan. First, personnel engaged in R&D include researchers, technicians, and support staff. All three types have progressively increased from 2001 to 2005, with researchers growing the fastest; in particular, researchers as a percentage of total R&D personnel grew to 59.6% in 2005, while the percentage of technicians and support staff declined. The index of

R&D personnel density in international comparisons is the number of researchers per 1,000 employed persons. This index showed steady growth from 2001 to 2005, rising to 8.9 persons/year in 2005 in Taiwan. Compared to other countries, Taiwan's full-time equivalent researchers per 1,000 employed persons measured lower only than Finland, Sweden, Japan, and the US, as presented in Figure 1.

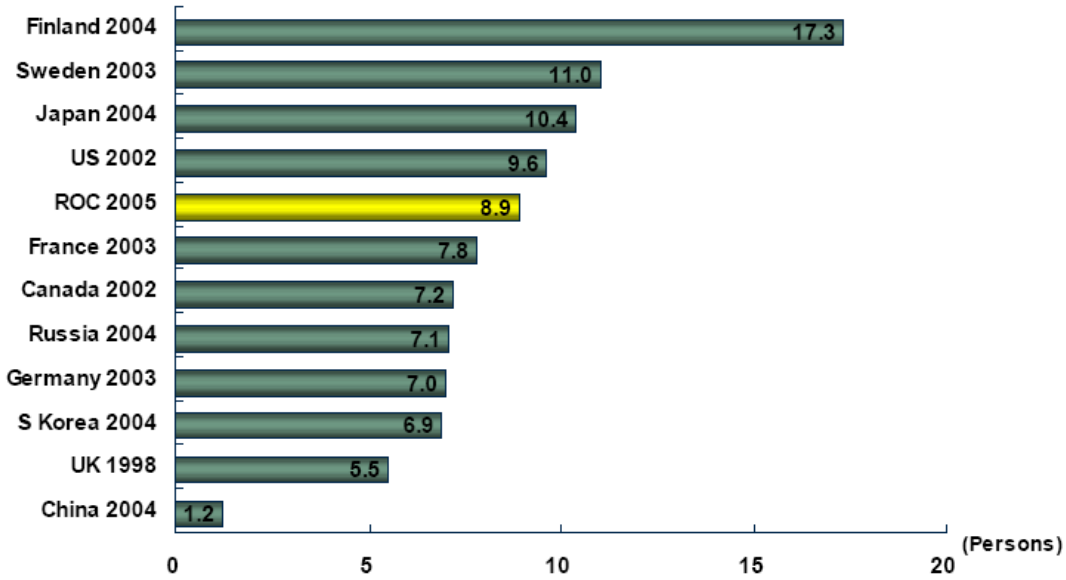


Figure 1. Researchers per 1,000 employed persons in various countries (National Science Council, 2007).

Second, R&D expenditures are generally divided into three categories: basic research, applied research, and experimental development (National Science Council, 2007). Experimental development accounted for the greatest percentage of national R&D spending in 2005 at 63.3%, followed by applied research at 26.4% and basic research with the smallest percentage at 10.3%. The environments of R&D expenditure performance consist of four types: business enterprise, government, higher education, and

private nonprofit. Business enterprise sectors spent the most on experimental development, which accounted for 78.8% of the sector's R&D expenditure in 2001 and rose to 79.7% in 2005. This indicates that the need for highly skilled labor expanded in business enterprise sectors. In fact, the shortages of talented and highly skilled manpower have recently become more serious (Tai & Wang, 2006; Wu, Liao, & Cheng, 2007).

However, according to past research, R&D professionals presented a high turnover rate in the high-tech industry (Chang, Choi, & Kim, 2008; Garden, 1990; Lazar, 2001). The high turnover of R&D professionals is costly not only due to the costs of selecting and recruiting new workers, but also because of the loss of new knowledge that is often created through the interactions among R&D professionals. For example, Hu et al. (2005) sampled 243 high-tech workers in HSP in Taiwan. They found that the R&D professionals had the second highest rate of turnover among all workers and the rate of turnover of high-tech workers was 37%, with job changes every 2-3 years, with another 25% changing jobs every 1-2 years. On the other hand, 42% of high-tech personnel expected to remain in their current job for 3 years, 28% anticipated that they would keep the same job for 3-6 years, and only 6% planned to remain in the same job for over 10 years.

R&D Professionals and Learning Organization

With rapid changes in technology and increasing competition in globalization, knowledge becomes a source of competitive advantage (Drucker, 1998). R&D's assets are intellectual and knowledge capital. The R&D environment relies primarily on creating value through innovation. Such innovation is possible mainly through the employees of the organization (Pfeffer, 1994), and this is especially true for R&D professionals. In fact, in the high-tech industry where organizations are driven by knowledge, innovation, science, and research (Parikh, 2001; Pegels & Thirumurthy, 1996; Tseng & Goo, 2005), the recruitment, development, and retention of skilled human resources, particularly R&D professionals, is essential to the organization's success (Dessler, 2005; Farris & Cordero, 2002; Kochanski& Ledford, 2001; Thom, 2001).

Learning can be viewed as an essential part of culture (Moynihan, 2005; Schein, 1993) that combines with employees' attitudes and thus can predict R&D professionals' performance. There is a high turnover rate of R&D professionals, and several studies have indicated that providing training opportunities will reduce the turnover rate (Dysvik & Kuvaas, 2008; Kuvaas, 2008; Pfeffer & Sutton, 2006) and increase organizational performance (Harel & Tzafrir, 1999; Kalleberg & Moody, 1994; Purcell, 1999; Wright & Boswell, 2002). Yanadori and Marler (2006) indicated that it is costly to have high turnover of R&D professionals--not only in finding and hiring new employees, but also in

creating new knowledge through communication among employees. Thus, R&D professionals are “needed on a long-tem basis to capture learning curves that are synergistically developed with peers” (Yanadori & Marler, 2006, p. 191).

In general, R&D professionals have value and attitudinal characteristics that vary noticeably from other employees: they have invested heavily in training and specialized knowledge, often have advanced degrees, and enjoy intellectual and technical challenges (Von Glinow, 1988). Likewise, Harpaz and Meshoulam (2004) confirmed that the perceptions of workers in high-tech companies are towards a work-oriented goal (e.g., a sense of achievement) rather than an instrument-oriented goal (e.g., money). Chang, Choi, and Kim’s (2008) study of turnover of R&D professionals found that there was a high turnover rate for R&D professionals because they were not given sufficient autonomy or opportunity to match their intrinsic needs for learning and achievement.

Consequently, building a successful learning environment is one HRD responsibility, and this is accomplished by engaging R&D management. As R&D professionals are committed more strongly to their profession than to their organization, making progress in organizational learning in an R&D environment must be associated with organizational commitment (Popper & Lipshitz, 2003). Anderson and Kleingartner (1987) proposed several human resource interventions to improve the R&D professionals’ productivity, such as limiting hierarchical levels of management,

increasing occupational or organizational commitment, and linking performance evaluation and dual-career ladders. Moreover, Sundgren et al. (2005) investigated six different R&D sites in the pharmaceutical industry and suggested that information-sharing and intrinsic motivation are critical factors for creative performance. Harvey and Dention (1999) conducted a study on organizational learning in UK's manufacturing companies. They analyzed the opinions from HR and R&D managers and concluded that organizational learning "is valued as concept because it affirms the strategic significance of R&D to their business" (p. 903). Similarly, Calantone, Cavusgil, and Zhao (2002) surveyed a sample of R&D vice presidents in the USA and confirmed that learning orientation has a positive impact on organizational innovation and performance. To summarize, building a learning organization, increasing job satisfaction and organizational commitment, and reducing turnover intention could improve R&D professionals' performance.

Definitions and Discussion of the Four Variables

In this section, organizational learning culture, job satisfaction, organizational commitment, and turnover intention will be defined and discussed. The first part emphasizes the meaning and implications of organizational learning culture. The second part highlights the impact of organizational learning on the three outcomes of job

satisfaction, organizational commitment, and turnover intention. Thus, each outcome's meaning, antecedents, and consequences will be presented.

Organizational Learning Culture

Learning, as a pertinent organizational process, was proposed by Argyris and Schön (1978) in their book, *Organizational Learning: A Theory of Action Perspective*. In 1990, Peter Senge's book, *The Fifth Discipline: The Art and Practice of the Learning Organization*, popularized the idea of a learning organization. Since then, the concepts of organizational learning and learning organization have obtained real importance, capturing the interest of the academic field (Rebelo & Gomes, 2008). These terms "have become inspiring and attractive catch-all terms in the field of human resource development in this decade" (Sun, 2003, p. 153). Some have used the concepts of organizational learning and learning organization interchangeably (Confessore & Kops, 1998; Harvey & Denton, 1999; Ortenbald, 2001), while others have maintained that they are not interchangeable (Marquardt, 1996; Ortenbald, 2001; Swanson & Holton, 2001) but have very particular and distinctive meanings.

Meaning. Because organizational learning and a learning organization have distinct meanings for some, as noted above, it is important to note their possible differences. According to Marquardt (1996), organizational learning focuses on the how–the process and proficiencies of knowledge development. A learning organization

refers to the what–the characteristics, principles, and systems of an organization that produces and learns collectively. Confessore and Kops (1998) asserted that the perspective of organizational learning contains the dimension of transforming individual knowledge into collective knowledge, and a learning organization is constructed so that "teamwork, collaboration, creativity, and knowledge processes have a collective meaning and value" (p. 366). In general, organizational learning is defined in terms of process and behavior, and a learning organization is conceived as an entity (Harvey & Denton, 1999).

Based on Kontoghiorghes et al. (2005), four differential features between the two terms have been offered (e.g., Blackler, 1995; Cook & Yanow, 1993; Dodgson, 1993; Easterby-Smith, 1997; Jensen & Rasmassen, 2004; Jones, 1995; Kim, 1993; Ortenbald, 2001; Tsang, 1997). First, organizational learning is considered to be a learning process; in contrast, a learning organization is regarded as a form of organization. Second, learning occurs naturally in organizations, whereas the learning organization needs to be developed. Third, the literature on organizational learning appeared from descriptive and academic inquiries; by contrast, the literature on the learning organization was developed mainly from prescriptive and practical demands. Fourth, organizational learning focuses on the individual learner, and knowledge resides in the individual; whereas, in a learning organization, learners perform at the individual, group, and organizational levels, and

knowledge is located not only in individuals, but also in the organization's memory of the particular learning organization.

Organizational learning culture is generally focused on research studies related to the concept of a learning organization (Marsick & Watkins, 2003; Reeves, 1996; Russ-Eft & Preskill, 2001; Schein, 1992). Numerous researchers think of organizational culture as a matter of worth in promoting organizational learning and transforming an organization into a learning organization (Brown & Gray, 2004; Cummings & Worley, 2005; Gilley & Gilley, 2003).

In the past decade, a learning organization has been defined by a number of researchers. These definitions have stressed a variety of perspectives, characteristics, and goals. A sample of definitions is presented chronologically, and key elements of each definition are to be found in Table 2. Although there is no single definition of what a learning organization is, a number of key elements keep recurring. The characteristics of a learning organization used in this study have been proposed by several researchers, focusing on continuous learning on the individual, group, and organizational level:

1. Creation, acquisition, and transformation of information and knowledge
2. Shared vision, value, and goals
3. Increasing the learning capacity of members of the organization
4. Empowerment of individual learners

5. Creativity and innovation
6. Integration of work and learning
7. Increasing productivity and improving performance

Table 2

Definitions of a Learning Organization

Author	Definition	Key Elements
Senge (1990)	An organization where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together. (p. 3)	continuous learning individual learning
Pedler et al. (1991)	An organization that facilitates the learning of all its members and consciously transforms itself. (p. 1)	individual learning
Garvin (1993)	An organization skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights. (p. 80)	knowledge creation knowledge acquisition knowledge transformation
Gephart et al. (1996)	An organization in which learning processes are analyzed, monitored, developed, managed and aligned with improvement and innovation goals. (p. 36)	Innovation performance improvement

Marquardt (1996)	An organization that learns powerfully and collectively and is continually transforming itself to better collect, manage, and use knowledge for corporate success; it empowers people within and outside the organization to learn as they work, and it utilizes technology to maximize learning and production. (p. 19)	continuous learning collective learning empowerment the use of technology productivity
Confessore and Kops (1998)	An organization as an environment in which organizational learning is structured so that teamwork, collaboration, creativity, and knowledge processes have a collective meaning and value. (p. 366)	team work collaboration creativity
Rowley (1998)	A learning organization is an organization that facilitates learning for all of its members, and thereby continuously transforms itself. (p. 19)	individual learning continuous learning
Griego, Geroy, and Wright (2000)	An organization that constantly improves results based on increased performance made possible because it is growing more adroit (p. 5).	Performance improvement
Lewis (2002)	An organization in which employees are continually acquiring and sharing new knowledge and are willing to apply that knowledge in making decisions or performing their work. (p. 282)	knowledge sharing knowledge acquisition
Armstrong and Foley (2003)	A learning organization has appropriate cultural facets (visions, values, assumptions and behaviors) that support a learning environment; processes that foster people's learning and development by identifying their learning needs and facilitating learning; and structural facets that enable learning activities to be supported and implemented in the workplace. (p. 75)	share visions and value individual learning workplace learning
Egan et al. (2004)	A learning organization is viewed as one that has capacity for integrating people and structure	continuous learning collective learning

	to move an organization in the direction of continuous learning and change. (p. 282)	
Moilanen (2005)	A learning organization is a consciously managed organization with learning as a vital component in its values, visions and goals as well as in its everyday operations and their assessment. (p. 71)	share vision and goals
Rebelo and Gomes (2008)	A learning organization as a particular type of organization that intentionally develops strategies and structures for maximizing productive learning with a view to achieving its goals. (p. 301)	productive learning

Implications. As can be seen, most of the learning organization literature emphasizes conceptual and descriptive studies. Because learning organizations recognize learning as the strategic work for performance improvement (Guns, 1996; Senge, 1992), there are several empirical studies demonstrating the outcomes of learning in different organizations or countries.Innovation is a crucial outcome and advantage of learning organizations (Teare & Dealty, 1998). Bates and Khasawneh (2005) collected a sample of 450 employees from 28 organizations in Jordan and examined the relationship between organizational learning culture, learning transfer climate, and organizational innovation. They also used the learning transfer climate as a mediator between organizational learning culture and organizational innovation. They concluded that all three relationships were positive. Similarly, investigating the efforts of 195 firms with more than 200 employees in Spain, Lopez et al. (2005) found that organizational learning has a

positive impact on business performance, namely innovation, competitiveness, and economic/financial results.

Business performance and human resource practices are other outcomes of a learning organization that have been popularized in the academic field. Abu Khadra and Rawabdeh (2006) developed a framework for learning organizations, based on the influence on organizational performance of the implementation of management and human resource practices in Jordan. This framework consists of five aspects of a learning organization: (a) leadership and strategy planning, (b) continuous alignment with strategy, (c) learning organization practices, (d) learning infrastructure, and (e) performance evaluation. They found that the component of learning and development showed a highly positive relationship to organizational performance. Similarly, Lien (2002) adopted the DLOQ of Marsick and Watkins (1996) as an instrument for examining high-tech companies in Taiwan and found that the relationships between the learning organization and organizational performance are positive.

Moreover, the most recent empirical study identified was conducted by Jamali and Sidani (2008). They defined the five dimensions of an effective learning organization through a thorough literature review and attempted to find the dimensions that are highly related to the Lebanese context. Their five dimensions of an effective learning organization include employee participation, learning climate, systematic employee

development, continuous learning and constant experimentation, and learning reward systems. After the investigation, they found that systematic employee development (education and training), learning climate, and employee participation had been emphasized by the respondents. In addition, the authors concluded that "progress towards the learning organization paradigm is incremental and long-term, rather than an overnight metamorphosis" (p. 71). Likewise, Dymock (2003) pointed out that building an effective learning organization is "not an easy or overnight transition" (p. 190), based on an Australian case study.

Job Satisfaction

Job satisfaction is recognized as an important topic in organizational behavior because of its relevance to the physical and emotional health of employees (Oshagbemi, 1999). In fact, job satisfaction is a reflection of an individual's behavior that leads to attractive outcomes and is typically measured in degrees of multiple perceptions using multiple constructs or categories (Schmidt, 2007; Thierry & Koopmann-Iawma, 1984).

Definition. Job satisfaction is a construct that has been described, discussed, and researched for over sixty years. Hoppock (1935) defined job satisfaction as "any combination of psychological, physiological, and environmental circumstances" (p. 47) that causes an employee to be satisfied with his/her job. Locke (1969) defined job satisfaction as "the pleasurable emotional state resulting from the appraisal of one's job

as achieving or facilitating the achievement of one's job values" (p. 316). Spector (1997) defined it as "how people feel about their jobs and different aspects of their jobs. It is the extent to which people like or dislike their jobs" (p. 2). Overall, job satisfaction is associated with an employee's satisfaction from both psychological and physical perspectives. Thus, job satisfaction is recognized as a complex construct that includes both intrinsic and extrinsic factors (Herzberg, Mausner, & Snyderman, 1959). Herzberg et al. identified the intrinsic as derived from internally job-related rewards, such as recognition, achievement, work itself, advancement, and responsibility. Extrinsic factors result from externally environment-related rewards, such as salary, company policies and practices, technical aspects of supervision, interpersonal relations in supervision, and working conditions. All of these features are related to organizational culture. Based on these definitions, organizational culture can have a significant impact on employees' job satisfaction.

In general, job satisfaction is assessed in degrees and can be examined from multiple viewpoints using multiple constructs or scales (Schmidt, 2007). For example, the Job Description Index (JDI), developed by Smith, Kendall, and Hulin (1969), defines five facets of a job: work, pay, promotion, supervision, and coworkers. Spector (1985) identified nine subscales for the Job Satisfaction Survey (JSS): pay, promotion, supervision, fringe benefits, contingent rewards, operating conditions, coworkers, nature

of work, and communication. The importance of each facet or subscale can be different to some extent; as a result, these facets or subscales may have varied significance when assessing overall job satisfaction (Spector, 1997).

Antecedents and consequences. Job satisfaction may be viewed as a result of a behavioral cycle; likewise, it can be viewed as a cause of behavior, or it can be due to an evaluation of results that lead to a decision about what kind of changes need to be made (Thierry & Koopmann-Iawma, 1984). Several studies have defined the antecedents of job satisfaction, including role stressors (e.g., Igbaria & Guimaraes, 1993); career orientation (e.g., Chen, Change, & Yeh, 2004; McMurtrey, Grover, Teng, & Lightner, 2002); personal learning (e.g., Lankau & Scandura, 2002); workplace training (e.g., Lowry, Simon, & Kimberley, 2002; Schmidt, 2007); and organizational culture (e.g., Johnson & McIntye, 1998; McKinnon, Harrison, Chow, & Wu, 2003; Ostroff, 1993).

For example, role stressors are a salient subject in IT literature and include role ambiguity and role conflict. Both have been identified as antecedents of job satisfaction for IT professionals, and their relationships have been negative (Igbaria & Guimaraes, 1993). Chen et al. (2004) proposed that a career development program might increase the level of job satisfaction and productivity among R&D professionals. Lowry et al. (2002) found that employees who received training opportunities showed more positive job satisfaction than those who had not. Schmidt (2007) investigated a sample of employees

from customer and technical service in the U.S. and Canada and concluded that job training satisfaction and overall job satisfaction were positively correlated. Johnson and McIntye (1998) found that organizational culture that included empowerment, involvement, and recognition was related to job satisfaction. McKinnon, Harrison, Chow, and Wu (2003) also confirmed that an organizational culture that values respect of people, innovation, stability, and aggressiveness resulted in a high level of job satisfaction and information sharing.

With respect to consequences, job satisfaction has been demonstrated to be a crucial predictor of turnover intention, organizational commitment, and absenteeism (Baroudi, 1985; Igbaria & Greenhaus, 1992; Moynihan & Pandey, 2007; Spector, 1997). It may also be a link to performance (Lau & May, 1999; Osterman, 1995). Much empirical evidence concerning the relationship between job satisfaction and turnover intention (e.g., Falkenburg & Schyns, 2007; Williams & Hazer, 1986) and absenteeism (e.g., Falkenburg & Schyns, 2007, Sagie, 1998) has shown that these relationships are negative. This implies that higher job satisfaction causes lower absenteeism and turnover intention. In the same vein, Keller, Julian, and Kedia (1996) examined the relationship between job satisfaction and productivity of R&D teams, and the results were highly positive, as supported by Chen et al. (2004). The relationship between job satisfaction and organizational commitment is presented in a later section.

Organizational Commitment

Organizational commitment has been the subject of continued research interest for several decades because of its relationship with individual and organizational performance and organizational effectiveness (Allen & Meyer, 1996; Mathieu & Zajac, 1990; Mowday, 1998). Organizational commitment is a multidimensional construct with antecedents and consequences varying across dimensions (Meyer & Allen, 1997).

Definition. Commitment comes in three categories, all of which impact employees' behavior: job commitment, career commitment, and organizational commitment (Burud & Tumolo, 2004). In this study, organizational commitment, which has been substantially researched, was considered. The definition of organizational commitment refers to "the strength of an individual's identification with and involvement in a particular organization" (Porter et al., 1974, p. 604).

According to Vandenberghe and Tremblay (2008), the model of organizational commitment proposed by Meyer and Allen (1991) is the most popular and comprehensively validated multidimensional model. Three components are contained in Meyer and Allen's (1991) organizational commitment model. First, affective commitment refers to employees' emotional attachment to, identification with, and involvement in the organization. Second, continuance commitment refers to commitment based on the costs that employees associate with leaving the organization. Last, normative commitment

refers to employees' feelings of obligation to remain with the organization. Indeed, employees can experience each of these psychological states to varying degrees. Consequently, Meyer and Allen (1991) argued that organizational commitment is "the view that commitment is a psychological state that (a) characterizes the employee's relationship with the organization, and (b) has implications of the decision to continue membership in the organization" (p. 67).

Antecedents and consequences. Antecedents to organizational commitment receiving consistent empirical support include demographic variables (e.g.. Igbaria & Greenhaus, 1992; Goswami et al., 2007), management support (e.g.. Reid, Allen, Riemenschneider, & Armstrong, 2008; Tu, Ragunathan, & Ragunathan, 2001), job and role characteristics (e.g., Goswami et al., 2007; Smeenk, Eisinga, Teelken, & Doorewaard, 2006), and workplace training (e.g., Ahmad & Bakar, 2003; Bartlett, 2001; Chang, 1999; Kontoghiorghes & Bryant, 2004; McEvoy, 1997; Paul & Anantharaman, 2004).

In a study examining management information system (MIS) professionals' organizational commitment, Igbaria and Greenhaus (1992)found that age and tenure are positively related to organizational commitment. However, they also confirmed that education levels do not impact organizational commitment. Tu et al. (2001) surveyed senior information system executives in the U.S. and concluded that management support

is closely connected to organizational commitment, while role conflict and role ambiguity are moderately negatively related to organizational commitment.

Smeenk et al. (2006) investigated a sample of two groups (separatist: low managerial, and hegemonist: high managerial) of university faculty in Holland. They concluded that decentralization, compensation, training and development, job tenure, and career mobility were related to organizational commitment among separatist faculty. On the other hand, for the hegemonist faculty, age, organizational tenure, level of autonomy, working hours, social involvement, and personal importance were highly correlated with organizational commitment. Bartlett's (2001) study of nurses in public U.S. hospitals demonstrated that employee attitudes toward training, such as perceived access to training, social support for training, motivation to learn, and perceived benefits of training were highly associated with organizational commitment. Kontoghiorghes and Bryant (2004) found a correlation between training effectiveness and organizational commitment.

Regarding consequences, O'Malley (2000) proposed three positive outcomes that a strong organizational commitment confers on business: enhanced employee retention' organizational citizenship behavior (OCB), which "is behavior by an employee intended to help coworkers or the organization" (Spector, 1997, p. 57); and improved organizational performance.

With respect to employee retention, many studies have focused on turnover or turnover intention. For instance, Thatcher, Stepina, and Boyle (2002) investigated information technology (IT) workers from public sectors in the U.S. Their results indicated that organizational commitment has a negative relationship with turnover intention. Regarding OCB in a study of the behavior of IT professionals, Pare and Tremblay (2007) concluded that IT professionals who exhibited a strong affective commitment toward their organization are more likely to show organization citizenship behavior than those with a low level of affective commitment or a high level of continuance commitment.

From the perspective of performance, knowledge sharing is a characteristic in organizational learning culture that promotes the innovation of R&D. For example, Alvesson (2001) contended that, if an organization creates high levels of organizational commitment, then knowledge generation and acquisition appropriation are successful. In a similar vein, results of a meta-analysis of 93 commitment studies from 1975 to 2001 supported the results of Cohen (1991) and Mathieu and Zajac (1990) that affective organizational commitment has a positive relationship with in-role performance (required duties)and extra-role performance (duties assumed beyond what is required) (Riketta, 2002).

Turnover Intention

Turnover intention is a valuable concept as it is linked with actual turnover behavior (Steel & Ovalle, 1984). Due to many external factors affecting turnover behavior, turnover is much more difficult to predict than turnover intention (Bluedorn, 1982b). Numerous studies have examined turnover intention in multiple disciplines and often explored the inverse relationship to job satisfaction and organizational commitment (Schwepker, 2001; Tett & Meyer, 1993; Williams & Hazer, 1986).

Definition. Turnover intention has been identified as the most common predictor of turnover. Price (1977) defined turnover as "the degree of individual movement across the membership boundary of a social system" (p. 4). Abassi and Hollman (2000) described the meaning of employee turnover as the rotation of workers around the labor market; between companies, jobs, and occupations; and between the situations of employment and unemployment. Based on Fishbein and Ajzen (1975), "the best single predictor of an individual's behavior will be a measure of his (sic.) intention to perform that behavior" (p. 369). In fact, turnover can be divided into voluntary and involuntary (Price, 1977). Price (1977) indicated that most studies focus on voluntary turnover rather than involuntary turnover, and the subject of voluntary turnover is more meaningful and controllable for managers. Thus, Mobley (1977) defined turnover intention as the intention to leave a job on a voluntary basis. It can be defined as "the intention to

voluntarily change companies or to leave the labour market altogether" (Falkenburg & Schyns, 2007, p. 711).

Antecedents and consequences. The turnover intention literature has examined the effects on turnover intention of various predictors, including demographic factors, employee attitudes, and human resource (HR) practices. First, demographic factors include gender, age, organizational tenure, education level, and family size (Chen & Francesco, 2000; Thatcher et al., 2002). Chen and Francesco (2000) found that age and tenure display a consistently negative relationship to turnover intentions, and Thatcher et al. (2002) confirmed that female IT workers have a higher level of turnover intention than male IT workers.

Second, Williams and Hazer (1986) reviewed several turnover models and found that employee attitudes, including both job satisfaction and organizational commitment, are important antecedents of turnover intentions. They also demonstrated that the two variables are negatively related to turnover intention. These results have been supported by several empirical studies showing that both variables are direct antecedents of turnover intention in different job types, such as human service workers (e.g., Barark, Nissly, & Levin, 2001); hospital workers (e.g., Ding &Lin, 2006), IT personnel (e.g., Guimmaraes & Igbaria, 1992), and engineering staffs (e.g., Ostroff, 1992). However, research has also found that job satisfaction through organizational commitment is an

indirect predictor of turnover (e.g., Deconinck & Bachmann, 2007; Griffeth, Hom, & Gaertner, 2000; Meyer & Allen, 1997; Schwepker, 2001).

Further, several previous studies on predicting turnover intention using HR practices (Allen, Shore, & Griffeth, 2003; Kuvaas, 2008; Way, 2002), training opportunities (Dysvik & Kuvaas, 2008; Kuvaas, 2008; Pfeffer & Sutton, 2006) and career orientation (Chang et al., 2008) targeted highly skilled workers, such as IT professionals, engineers, or R&D professionals. In Pare and Tremblay's (2007) study on IT professionals, they found that HR practices, such as recognition, competence development, fair rewards, and information sharing had a negative impact on turnover intention. Chen et al. (2004) demonstrated that closing the gap between career needs and career development programs strongly reduced turnover intention and highly increased job satisfaction of R&D professionals in Taiwan.

A number of studies have indicated that the direct cognitive consequence of turnover intention is turnover (Abrams et al., 1998; Lee & Mowday, 1987; Michaels & Spector, 1982, Mobley 1982; Thatcher et al., 2002). Because the employees have already quitt the job and left the organization, it is normally difficult to measure actual turnover (Harris, Harris, & Harvey, 2008; Griffeth et al., 2000). Therefore, turnover intention can be used as a predictor of turnover. Based on Joseph, Ng, Koh, and Ang (2007) and

Thatcher et al. (2002), turnover intentions have a positive relationship with actual turnover behavior for IT professionals.

Hypotheses and Relationships

Due to a number of specific but interlinked questions in the present study, six hypotheses among organizational learning culture, job satisfaction, organizational commitment, and turnover intention are addressed in this section.

The Relationship between Organizational Learning Culture and Job Satisfaction

Based on the previous discussion, the characteristics of learning organization include several facets, such as knowledge sharing, organizational learning capacity, workplace learning, innovation, empowerment, team work, and so forth. In general, work and organizational conditions are mainly influenced by the situational approach of job satisfaction (Chiva & Alegre, 2008). The characteristics of a learning organization may, then, have some impact on job satisfaction.

There are a number studies on job satisfaction related to individual characteristics of the learning organization. Mikkelsen, Ogaard, and Lovrich (2000) identified a positive connection between learning climate and job satisfaction. Keller et al. (1996) reported that work climate has a significant impact on job satisfaction and team productivity, especially participation, cooperation, and work importance. Rowden and Ahmad (2000) and Tsai, Yen, Huang, and Huang (2007) concluded that workplace learning promoted a

high level of job satisfaction among employees. Eylon and Bamberger (2000) concluded that empowerment has a positive relationship on job satisfaction. Griffin, Patterson, and West (2001) confirmed that the extent of teamwork is related to perceptions of job autonomy, which, in turn, impacts job satisfaction. Kim (2002) suggested that participative management that incorporates effective supervisory communication can improve job satisfaction. Lund (2003) indicated that organizational culture with innovation, entrepreneurship, and flexibility obtains a high level of employee job satisfaction. Chiva and Alegre (2008) stated that organizational learning capacity through a stimulating work context has effects in developing employees' competencies and job satisfaction.

With respect to the full scope of organizational learning culture, several studies from a variety of industries have indicated that employee job satisfaction is related to perceptions of facets of the organizational learning culture. A study of an engineering company showed that an effective learning organization can result in beneficial effects not only on organization performance, but also on improvement in individual job performance and job satisfaction (Gardiner & Whiting, 1997). A study of a sample of employees from the financial, insurance, manufacturing, and service industries in Taiwan was conducted by Chang and Lee (2007). They found that the presence of organizational learning culture showed a positive relationship with job satisfaction. As we can see from

the empirical research, the promotion of organizational learning culture can enhance job satisfaction. This result is also confirmed by Egan et al. (2004), Lim (2003), Wang (2005), and Xie (2005). Based on the above studies, the following hypothesis was offered:

Hypothesis 1: Organizational learning culture positively influences job satisfaction.

The Relationship between Organizational Learning Culture and Organizational Commitment

A learning-oriented environment creates many benefits for individuals and organizations; among them is organizational commitment (Farrel, 1999; Maurer & Lippstreu, 2008). However, many studies concerning learning aspects were found. The learning perspective provides a comprehensive view of learning at all organizational levels (Bhatnager, 2007). Several studies have shown that training and education activities not only develop and improve employees' skills and abilities, but also enhance their commitment to the organization (Ahmad & Bakar, 2003; Bartlett, 2001; McEvory, 1997; Paul & Anatharaman, 2004). Meyer and Allen (1997) concluded that commitment can be impacted by training experience and affect employees' motivation for future training. Furthermore, self-directed learning is a good example of informal learning (Marsick & Watkins, 1990); self-directed learning readiness is positively related to organizational commitment (Cho & Kwon, 2005).

Lok and Crawford (2001) indicated that supportive and innovative cultures have a strongly positive effect on organizational commitment, while a bureaucratic culture has a negative effect on organizational commitment. Robertson and O'Malley-Hammersley (2000) found that high levels of commitment can be linked to positive attitudes of knowledge sharing. Wu and Cavusgil (2006) found that the learning intention of a firm has a positive relationship with organizational commitment that affects significantly alliance and firm performance. Pool and Pool (2007) reported that executives with a high level of organizational commitment and work motivation results in an organization with higher levels of organizational learning. Bhatnagar (2007) found that affective and normative commitment appeared to be highly positively related to learning capability. Maurer and Lippstreu (2008) contended that organizations that create mechanisms and an environment favorable to learning and development will increase employee learning engagement, and this learning experience increases their commitment.

Moreover, a number of studies have directly examined the relationship between organizational learning culture and organizational commitment. A positive correlation between them was found by Lim (2003), Wang (2005), and Xie (2005). Based on the above studies, the following hypothesis was offered:

Hypothesis 2: Organizational learning culture positively influences organizational commitment.

The Relationship between Organizational Learning Culture and Turnover Intention

Although organizational learning is among the most widespread and fastest-growing interventions in HRD practice (Cummings & Worley, 2005), the context of organizational learning culture related to its interaction with turnover intention has not been explored extensively (Egan et al., 2004; Lee-Kelley et al., 2007). In the context of social exchange theory, employees who receive sufficient and relevant training opportunities in organizations might be more reluctant to leave their organization (Shore, Tetrick, Lynch, & Barksdale, 2006). Thus, if employees perceive that they have more training opportunities, then it may result in diminishing their turnover intention (Chow, Haddad, & Singh, 2007; Dysvik & Kuvaas, 2008; Hemdi & Nasurdin, 2006; Pfeffer & Sutton, 2006). Similarly, Lankau and Scandura (2002) reported that job learning is negatively associated with turnover intention. Karatepe, Yavas, and Babakus (2007) suggested that job resources, including supervisory support, training, empowerment, and rewards, increase employees' job satisfaction and affective commitment and reduce their turnover intention. Pare and Tremblay (2007) indicated that competence development and information sharing have a negative effect on turnover intention.

While there is limited empirical evidence to support a relationship between organizational learning culture and turnover intention, the research that has been done supports this connection. Based on Gouillart and Kelly (1995), an organizational culture

that encourages employees' self-development may reduce individuals' desire to seek employment elsewhere if they are acquiring new skills and competencies that allow them to increase their self-efficacy. Egan et al. (2004) demonstrated that a learning culture impacted job satisfaction; in addition, a learning culture was mediated by job satisfaction, with a negative effect on turnover intention. Lee-Kelley et al. (2007) conducted a study exploring learning organizations and the retention of knowledge workers in the IT industry. The researchers applied Senge's five learning organization disciplines to explore the relationship between job satisfaction and turnover intention. They concluded that shared vision, which is one of the learning disciplines, has a negative relationship to turnover intention because knowledge workers were strongly influenced by shared vision and showed decreased turnover intention. Based on the above studies, the following hypothesis was offered:

Hypothesis 3: Organizational learning culture negatively influences turnover intention.

The Relationship between Job Satisfaction and Organizational Commitment

Job satisfaction and organizational commitment are regarded as separate constructs. Job satisfaction refers to an emotional state that reveals an affective reaction to the job and the work situation (Gregson, 1987; Lock, 1976; Porter et al., 1974). On the other hand, organizational commitment places much more emphasis on a global reaction

(emotional or non-emotional) to the whole organization (Lance, 1991; Porter et al., 1974). As a result, organizational commitment is less impacted by daily events, and it develops more stability over time than job satisfaction (Mowday, Steers, & Porter, 1979; Sagie, 1998).

Despite the fact that there is relative consensus on the strong positive relationship between job satisfaction and organizational commitment, there is an ongoing argument regarding the causal order between these two variables. Bateman and Strasser (1984) argued that organizational commitment is an antecedent of job satisfaction, meaning that, when employees have a strong commitment to their organization, it will increase employee job satisfaction. Several other studies have argued that job satisfaction will affect organizational commitment (Bluedorn, 1982a; Williams & Hazer, 1986). A third position considers the relationship as being reciprocal (Mathieu & Zajac, 1990; Meyer, Staneley, Herscovitch, & Topolnytsky, 2002).

There appear to be many studies of job satisfaction being influenced by various other variables with a positive impact on organizational commitment. These variables include training and education (Griffeth et al., 2000; Yu & Egri, 2005), ethical climate (Cullen, Parboteeah, & Victor, 2002; Schwepker, 2001), a supportive and innovative culture (Lok & Crawford, 2001), role stressors (Igbaria & Guimaraes, 1993; Johnston, Parasuraman, Futrell, & Black, 1990), and career development (Igbaria & Greenhaus,

1992). Consequently, this study adopts this position because R&D professionals who have technical expertise prefer autonomy and flexibility, and, when they are satisfied with their job, they are more likely to identify with and be involved in their organization (Goswami et al., 2007). Therefore, they are more likely to have "a strong belief in and acceptance of the organization's goals and values" (Mowday et al., 1979, p. 226). Based on the above discussion, the following hypothesis was offered:

Hypothesis 4: Job satisfaction positively influences organizational commitment.

The Relationship between Job Satisfaction and Turnover Intention

Most of theories of turnover consider it as a result of employee job dissatisfaction (Bluedorn, 1982a; Mobley, 1977; 1982). The theory is that people who dislike their job will think about quitting the job, intend to search for alternative employment, and intend to leave the organization (Sager, Griffeth, & Hom, 1998). Although job satisfaction is measured at one point in time, the effects of job satisfaction on employee turnover have been shown in longitudinal studies (Johnston, Griffeth, Burton, & Carson, 1993; Spector, 1997). As noted previously, turnover intention is the single best predictor of turnover; therefore, job satisfaction is an antecedent of turnover intention.

A number of empirical studies have confirmed the important role of job satisfaction in influencing turnover intention (e.g., Hom & Griffeth, 1995; Joseph et al., 2007; Steel & Ovalle, 1984; Trevor, 2001). Griffeth, Hom, and Gartner's (2000)

meta-analysis indicated that the overall job satisfaction displayed the highest relationship to turnover intention among all kinds of job attitudes. Igbaria and Greenhaus (1992) and Igbaria and Guimaraes (1993) demonstrated that job satisfaction has a direct effect on turnover intention and an indirect effect through organizational commitment on the turnover intention of IT professionals. In a recent study, Falkenburg and Schyns (2007) confirmed this result. Chen et al. (2003) reported that career development programs increased the R&D professional's job satisfaction, and job satisfaction reduced their degree of turnover intention. Consequently, higher job satisfaction results in less turnover intention. This assertion has been confirmed by prior research that shows a negative relationship between job satisfaction and turnover intention. Based on the above discussion, the following hypothesis was offered:

Hypothesis 5: Job satisfaction negatively influences turnover intention.

The Relationship between Organizational Commitment and Turnover Intention

The best predictors of turnover intention are job satisfaction, organizational commitment, professional commitment, and burnout, according to Barak et al. (2001). In fact, numerous studies of turnover intention have confirmed that it occurs as a result of job satisfaction and organizational commitment (Carayon, Schoepke, Hoonakker, Haims, & Brunette, 2006). The consistent relationships between satisfaction, commitment, and

turnover intention strongly support “the inclusion of organizational commitment in the causal process leading to turnover intention” (Bluedorn, 1982a, p. 88).

In the past, many studies of organizational commitment associated with turnover intention have been examined. In a meta-analysis of 200 commitment studies, Mathieu and Zajac (1990) supported the prediction of Nowday et al. (1982) that organizational commitment has a negative relationship with turnover intention. Their study also implied that an employee who is committed to an organization is more likely to remain at his or her job. Similarly, in a meta-analysis of 155 studies that included 178 independent samples conducted by Tett and Meyer (1993), the authors found that organizational commitment was a predictor of turnover intention. Johnston et al. (1990) used a longitudinal design and confirmed these results.

As discussed above, organizational commitment contains three components: affective, continuance, and normative (Meyer & Allen, 1991). While most studies conducted with affective commitment have shown that the strongest and most consistent relationship with turnover intention (Iverson & Buttigieg, 1999; Meyer & Allen, 1997; Vandenberghe & Tremblay, 2008; Wasti, 2003), researchers have found a significantly negative relationship between continuance commitment and turnover intention (e.g., Chen, Hui, & Sego, 1998; Jaros, Jermier, Koehler, & Sincich, 1993; Meyer et al., 2002; Udo, Guimaraes, & Igbaria, 1997). Pare and Tremblay (2007) examined the impact of

continuance commitment on turnover intention and found that IT professionals are willing to stay with their organization not only due to emotional attachment, but also due to the cost of leaving. Thus, continuance commitment processed as a perceived cost has been shown to correlate more highly than do affective and normative commitments (Dunham, Grube, & Castaneda, 1994; Meyer, Allen, & Gellatly, 1990; Wasti, 2003). Research results in the R&D professionals' literature are in accord with these findings (Chang & Choi, 2007; Iverson, Mueller, & Price, 2004). Based on the above discussion, the following hypothesis was offered:

Hypothesis 6: Organizational commitment negatively influences turnover intention.

Hypothesized Structural Equation Model

As a result, according to the above review of the literature, a hypothesized structural equation model is shown in Figure 2.

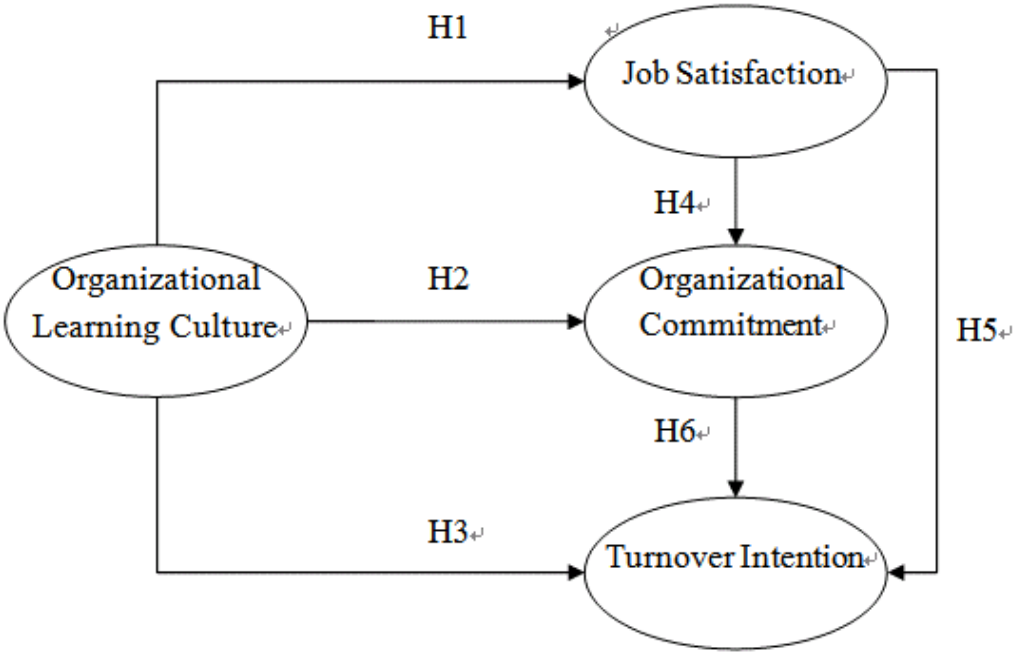


Figure 2. Hypothesized structural equation model

Summary

R&D professionals are critically important due to competition arising from globalization and modern technology. The ability of an organization to retain its highly skilled human resources, particularly R&D professionals, is vital to the organization's success. In the present global economy, a high turnover rate of R&D professionals becomes a serious issue in HRD. In general, learning can be seen as an integral part of organizational culture and can assist organizations with R&D professionals in reducing turnover rate and establishing their competitive advantage through knowledge acquisition and sharing.

According to the literature review, the benefits of a learning organization are to improve individual and organizational performance. As most research on learning organizations has been conducted with an emphasis on innovation in business practices and business performance in a variety of business units, there are very few studies on the impact of learning organizations on R&D professionals. In a similar vein, few studies have been done on the effect of learning organizations on turnover intention. In order to understand the impact of organizational learning culture, it is necessary to examine the relationships between organizational learning culture and the three outcomes: job satisfaction, organizational commitment, and turnover intention. The main goal of this chapter was to present a conceptual framework for linking the four variables and thus broaden HRD theory and practice. As a result, the research hypotheses were:

Hypothesis 1: Organizational learning culture positively influences job satisfaction.

Hypothesis 2: Organizational learning culture positively influences organizational commitment.

Hypothesis 3: Organizational learning culture negatively influences turnover intention.

Hypothesis 4: Job satisfaction positively influences organizational commitment.

Hypothesis 5: Job satisfaction negatively influences turnover intention.

Hypothesis 6: Organizational commitment negatively influences turnover intention.

CHAPTER 3

RESEARCH METHODS

This chapter is organized into four major sections. It begins with the research design of this study, which describes the sampling, data-collection, and IRB procedures. Following this research design, an extensive discussion of the instrument used includes four variables with their associated instruments, instrument translation, and pilot test. Then, the reliability and validity of the instrument are reported. The last section includes data analysis.

Research Design

A quantitative research design using a survey was employed in this study. A survey is defined as "a method for gathering information from a sample of individuals" (Scheuren, 2004, p. 9). The main purpose of survey research is "to collect information from one or more people on some set of organizationally relevant constructs" (Bartlett, 2005, p. 99). Moreover, the present study attempted to measure phenomena that are not directly observable, for which a survey is considered to be an appropriate way to capture the findings from a large population at one time (Gall, Gall, & Borg, 2007; Schneider, Ashworth, Higgs, & Carr, 1996). A five-step process for conducting survey research in organizations was proposed by Bartlett (2005). This process consists of defining the

purpose and objectives, deciding on the sample, creating and pre-testing the instrument, contacting the respondents, and collecting and analyzing data.

Population and Sample

The target population for this study consisted of R&D professionals from business enterprises in high-tech industries in Taiwan. Although R&D professionals are distributed in four types of organizations, including business enterprises, government, higher education, and private nonprofits (National Science Council, 2007), this present study placed emphasis on business enterprises due to the shortage of highly skilled workers and the high turnover rate of R&D professionals in that sector (Hu et al., 2005; Tai & Wang, 2006; Wu et al., 2007).

Moreover, in Taiwan, the high tech industry covers six major industries in Hsinchu Science Park (HSP), a major industrial park near Taipei: (1) integrated circuits (IC); (2) PC and peripherals; (3) telecommunication; (4) optoelectronics; (5) precision machinery; and (6) biotechnology. However, IC products are the major components that have been Taiwan's largest export since the late 1980's (Chen et al., 2004), and some information products and fine materials manufactured in Taiwan have placed the country in a leading position in the world (Han, 2007). By 1999, Taiwan ranked as the world's third largest producer of IT hardware, surpassed only by the U.S. and Japan (Saxenian, 2002). Now, Taiwan is the fourth largest IC producing country in the world (Wu, et al.,

2007), lower than the U.S., Japan, and South Korea. Based on the statistics from HSP, 98% of the R&D expenditures in 2006 (Hsinch Science Park, 2008a) and 98% of the R&D personnel in 2003 (Hsinch Science Park, 2005b) were from IC, PC and peripherals, telecommunication, and optoelectronics industries. Thus, the R&D professionals who work for the above industries were the key target population.

In the present study, the criteria for selecting the sample were: (a) the sample population needed to be R&D professionals who worked in firms belonging to the industry category of IC, PC and peripherals, telecommunication, or optoelectronics industries in HSP; (b) the firm's name was listed on the website for the Association of Industries in Science Park, which is the leading association for Science Parks in Taiwan, founded in 1983; and (c) the firms needed to have more than 10% of their personnel in R&D. The percentage of R&D personnel employed varied for each industry, and the average of R&D personnel was 11% in HSP (Hsinch Science Park, 2005).

The number of employees in HSP was 125,589 in 2007 (Hsinchu Science Park, 2008b). Approximately 13,814 R&D professionals in HSP were employed based on 11% of the employees. The sample size estimation was determined by applying the equation, $n=z^2 s^2/e^2$ (Lohr, 1999). In this research, a 95% confidence interval with tolerable error 0.03 was used. Thus, the total sample size of respondents was at least 418 R&D professionals (Dillman, 2007). Contact information for R&D professionals is very

sensitive and a valuable asset to companies in Taiwan; thus, it is very difficult to get this information. Accordingly, the surveys for R&D professionals needed to go through the HR or R&D departments. Based on the criteria and the desired number of respondents, 100 sample firms (assuming 10 R&D professionals per firm) were drawn using purposive sampling, based on the researcher's personal network and the accessibility of the firms (Passmore & Baker, 2005). These firms were e-mailed a letter describing the study and inviting participation. After receiving the firms' agreement, each firm was given a number of instruments depending on the number of R&D professionals, ranging from 1 to 50. Even if a firm had more than 50 R&D professionals, the maximum number of instruments provided was 50. Then, the HR or R&D manager e-mailed the survey to the R&D professional. A total of 775 surveys were distributed.

The mixed-mode surveys combined an on-line survey and paper surveys to collect data from most participants (Dillman, 2007). At the beginning, Survey Monkey (http://www.SurveyMonkey.com) was used to gather data from those participating on-line. There are several advantages to using a web survey: it can be conducted 24 hours a day and 7 days a week; it can be delivered quickly through the Internet; the data can be saved automatically in electronic form; the administration costs can be reduced; there is lower cost; there is greater accuracy because respondent scores do not have to be transcribed with the potential of error in data recording; and the format of the survey can

be designed and implemented with flexibility (Birnbaum, 2004; Dilman, 2007). However, if a low response rate occurs, paper surveys could be another choice to get the data, as was required in this study.

The detailed features of data collection include several stages. First, the standard formal invitation letter (pre-notice) (Appendix A) was e-mailed to the HR or R&D manager of the selected firms for their agreement to participate in this survey. The letter consisted of a brief introduction about the present study and the requirement that participants be R&D professionals. Moreover, anonymity of participants and companies was highlighted in the letter. A phone call followed to describe detailed information about the survey.

After receiving the HR or R&D department's agreement, an e-mail was sent containing a cover page to secure consent and an embedded website link for the survey (Appendix B). The HR or R&D department identified the R&D professionals and sent the e-mail to them, giving them the URL for the survey website and encouraging them to complete the survey. The online survey consisted of all 71 items, and the estimate was that it would take approximately 10-15 minutes to complete, based on trial completions. No personal identification data were collected from the participants, in order to maintain individual anonymity. Moreover, in order to increase the response rate, which was quite low with the on-line survey, some companies distributed paper surveys. Seventy-five

confirmations from the 100 sample firms represent the volunteer sample firms for this study. Seven hundred and seventy-five (775) R&D professionals from the 75 companies were asked to participate in the study. Four hundred and seventy-five (475) surveys were submitted, 142 on-line and 333 in paper; 418 completed the survey, while 57 did not complete scales related to one or more of the variables. The response rate for usable surveys was 53.9% as shown in Table 3.

Table 3

Response Rate

Survey Method	Sample Size	Number of Respondents	Number of Non-completed	Number of Completed	Response Rate (%)
On-line Survey	360	142	34	108	30.0
Paper Survey	415	333	23	310	74.7
Total	775	475	57	418	53.9

As a result, 418 completed surveys from R&D professionals were received from 65 firms in the industries presented in Table 4.

Table 4

Sample of Participants by Industry

Industry Category	Number of Companies	Number of Surveys Distributed	Number of Usable Surveys	Participants Rate (%)
Integrated Circuits	39	398	203	48.6
PC and Peripherals	5	35	13	3.1

Telecommunication	7	58	30	7.2
Optoelectronics	14	232	172	41.1
Total	65	723	418	100

The large majority (203) represented 39 integrated circuits industry companies.

Respondents' demographic characteristics are shown in Table 5.

Table 5

Demographic Characteristics of Respondents

Demographic Variable	Category Composition	Frequency	Percentage
Gender	Male	357	85.4
	Female	61	14.6
	Total	418	100
Age	30 or younger	149	35.6
	31-40	207	49.5
	41-50	51	12.2
	51 or older	11	2.6
	Total	418	100
Education	High school	2	0.5
	College (no degree)	28	6.7
	University (degree)	130	31.1
	Graduate school	258	61.7
	Total	418	100
Supervisor Position	Yes	120	28.7
	No	298	71.3
	Total	418	100

Job Tenure	Fewer than 2 years	142	34.0
	2-5 years	134	32.1
	6-10 years	101	24.2
	11-15 years	32	7.7
	More than 15 years	9	2.2
	Total	418	100
Organization Size	0-300	115	27.5
	301-1000	120	28.7
	1001-3000	83	19.9
	3001-10000	51	12.2
	More than 10000	49	11.7
	Total	418	100
Organization Age	Fewer than 5 years	43	10.3
	5-10 years	128	30
	11-15 years	134	30.6
	16-20 years	57	32.1
	More than 20 years	56	13.6
	Total	418	`13.4

IRB Approval

The present study involved collecting data from adult participants. Even though the study was implemented in Taiwan, in order to obtain approval for it and gain cooperation from participants who were influenced by it, the research proposal was submitted to the Institutional Review Board (IRB) of the University of Minnesota. The procedures used followed IRB guidelines for selecting participants, obtaining

participants' consent, and ensuring privacy and confidentiality. These steps ensured the protection of human subjects from risk (Gall et al., 2007).

Instrument

To ensure the quality of the instrument, the process of developing the survey followed these four stages:

1. Creating the initial survey from a literature review of existing scales
2. Conducting a pilot study with interviews to test the survey
3. Modifying the survey based on feedback from the pilot study
4. Implementing the revised survey (Carayon et al., 2006**,** p. 383)

Each item of the instrument was designed to obtain from the R&D professionals information on how they feel about their work and their company (Schneider et al., 1996). Thus, the instrument went through several iterations to achieve the final goal. The instrument for this study was composed of five sections (see Appendix C): organizational learning culture, job satisfaction, organizational commitment, turnover intention, and the participants' demographic information. There are 57 items in the survey with a 5-point Likert-type response scale ranging from 1 (strongly disagree) to 5 (strongly agree). Based on a thorough literature review, existing and established instruments were used. Organizational learning culture was assessed by the 21items of the dimensions of the learning organization questionnaire (DLOQ) from research by Watkins and Marsick

(1997), using the short form of the instrument developed by Yang (2003). Job satisfaction was assessed using a 9-item instrument adapted from Spector (1985). Organizational commitment was measured using two subsets of the 16-item instrument developed by Allen and Meyer (1990). A 4-item instrument was used to assess turnover intention as drawn from the Staying or Leaving Index (SLI) by Bluedorn (1982a). The final section has 7 demographic items. Additionally, in order to reduce the number of items answered by R&D professionals and to increase response reliability, three items were provided by organizational representatives to describe the organization so that respondents would not have to provide this information. A summary of the constructs is shown in Table 6.

Table 6

Summary of Constructs

Construct	Items	Source of Instrument	Reliability
Organizational Learning Culture	21	DLOQ short form (Yang, 2003)	.72~.89
Job Satisfaction	9	JSS (Spector, 1997)	.91
Organizational Commitment	16	ACNCS (Allen & Meyer, 1990)	.73~.82
Turnover Intention	4	SLI (Bluedorn, 1982a)	.84~.92
Demographic Information	7		
Total Number of Items	57		

Although this study used scales originally developed in the U.S., it is possible to establish the equivalence of the scales cross-nationally after careful development, pilot testing, and back-translation (Liu, Brog, & Spector, 2004).

Organizational Learning Culture

According to the literature review, there are a variety of instruments to measure a learning organization. Ortenblad (2002) defined the following four aspects of a learning organization that is appropriate to an R&D environment:

- Organizational learning: learning needs are at different levels Learning at work: employees learn at work

- Learning climate: the learning organization as an entity that facilitates employee learning
- Learning structure: the structure of a learning organization needs to be flexible

According to Yang, Watkins, and Marsick (2004), Watkins and Marsick's (1993) model, which was described in chapter 2, is the only theoretical framework in the literature that includes Ortenblad's (2002) four aspects of a learning organization. Later, Watkins and Marsick (1997) developed the dimensions of the learning organization questionnaire (DLOQ).

The purpose of the DLOQ was to measure the "correlation of seven learning organization dimensions and knowledge and financial performance" (Marsick & Watkins, 2003, p. 136). The seven dimensions are identified as continuous learning, inquiry and dialogue, team learning, empowerment, embedded system, system connection, and strategic leadership (Marsick & Watkins, 2003). The DLOQ includes five sections of questions: individual level, team or group level, organization level, measuring performance at the organizational level, and demographic information. In recent years, several empirical studies have been performed to establish the reliability and content and predictive validity of the DLOQ (Davis & Daley, 2008; Ellinger, Ellinger, Yang, & Howton, 2002; Marsick & Watkins, 2003; Yang et al., 2004). These studies indicated that

the DLOQ is a reliable instrument for each of the seven dimensions of a learning organization with alphas exceeding .70.

This study adapted the short version of the DLOQ to measure learning culture (Yang, 2003). The original DLOQ consists of seven dimensions with a total of 43 items. Each dimension has six items except for the dimension of continuous learning, which has seven items. Yang (2003) conducted a broad series of exploratory and confirmatory factor analyses and found that the DLOQ can be reduced to 21 items with three questions for each of the seven dimensions. The abbreviated form of the DLOQ is better for research to examine theoretical relationships between learning organizations and other variables and has superior psychometric properties (Yang, 2003). This instrument has also been validated by several empirical studies (e.g., Egan et al., 2004; Wang, Yang, & McLean, 2007; Zhang, Zhang, & Yang, 2004), and its internal consistency reliability based on these research studies shows, respectively, an overall Cronbach's alpha coefficient of .89, .94, and .79.

Moreover, the Chinese version of the DLOQ (Lien, 2002) has been translated by Chinese and Taiwanese scholars and has been empirically validated, particularly in the high-tech industry (Lien, Hung, Yang, & Li, 2006). The authors also indicated that the internal consistency of the Chinese DLOQ for the seven dimensions are acceptably reliable, falling between 0.72 to 0.89. Therefore, this study used the Chinese version of

the DLOQ provided by Lien et al. (2006) but used a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Job Satisfaction

Job satisfaction was measured using a composite of nine subscales from the Job Satisfaction Survey (JSS) developed by Spector (1985). These subscales assess satisfaction with pay, promotion, supervision, fringe benefits, contingent rewards, operating procedures, coworkers, nature of work, and communication. Each subscale has four questions for a total of 36 items using a 6-point Likert-type response scale ranging from "Disagree very much" to "Agree very much" to indicate participants' level of satisfaction. Spector (1997) showed that the internal consistency of the JSS was an overall Cronbach's alpha coefficient of .91, and the sub-scales ranged from .60 to .82, with two subscales below .70: operating procedures, .62, and coworkers, .60.

Concurrent validity of the JSS has been established by comparing it with the Job Descriptive Index (JDI) (Smith et al., 1969)**,** which is the most thoroughly validated scale for job satisfaction. The correlations between the two scales ranged from .61 for coworkers to.80 for supervision (Spector, 1997).

The JSS was chosen because of its apparent advantages. First, it provides a reliable and valid instrument for determining job satisfaction (Rowden & Ahmad, 2000). Second, the JSS offers a global measure of job satisfaction that is applicable to a wide

diversity of occupations (Blood, Ridenour, Thomas, Qualls, & Hammer, 2002). Third, numerous studies have used the JSS in different countries with different populations and have provided evidence of its acceptable construct validity and reliability (e.g., Blood et al., 2002; Bruck, Allen, & Spector, 2002; Rowden & Ahmad, 2000; Schmidt, 2007). Fourth, only the JSS includes the facet of communication among a variety of job satisfaction instruments. According to Thamhain's (2003) study, effective communication that satisfies R&D professionals' needs has a strong impact on organizational performance. In this study, one item from each of the nine subscales of JSS (Spector, 1997) was chosen. The items were chosen to fit best the characteristics of R&D professionals based on the literature review, a similar approach to that used in a previous study (Deconinck & Bachmann, 2007). The items selected are shown in Table 7. As no Chinese version of this instrument exists, it was translated into Chinese.

Table 7

Facet and Items from the Job Satisfaction Survey

Facet	Item
Pay	1. I feel satisfied with my chances for salary increases
Promotion	2. Those who do well on the job stand a fair chance of being promoted.
Supervision	3. My superior is quite? competent in doing his/her job
Fringe benefits	4. The benefits we receive are as good as most other organizations offer.
Contingent rewards	5. When I do a good job, I receive the recognition for it that I should receive.

Operating conditions	6. Many of our rules and procedures make doing a good job simple.
Coworkers	7. I enjoy my coworkers.
Nature of Work	8. I like doing the things I do at work.
Communication	9. Communications seem good within this organization.

Organizational Commitment

Meyer and Allen (1991) proposed that the three components of organizational commitment are affective, continuance, and normative commitment. Much of the evidence shows that affective commitment has the strongest and most consistent and effective relationship with desired outcomes (Iverson & Buttigieg, 1999; Mannheim, Baruch, & Tai, 1997; Meyer & Allen, 1997; Wasti, 2003). In fact, employees with strong affective commitment to their organization will perform better at their jobs than those with low affective commitment (Meyer & Allen, 1997).

Meyer and Allen (1997) and McElroy (2001) claimed that HR practices, including information sharing, positively influence continuance commitment. Similarly, Meyer et al. (2002) found that "continuance commitment correlated negatively with perceived transferability of skills and education" (p. 42).

Morrow (1993) argued that normative commitment has either not been stable or has not been consistently measured. The approach of using affective and continuance commitment has been applied in recent Korean and IT professionals studies (e.g., Paik, Parboteeah, & Shim, 2007; Pare & Tremblay, 2007), with cultures and participants

similar to the present study. As a result, this study has adopted affective and continuance commitment as the components of organizational commitment.

The instrument of organizational commitment used the affective commitment and continuance commitment subscales developed by Allen and Meyer (1990), which are part of the affective, continuance, and normative commitment scale (ACNCS). The distinguishable relations between the two commitments have been supported by confirmatory factor analyses (e.g., Allen & Meyer, 1990; Hackett, Bycio, & Hausdorf, 1994). There are 8 items for each type of commitment, using a 7-point Likert-type scale with anchors from 1 = strongly disagree to 7 = strongly agree. The validity and reliability of ACNCS has been tested and modified by a variety of empirical studies and meta-analyses. Meyer et al. (2002) found Cronbach's alpha coefficients for the two scales of .82 and .76, respectively. Bhatnagar (2007) and Cho and Kwon (2005) observed that the generalizabilility of the ACNCS was similar both inside and outside of North America. This means that this instrument is applicable in other cultures and countries. In this present study, the scales of affective and continuance commitment were used, with each scale consisting of eight items for a total of 16 items with a five-point Likert-type scale.

Dillman (2007) recommended that the scalar answer categories have a consistent direction in an entire instrument. In this present study, most of the items' direction is from negative to positive; however, several reverse statements are found in the ACNCS and

needed to be modified so they were all positively worded. A summary of modified statements for affective and continuance commitment is presented in Table 8. A modified Chinese version of ACNCS by Wang (2005) was employed in this study.

Table 8

Summary of Modified Statements for Affective and Continuance Commitment

Original Statement from ACNCS	Modified Statement
1. I think that I could easily become as attached to another organization as I am to this one. (AC)	1. I think that I could not easily become as attached to another organization as I am to this one.
2. I do not feel like ‘part of the family’ at my organization. (AC)	2. I feel like 'part of the family' at my organization.
3. I do not feel ‘emotionally attached to this organization. (AC)	3. I feel 'emotionally attached' to this organization.
4. I do not feel a strong sense of belonging to my organization. (AC)	4. I feel a strong sense of belonging to my organization.
5. I am not afraid of what might happen if I quit my job without having another one lined up. (CC)	5. I am afraid of what might happen if I quit my job without having another one lined up.
6. It wouldn’t be too costly for me to leave my organization now. (CC)	6. It would be too costly for me to leave my organization now.

Turnover Intention

In this study, turnover intention focuses on voluntary turnover as described in Chapter 2. Thus, the measurement of turnover intention can be divided into two phases: assessing the participants’ intent, desire, and plan to leave the organization; and measuring the participants’ intent to search for another job and plan to quit (Falkenburg

& Schyns, 2007). High scores indicate that participants have stronger intentions to leave the organization.

Turnover intention was measured with four items from the Staying or Leaving Index (SLI) (Bluedorn, 1982a), which is one of the few measures of turnover intention that has been validated (Sager et al., 1998). In a meta-analysis of turnover studies conducted by Griffeth et al. (2000), the authors found that the SLI is common in organizational research and has consistently maintained reliability and construct validity. Moreover, a variation of this instrument has been used in numerous studies to measure different employees' intention to leave, including in Taiwan, and has had good reliability as indicated by coefficient alpha levels above .80 (e.g., Chen, Lam, Naumann, & Schaubroeck, 2005; Chiu, Lin, Tsai, & Hsiao, 2005; Johnston et al., 1990). The four items of turnover intention include:

1. If I can find a better job, I will leave this company.
2. I often think about quitting my current job.
3. I will look for a new job outside of this company within the next six months.
4. I will look for a new job outside of this company within the next year.

These items were translated into Chinese and then back-translated to insure accuracy of the translation, as described below.

Instrument Translation

A Chinese version of the instrument was developed using the back-translation method proposed by Brislin (1986). In this present study, the Chinese version of the DLOQ, developed by Lien (2002), and the Chinese version of ACNCS by Wang (2005) with a modified font system to the traditional Chinese version, were used. The other two scales were translated into Chinese, back-translated, and then reviewed to ensure content validity.

The first step is to translate the English into Chinese. I did the translation. At the second step, two HRD professionals in Taiwan who are fluent in Chinese and English and are familiar with the R&D environment compared the Chinese and English versions word by word to make sure there were no errors in the meaning of the Chinese version. As the third step, the new Chinese version was translated into English by another Chinese HRD professional in the U.S. Then, the researcher checked the conceptual equivalence of the new English version with the original English version. Finally, two Chinese HR professionals and I refined the new Chinese version based on this review to create the final pilot version of the instrument.

*Pilot Tes*t

A pilot test is “the activity related to the development of the questionnaire or measurement instrument to be used in a survey or experiment” (Green, Tull, & Albaum,

1988, p. 185). According to Reynolds, Diammantopoulos, and Schlegelmilch (1993), a pilot test is used to enhance the questionnaire design and identify improvement areas needed in the questionnaire that could be issues concerned with the target population, such as a specific word meaning. In this present study, the pilot test used the strategy of convenience sampling. The participants in the pilot test were R&D professionals who worked for the industries that fit the criteria of this study, but their company was not located in the Hsinchu Science Park (HSP). These participants were selected from the participants of a training course in the public training center near HSP.

Green et al. (1988) indicated that the sample size should be small, but it should cover all subgroups of the target population. Thus, the pilot test used a sample size of 80 R&D professionals from the major industries in the population, and these professionals were not included in the sample of the population. The second step was to e-mail a pre-notice letter to the chosen sample. After receiving 50 acceptances, a cover letter and the on-line instrument were e-mailed to them, resulting in 24 respondents.

The results of the pilot test indicated that the coefficient alpha of each scale was higher than 0.7. However, the coefficient alphas of the seven learning organization dimensions were lower than 0.7, and several missing data existed on the items of organizational learning culture, organization commitment, and demographic information.

The respondents suggested that the wording in the organizational learning culture scale be modified.

To ensure higher reliability, several modifications were made based on the weaknesses identified in the first pilot test. First, two more items were selected for each dimension of organizational learning culture from the full DLOQ based on those most relevant to the context, resulting in a total of fourteen items being added. The items are presented in Table 9. As for structure, all items were randomized except for the demographic information; the demographic questions were moved to the beginning of the survey. Moreover, in order to identify the characteristics of the organization, two demographic items were changed--organization size and organization age. Finally, the second pilot test was delivered to a different sample on-line. The results based on 24 respondents showed that there was a reasonable reliability in each scale. Appendices D and E provide the full survey, including 71items, in English and Chinese, respectively.

Table 9

Summary of Additional 14 Items from the DLOQ

Dimension	Item
Continuous Learning	1. In my organization, people openly discuss mistakes in order to learn from them. 2. In my organization, people identify skills they need for future work tasks.

Inquiry and Dialogue	3. In my organization, people are encouraged to ask "why" regardless of rank. 4. In my organization, people treat each other with respect.
Team Learning	5. In my organization, teams/groups focus both on the group's task and on how well the group is working. 6. In my organization, teams/groups are rewarded for their achievements as a team/group.
Empowerment	7. My organization uses two-way communication on a regular basis, such as suggestion systems, electronic bulletin boards, or town hall/open meetings. 8. My organization enables people to get needed information at any time quickly and easily.
Embedded System	9. My organization gives people choices in their work assignments. 10. My organization builds alignment of visions across different levels and work groups.
System Connection	11. My organization helps employees balance work and family. 12. My organization encourages everyone to bring the customers' views into the decision making process.
Strategic Leadership	13. In my organization, leaders generally support requests for learning opportunities and training. 14. In my organization, leaders share up-to-date information with employees about competitors, industry trends, and organizational directions.

Reliability and Validity of Instrument

Each scale was evaluated for its validity and reliability in order to confirm the construction of an effective instrument (Bourque & Fielder, 20003). Confirmatory factor analysis measured the construct validity of the survey, especially to determine if it was

appropriate to change the scales from 6 or 7 points to a 5-point Likert-type instrument. Coefficient alphas were used to determine the reliability of the subscales and the overall instrument. McMillan and Schumacher (1997) maintained that a coefficient alpha of .90 implies a highly reliable instrument; however, coefficients ranging from .70 to .90 are acceptable for most instruments (Nunnally, 1978).

Construct Reliabilities in the Current Study

The final internal consistencies (i.e., coefficient α) of the four constructs are provided in Table 10. From the results, the four constructs have satisfactory reliability estimates.

Table 10

Coefficient α for Four Constructs (n = 418)

Construct	Coefficient α
Organizational Learning Culture	0.95
Job Satisfaction	0.82
Organizational Commitment	0.81
Turnover Intention	0.85

The reliability of the sub-scales of organizational learning culture and organizational commitment are reported in Table 11.

Table 11

Sub-scale Coefficient α for Four Construct (n = 418)

Construct	No. of Items	Coefficient α
1. Organizational Learning Culture	35	0.95
-Continuous Learning	5	0.73
-Inquiry and Dialogue	5	0.79
-Team Learning	5	0.76
-Empowerment	5	0.72
-Embedded System	5	0.67
-System Connection	5	0.65
-Strategic Leadership	5	0.81
2. Job Satisfaction	9	0.82
3. Organizational Commitment	16	0.81
-Affective Commitment	8	0.74
-Continuance Commitment	8	0.72
4. Turnover Intention	4	0.85

The results indicate that most of the sub-scales in the organizational learning

culture and organizational commitment demonstrate acceptable reliability except for the embedded system (α = 0.67) and system connection (α = 0.65), both of which are below 0.70. However, a reliability of 0.60 is sufficient for research (Fornell & Larcker, 1981; Hair, Anderson, Tatham, & Black, 1998; Robinson & Shaver, 1973).

Construct Validity in the Current Study

The measurement models were assessed by confirmatory factor analysis (CFA) (Anderson & Gerbing, 1988a), using the program LISREL 8.72 (Joreskog & Sorbom, 2005). To determine the appropriate sample size in factor analysis, numerous recommendations have been proposed. Cattell (1978) suggested that the ratio of sample size to the number of items should be in the range of 3 to 6, and Everitt (1975) and Schwab (1980) recommended that the ratio should be at least 10. With 418 completed respondents and 64 items, it seems acceptable to have a ratio of 6.5 in the present study. The main focus of the measurement model is to evaluate the reliability and validity of each construct. First, the first-order measurement models of all constructs were examined separately including organizational learning culture, job satisfaction, organizational commitment, and turnover intention. Then, the second-order measurement models of the two constructs, organizational learning culture and organizational commitment, were assessed. Finally, the overall measurement model was assessed to test the overall fit of the hypothesized model.

Several common indices were applied to evaluate model fit in the present study. Chi-square (χ^2) was used to test relative fit of the hypothesized model using chi-square/df, adjusting for the degrees of freedom. The other indices included the two most important indices: the root mean square error of approximation (RMSEA) and the comparative fit index (CFI), as recommended by Coovert and Craiger (2000). In addition, the goodness of fit index (GFI), which is commonly considered in CFAs; the normed fit index (NFI); the nonnormed fit index (NNFI); and the root mean square residual (RMR) were used to assess the quality of the variance-covariance matrices. The cutoff values of indices are described in Table 12.

Table 12

Overall Fit Indices of SEM Model

Index	Cutoff Values	Authors
χ^2/df,	<5 and >1	Bollen (1989)
RMSEA, root mean square error of approximation	<0.05 good well 0.05~0.08 reasonable 0.08~0.10 tolerable	Browen and Cudeck (1993)
CFI, comparative fit index	>0.90	Bentler and Bonnett (1980)
GFI, Goodness of fit index	>0.90	Bentler and Bonnett (1980)
NFI, Normed fit index	>0.90	Hoyle (1995)
NNFI, Nonnormed fit index	>0.90	Bentler and Bonnett (1980)

RMR, root mean square residual	<0.1	Salisbury, Chin, Gopal, and Newsted (2002)

First-order correlated measurement model of all constructs. The first-order confirmatory factor model was evaluated with the aim of assessing the existence of the hypothesized dimensions of organizational learning culture. These dimensions are continuous learning, inquiry and dialogue, team learning, empowerment, embedded system, system connection, and strategic leadership (Marsick & Watkins, 2003). Organizational commitment was tested by the two subscales of affective commitment and continuance commitment. Job satisfaction was measured with nine items and turnover intention with four items. The results are shown in Table 13.

Table 13

First-order Confirmatory Factor Model of All Constructs

Construct	χ^2	Df	X^2/df	RMSEA	CFI	GFI	NFI	NNFI	RMR
Organizational Learning Culture	3060.60	538	5.69	0.11	0.94	0.70	0.93	0.94	0.067
Job Satisfaction	123.44	27	4.57	0.09	0.95	0.94	0.93	0.93	0.054
Organizational Commitment	546.09	100	5.46	0.10	0.92	0.86	0.90	0.90	0.097
Turnover Intention	30.39	2	15.46	0.18	0.97	0.97	0.97	0.91	0.042

Table 13 demonstrates that the CFA model of each construct yielded high goodness of fit indices. For example, the organizational learning culture model demonstrated a relatively close fit, χ^2 (538) =3060.60, χ^2/df = 5.69, root mean square error of approximation (RMSEA) = 0.11, a comparative fit index (CFI) = 0.94, normed fit index (NFI) = 0.93, nonnormed fit index (NNFI) = 0.94, and root mean square residual (RMR) = 0.067. For job satisfaction, the measurement model obtained a close fit, χ^2 (27) =123.44, χ^2/df = 4.57, RMSEA=0.09, CFI=0.95, GFI=0.94, NFI=0.93, NNFI=0.93, and RMR=0.054. Apart from the value of the RMSEA of each construct and the value of GFI of the organizational learning culture, the remaining indices are satisfactory. However, recommended values for GFI above 0.85 are also acceptable (Hadjistavropoulos, Frombach, & Asmundson, 1999; Hair et al., 1998). These results indicate that the model fits the data as hypothesized well.

Second-order constructs for organizational learning culture and organizational commitment. A second-order model was measured to test the hypothesis that there is a single dimension integrating the seven dimensions of organizational learning culture, and the other single dimension comprising the two subscales of organizational commitment. To assess a second-order organizational learning culture construct and a second-order organizational commitment construct, I compared the first-order correlated model and the second-order model for each construct. Therefore, the values of three types of tests were

evaluated: the gamma coefficient, fit indices, and the target coefficient. The results are shown in Table 14.

Table 14

Second-order Confirmatory Factor Model of Two Constructs

Construct	χ^2	Df	X^2/df	RMSEA	CFI	GFI	NFI	NNFI	RMR
Organizational Learning Culture	3517.14	553	6.36	0.11	0.94	0.67	0.93	0.93	0.075
Organizational Commitment	554.89	75	7.40	0.12	0.90	0.84	0.88	0.88	0.100

The results show that all of the gamma coefficients between items and factors are positive and significant ($p < 0.05$) (Anerson & Gerbing, 1988b). The gamma values ranged from 0.66 to 0.96 for organizational learning culture and organizational commitment. These values demonstrate that all seven dimensions of organizational learning culture and the two subscales of organizational commitment are significantly related to the single higher-order factor. Moreover, Marsh and Hocevar (1985) suggested that "higher order factors are merely trying to explain the covariation among the first-order factors in a more parsimonious way" (p. 570). Most fit indices of the second-order constructs exceed the recommended values. However, the fit indices of the second-order model can never be better than the corresponding first-order model (Marsh & Hocevar, 1985).

The target coefficient is the ratio of the chi-square value for the first-order model to that for the second-order model. The recommended value of the target coefficient has an upper limit of 100% (Marsh & Hocevar, 1985). For organizational learning culture, the chi-square value for the first-order model was 3060.60 and for the second-order model was 3517.14, giving a target coefficient of 87%. For organizational commitment, the chi-square value for the first-order model was 546.09 and the second-order model was 554.89, giving a target coefficient of 98.4%. As a result, the values of the gamma coefficient, fit indices, and the target coefficient show evidence of second-order constructs.

Overall confirmatory factor analysis. The overall CFA was measured by 22 sub-scales of the instrument, including seven sub-scales in organizational learning culture, nine sub-scales of job satisfaction, two sub-scales of organizational commitment, and four sub-scales of turnover intention. To verify the validity of the scale, the overall fit of the hypothesized model was evaluated by three types of tests. The first test involved the composite reliability of each scale (coefficient α), as shown in Table 11. The reliability of all the scales ranged from 0.65 to 0.95. The second test involved an examination of the item reliability, which is the factor loadings of each item. This test indicates the amount of variance in a measure due to the construct rather than to error. According to Hair et al. (1998), the absolute value of factor loadings of 0.30 are considered significant, loadings

of 0.40 are considered more important, and loading of 0.50 or greater are considered very significant. The results of the factor loadings are shown in Table 15.

Table 15

Factor Loadings Matrix

	Factors			
Sub-scales	1	2	3	4
Organizational Learning Culture				
1. Continuous Learning	0.83			
2. Inquiry and Dialogue	0.81			
3. Team Learning	0.82			
4. Empowerment	0.80			
5 Embedded System	0.84			
6. System Connection	0.83			
7. Strategic Leadership	0.81			
Job Satisfaction				
1. Pay		0.59		
2. Promotion		0.69		
3. Supervision		0.58		
4. Fringe Benefits		0.52		
5. Contingent Rewards		0.72		

6. Operation Conditions	0.65		
7. Coworkers	0.50		
8. Nature of Work	0.67		
9. Communication	0.78		
Organizational Commitment			
1. Affective Commitment		1.03	
2. Continuance Commitment		0.47	
Turnover Intention			
1. Finding a better job			0.55
2. Thinking about quitting job			0.79
3. Looking for a new job within six months			0.95
4. Looking for a new job within one year			0.93

Only the value of continuance commitment was lower than 0.5. The results presented in Table 15 demonstrate that the factor loadings of all the items are highly satisfactory and have adequate validity. The last test involved the overall fit index. The overall measurement model fit is highly acceptable, χ^2 (203) =1070.28, p =0.00, χ^2/df=5.27, RMSEA=0.10, CFI=0.96, GFI=0.81, NFI=0.95, NNFI=0.95, RMR=0.084.

Data Analysis

The present study used descriptive and inferential statistics. The data analyses used several statistical analysis tools in order to answer the research questions. The means, standard deviations, and a correlation matrix of the variables are provided. Correlation analysis demonstrated the linear relationship between dependant and independent variables.

Structural equation modeling (SEM) was used to conduct the data analysis for testing the research hypotheses and hypothesized model. SEM is a feasible statistical tool for exploring the multivariate relationships among some or all of the variables (Burnette & Williams, 2005). It also provides a comprehensive approach to a research question for measuring and analyzing theoretical models (Anderson & Gerbing, 1988a). A structural equation model examines the hypothesized factor structure for all variables. The SEM examines measurement error and provides path coefficients for both the direct and indirect effects of structural hypotheses (Joreskog & Sorbom, 1996). Thus, Figure 2 (in Chapter 2) represents the structural model being examined. The model describes the relationships among theoretical constructs.

Summary

A survey was used to gain insight into the research issues to be explored in the present study. The population was R&D professionals in the high-tech industry in Taiwan,

particularly IC, PC and peripherals, telecommunication, and optoelectronics industries. In the present study, 418 of 775 R&D professionals completed the survey for a response rate of 53.9%. The majority of respondents were from the IC industry. Moreover, 85.4% of respondents were male and 61.7% hold graduate school degrees. Four existing constructs were adapted to form a Chinese instrument formed from existing instruments translated into Chinese or using back translation to measure the relationships among organizational learning culture, job satisfaction, organizational culture, and turnover intention. There were 71 items in the survey following two pilot tests.

The four constructs have satisfactory reliability estimates with scales ranging from 0.65 to 0.95. The measurement models were assessed by CFA to evaluate the validity of each construct. The overall CFA was measured by 22 sub-scales of the instrument, and the overall measurement model fit was highly acceptable, χ^2 (203) =1070.28, p =0.00, χ^2/df=5.27, CFI=0.96, GFI=0.81, NFI=0.95, NNFI=0.95, RMR=0.084. Data analyses used descriptive statistics, correlation analysis, and structural equation modeling (SEM) to test the hypotheses.

CHAPTER 4

RESULTS

This chapter presents the findings of the data analyses from 418 R&D professionals' responses. To address the research questions, statistical analysis tools were applied, including descriptive statistics, correlations, and structural equation modeling (SEM). SPSS 16 and LISREL 8.7 were employed to produce the results.

Descriptive Statistics and Correlations

The means and standard deviations for the four constructs are provided in Table 16.

Table 16

Means and Standard Deviations for Four Constructs (n = 418)

Construct	Mean	S.D.
Organizational Learning Culture	3.67	0.74
Job Satisfaction	3.55	0.74
Organizational Commitment	3.32	0.83
Turnover Intention	2.66	0.93

The descriptive statistics show a low score for turnover intention (M=2.66, SD=0.93), indicating that the R&D professionals reflected a low degree of intention to

leave the organization. This result could be an artifact of the economic situation at the time that the data were collected.

The means and standard deviations for the subscales of the four variables are shown in Table 17.

Table 17

Sub-scale Means and Standard Deviations for Four Constructs (n = 418)

Construct	No. of Items	Mean	S.D.
1. Organizational Learning Culture	35	3.67	0.74
-Continuous Learning	5	3.74	0.75
-Inquiry and Dialogue	5	3.67	0.72
-Team Learning	5	3.65	0.69
-Empowerment	5	3.58	0.75
-Embedded System	5	3.67	0.74
-System Connection	5	3.58	0.75
-Strategic Leadership	5	3.75	0.75
2. Job Satisfaction	9	3.55	0.74
3. Organizational Commitment	16	3.32	0.83
-Affective Commitment	8	3.43	0.78

-Continuance Commitment	8	3.22	0.89
4. Turnover Intention	4	2.66	0.93

The demographic information was coded as follows: gender (1 = male, 2 = female); age (1 = less than 30, 2 = 30-39, 3 = 40-49, 4 = 50 or older); education (1 = high school, 2 = college, 3 = university, 4 = graduate school); supervisor position (1 = yes, 2 = no); job tenure (1 = fewer than 2 year, 2 = 2-5 years, 3 = 6-10 years, 4 = 11-15 years, 5 = more than 15 years); organization size (1 = 0-300, 2 = 300-1000, 3 = 1001-3000, 4 = 3001-10000, 5 = more than 10000); and organization age (1 = fewer than 5 years, 2 = 5-10 years, 3 = 11-15 years, 4 = 16-20 years, 5 = more than 20 years). Results of the correlation analyses involving demographic information, organizational learning culture, job satisfaction, organizational commitment, and turnover intention are provided in Table 18.

Table 18

Correlations of Study Variables

Construct	1	2	3	4	5	6	7	8
1. Gender	1							
2. Age	-.12(*)	1						
3. Education	-.28(**)	-.15(**)	1					
4. Supervisor Position	.11(*)	-.45(**)	-.07	1				
5. Job Tenure	.04	.57(**)	-.18(**)	-.40(**)	1			
6. Organization Size	.01	.09	.01	-.02	.11(*)	1		
7. Organization Age	.06	.20(**)	-.02	-.07	.34(**)	.67(**)		
8. Continuous Learning	.05	-.06	-.05	-.06	-.05	.06	.12(*)	1
9. Inquiry and Dialogue	.07	-.18(**)	-.01	.06	-.14(**)	.12(*)	.13(**)	.72(**)
10. Team Learning	.05	-.12(*)	.01	-.03	-.05	.10(*)	.12(*)	.66(**)
11. Empowerment	.09	.03	-.07	-.11(*)	.03	.21(**)	.22(**)	.68(**)
12. Embedded System	.07	-.05	-.00	-.04	-.03	.16(**)	.13(**)	.66(**)
13. System Connection	.07	-.00	-.03	-.07	-.01	.17(**)	.16(**)	.69(**)
14. Strategic Leadership	.00	-.03	-.03	-.08	-.06	.15(**)	.14(**)	.64(**)
15. Job Satisfaction	.04	-.04	.01	-.06	-.02	.14(**)	.15(**)	.71(**)
16. Affective Commitment	.07	.02	-.03	-.09	.05	.046	.14(**)	.65(**)
17. Continuance Commitment	.12(*)	-.01	-.02	-.02	.02	.02	.07	.29(**)
18. Turnover Intention	.04	.05	-.10(*)	.03	.06	-.04	-.07	-.37(**)

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 18 (continued)

Correlations of Study Variables

Construct	8	9	10	11	12	13	14	15	16	17
8. Continuous Learning	1									
9. Inquiry and Dialogue	.72(**)	1								
10. Team Learning	.66(**)	.69(**)	1							
11. Empowerment	.68(**)	.61(**)	.62(**)	1						
12. Embedded System	.66(**)	.67(**)	.72(**)	.66(**)	1					
13. System Connection	.69(**)	.63(**)	.65(**)	.73(**)	.70(**)	1				
14. Strategic Leadership	.64(**)	.64(**)	.68(**)	.67(**)	.70(**)	.68(**)	1			
15. Job Satisfaction	.71(**)	.70(**)	.72(**)	.67(**)	.69(**)	.68(**)	.69(**)	1		
16. Affective Commitment	.65(**)	.60(**)	.60(**)	.61(**)	.63(**)	.63(**)	.62(**)	.70(**)	1	
17. Continuance Commitment	.29(**)	.18(**)	.28(**)	.30(**)	.34(**)	.33(**)	.24(**)	.36(**)	.49(**)	1
18. Turnover Intention	-.37(**)	-.36(**)	-.34(**)	-.32(**)	-.39(**)	-.37(**)	-.47(**)	-.47(**)	-.42(**)	-.12(*)

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

In respect to demographic information, the correlation analysis in Table 18 showed few statistically significant relationships with the construct variables and none that suggested any practical significance.. As expected, there was a significant and positive correlation among the seven dimensions of organizational learning culture and job-related behaviors, including job satisfaction and organizational commitment. All of the correlations were significant in a range of 0.60 to 0.71, with the exception of continuance commitment. Although the relationships among the seven dimensions of organizational learning culture and continuance commitment were positive, the correlation range of 0.18 to 0.36 reflects a weak relationship. Table 18 also indicates that organizational learning culture is more strongly related to job satisfaction than to continuance commitment. The correlations between the seven dimensions of organizational learning culture and turnover intention are all negative. Strategic leadership correlates inversely and most strongly (r = -0.47) with turnover intention, followed by embedded system (r = -0.39).

In addition, the correlations between job satisfaction and affective commitment are stronger (r = 0.70) than those for continuance commitment (r = 0.36). Job satisfaction also has a strongly negative relationship with turnover intention (r = -.47). In the same vein, affective commitment and continuance commitment are negatively related to turnover intention (r = -0.42 and r = -0.12).

Due to a number of significant correlations among the study variables, two statistical tests were performed to determine the significance of multicollinearity in this study. Tolerance is a statistic used to determine how closely the independent variables are linearly related to one another. The higher the correlation of one variable with other independent variables, the closer the tolerance index is to 0. In the present study, the tolerance indexes ranged from .43 to .79, which suggests that multicollinearity is unlikely (Bryman & Cramer, 2001; Neter, Kutner, Nachtscheim, & Wasserman, 1996). Another method for detecting the presence of multicollinearity is the variance factors (VIF) test. VIF measures the inflation of variances of the estimated regression coefficients when the independent variables are linearly related (Neter et al., 1996). A maximum VIF value in excess of 10 is often taken as an indication of multicollinearity. In this study, the VIF values ranged from 1.26 to 2.31, which are highly satisfactory. None of these correlations is high enough to cause concern about multicollinearity in the structured equation model.

Structural Models

The structural model is composed of the unobservable constructs and the theoretical relationships among them (Kaplan, 200). Such a model assesses the explanatory power of the model and the significance of paths in the structural model that specifies hypotheses to be tested (Igbaria, Guimaraes, & Davis, 1995). In addition to the overall fit indices, the R^2 values for each endogenous variable and each structural

equation were calculated to assess the explanatory power of the structural equations. The R^2 value is a measure of the proportion of variation of the endogenous variable about its mean that is explained by the exogenous variables (Bates, 2005). In addition, the statistical test for parameter estimates is evaluated by the critical ratio. This test represents the parameter estimate divided by its standard error. Critical ratio (t) values that are larger than |1.96| show the path coefficient to be statistically significant at $p < 0.05$.

Testing the Structural Models

To examine the model fit, several fit indices were used, including chi-square (χ^2), chi-square/df (χ^2/df), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), goodness of fit index (GFI), normed fit index (NFI), nonnormed fit index (NNFI), and root mean square residual (RMR). Table 19 shows the test results of the hypothesized model (Model 1) that is presented in Figure 3.

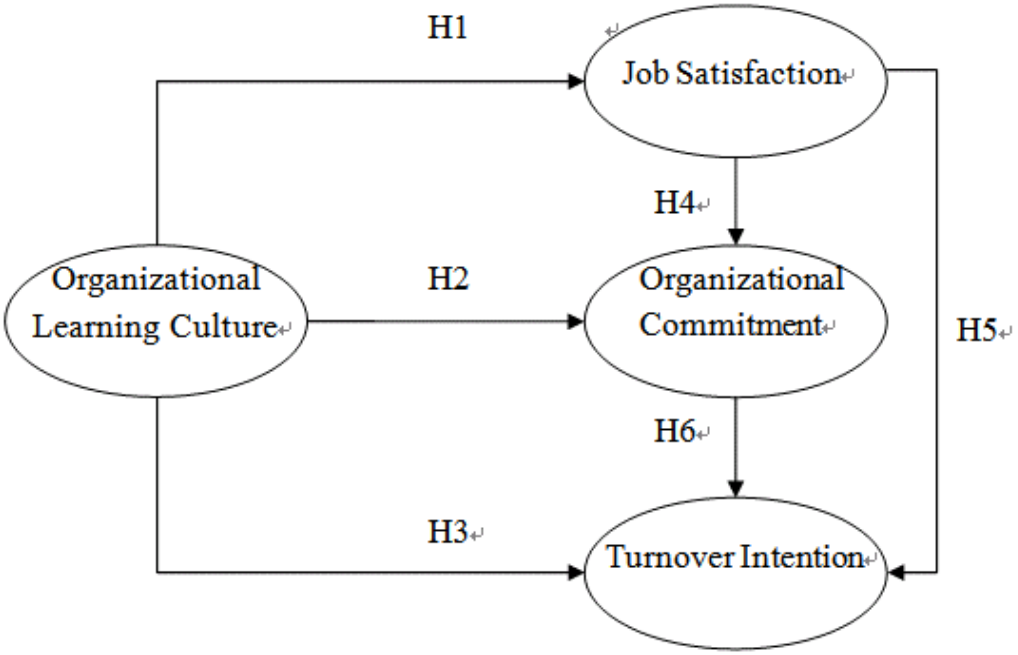


Figure 3. Hypothesized Model

Table 19

Comparison of Fit Indices for Structural Models

Structural Model	χ^2	Df	X^2/df	RMSEA	CFI	GFI	NFI	NNFI	RMR
Model 1: Hypothesized Model	1070.28	203	5.27	0.10	0.96	0.81	0.95	0.95	0.084
Model 2: H4, H5, H6 removed	1090.42	206	5.29	0.10	0.96	0.81	0.95	0.95	0.087
Model 3: H1, H3 removed	1362.18	205	6.64	0.12	0.93	0.77	0.92	0.93	0.280
Model 4: H3, H5 removed	1080.75	205	5.28	0.10	0.96	0.81	0.95	0.95	0.098

These results indicate a reasonably good fit to the data, and a closer examination of the path estimates reveal that the organizational learning culture has a significant and

positive relationship with job satisfaction ($\gamma = 0.94$, $t = 12.40$, $p < 0.05$) and organizational commitment ($\gamma = 0.36$, $t = 2.45$, $p < 0.05$). However, the organizational learning culture factors are not significantly related to turnover intention ($\gamma = 0.13$, $t = 0.59$, $p < 0.05$). The results suggest that the fulfillment of the organizational learning culture might be mediated through job satisfaction or organizational commitment. Further inspection of Model 1 indicates that the path estimate has no strong relationship between organizational commitment and turnover intention ($\beta = -0.07$, $t = -1.01$, $p < 0.05$); in contrast, the relationship between job satisfaction and turnover intention ($\beta = -0.51$, $t = -2.22$, $p < 0.05$) is significant. This result also suggests that job satisfaction could be mediating this relationship.

To test for possible meditating effects of organizational learning culture on the relationship between job satisfaction and organizational commitment, the present study followed the method discussed by Baron and Kenny (1986) and Judd and Kenny (1981). The authors recommended that the strategies of testing for meditation use a series of alternative models, shown in Table 20, that test the relationship among the mediator, exogenous variable, and endogenous variable.

Table 20

Structural Parameter Estimates for Structural Models

Parameter/Relationship	Model 1	Model 2	Model 3	Model 4
Exogenous → Endogenous				
H1: OLC →JS	0.94 (12.40)	0.94 (12.40)		0.94 (12.48)
H2: OLC → OC	0.36 (2.45)	0.75 (18.45)	0.55 (13.27)	0.34 (2.16)
H3: OLC → TI	0.13 (0.59)	-0.42 (-7.11)		
Endogenous → Endogenous				
H4: JS → OC	0.41 (2.74)		0.38 (8.35)	0.49 (2.99)
H5: JS → TI	-0.51 (-2.22)		-0.39 (-5.87)	
H6: OC → TI	-0.07 (-1.01)		-0.08 (-1.54)	-0.39 (-6.54)

OLC: organizational learning culture, JS: job satisfaction, OC: organizational commitment, TI: turnover intention. t-value is in parentheses.

Model 2 was used to test the paths between exogenous variables and endogenous variables presented in Figure 4. For this model, the relationship between job satisfaction and organizational commitment (H4) was removed along with the relationships between job satisfaction and organizational commitment with turnover intention (H5 and H6). The

results of path estimates indicate that organizational learning culture is highly significant for job satisfaction ($\gamma = 0.94$, $t = 12.40$, $p < 0.05$), organizational commitment ($\gamma = 0.75$, $t = 18.45$, $p < 0.05$), and turnover intention ($\gamma = -0.42$, $t = -7.11$, $p < 0.05$). These three path coefficients were also supported by the theoretical relationships in Model 2; however, the weakness of this model is that it did not cover the three paths among job satisfaction, organizational commitment, turnover intention.

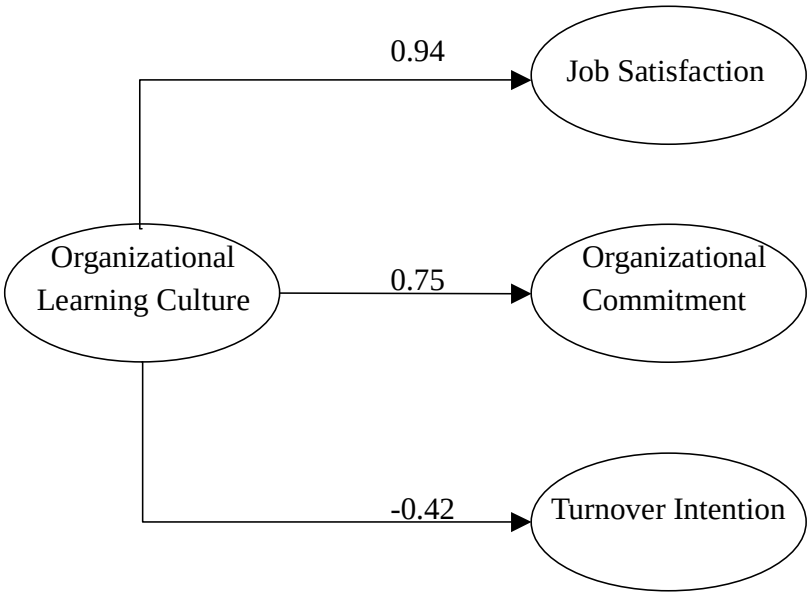
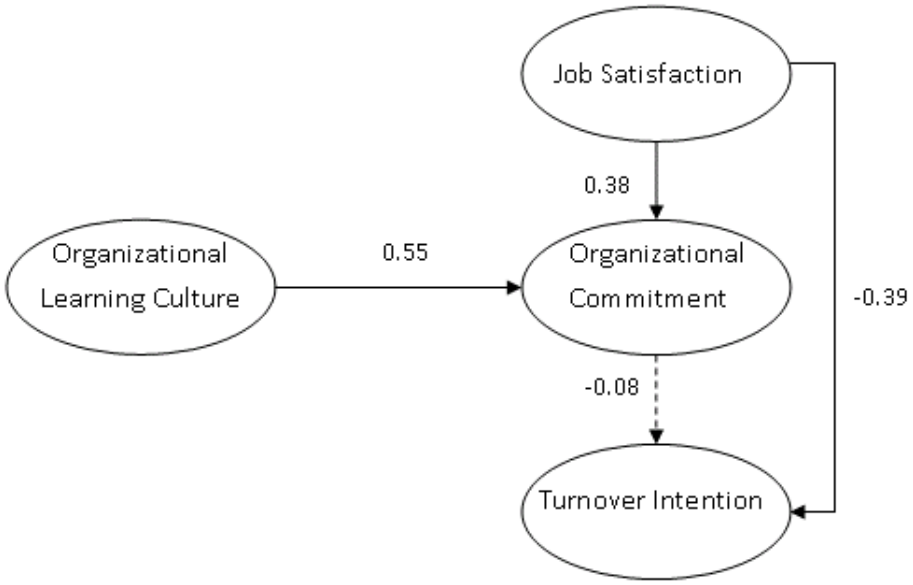


Figure 4. Model 2

Model 3 was used to test the relationship between job satisfaction and turnover intention. The absence of any estimated paths between these variables and organizational learning culture (H1 and H3 removed) is shown in Figure 5. Results from this model indicate that job satisfaction is negatively and significantly related to turnover intention

(β = -0.39, t = -5.87, $p < 0.05$) and positively and significantly related to organizational commitment (β = 0.38, t = 8.35, $p < 0.05$). Indeed, organizational commitment does not show a significant relationship with turnover intention (β = -0.08, t = -1.54, $p < 0.05$), which could not be justified by the theory. This result indicates that organizational commitment could be a mediator between job satisfaction and turnover intention.



Note: —▶ significant path; --▶ non-significant path; $p < 0.05$ ($t > 1.96$)

Figure 5. Model 3.

So far, significant zero-order relationships have been shown in Model 2, and a relationship between organizational learning culture and turnover intention leads to

rejection of Model 3. All of these results present a fully supported result of the hypothesized model (Model 1), showing that a path estimate between organizational learning culture and turnover intention was non-significant. This result reveals that job satisfaction fully mediates the relationship between fulfillment of organizational learning culture and turnover intention.

To assess whether organizational commitment mediated the relationship between job satisfaction and turnover intention, Model 4 was tested as shown in Figure 6. Model 4 (H3 and H5 removed) shows that organizational learning culture has a highly significant relationship with job satisfaction and organizational commitment, and job satisfaction is significantly related to organizational commitment ($\beta = 0.49$, $t = 2.99$, $p < 0.05$), as well as organizational commitment to turnover intention ($\beta = -0.39$, $t = -6.54$, $p < 0.05$). As a result, organizational commitment fully mediates the relationship between job satisfaction and turnover intention.

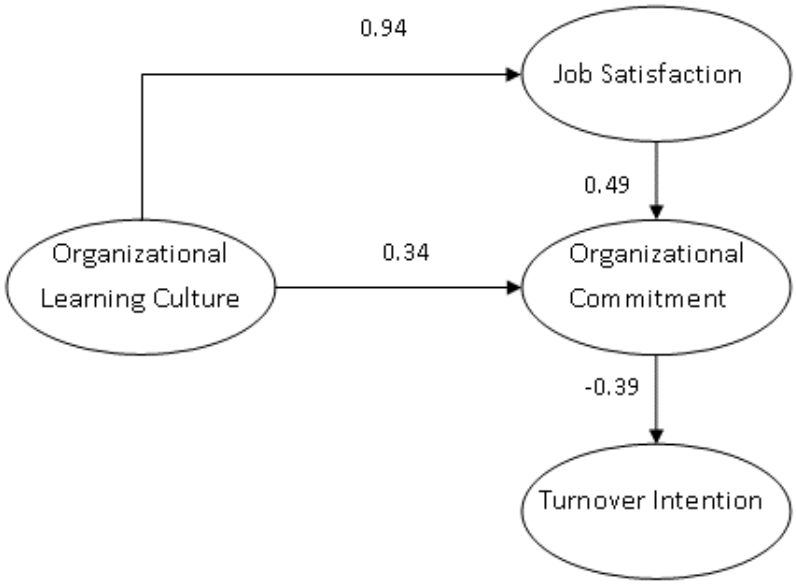


Figure 6. Model 4.

The results of fit indices comparing all the structural models are shown in Table 19. Clearly, compared to all the alternative models (Model 2-4), the hypothesized model did not provide a better fit to the data. More specifically, in terms of the ratio of X^2/df, the hypothesized model was the lowest among the structural models. Additionally, all of the alternative models examined the relationships among organizational learning culture, job satisfaction, organizational commitment, and turnover intention. Having established the mediation of organizational learning culture by job satisfaction, and the mediation of job satisfaction by organizational commitment, the hypothesized model was the best in taking these findings into account. To sum up, the hypothesized model was accepted as the final

and best model based on the significance in estimated path coefficients. This model indicated the strength and the sign of the theoretical relationships.

Results of Hypothesized Model

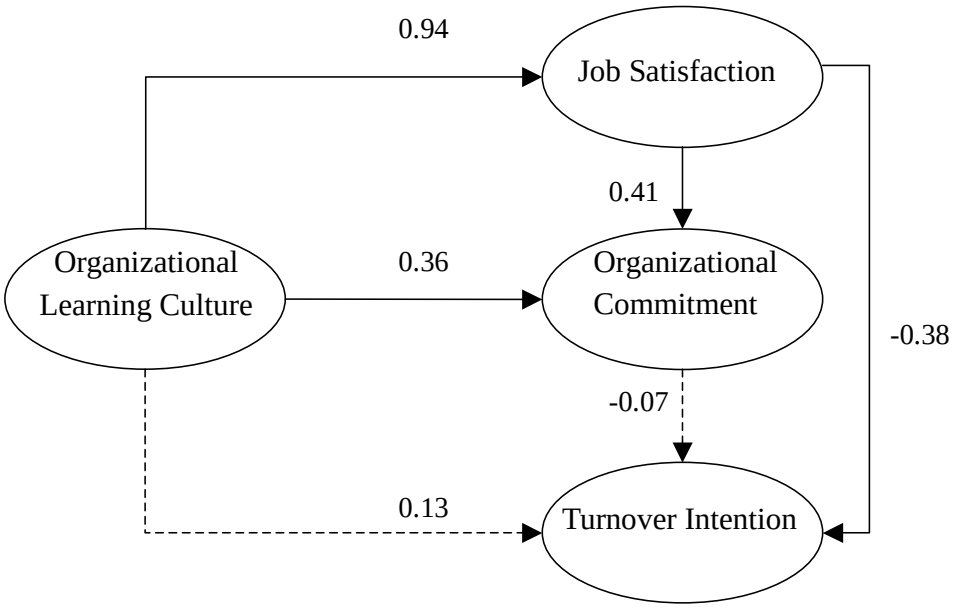
To address the research questions and test the hypotheses, the percentages of explained variance (R^2) for each endogenous variable and the path coefficients of the hypothesized model were assessed. The data show that substantial portions of the variance are explained for job satisfaction (88%), organizational commitment (55%), and turnover intention (16%). In spite of these results, there is considerable support for the hypothesized model as the specific linkages in the model received differential degrees of support. A summary of the results of the hypotheses is presented in Table 21 and Figure 7.

Table 21

Summary of Hypotheses and Findings

Hypothesis	Direct Effect	Indirect Effect	Total Effect	Results
H1: OLC → JS	0.94 (12.40)		0.94(12.40)	Supported
H2: OLC → OC	0.36 (2.45)	0.38(2.77)	0.74(17.96)	Supported
H3: OLC → TI	0.13(0.59)	-0.53(-2.53)	-0.40(6.85)	Supported
H4: JS → OC	0.41 (2.74)		0.41(2.74)	Supported
H5: JS → TI	-0.51 (-2.22)	-0.03(-1.00)	-0.53(2.38)	Supported
H6: OC → TI	-0.07 (-1.01)		-0.07(-1.01)	Not Supported

t-value is in parentheses.



Note: → significant path; ⇢ non-significant path; $p < 0.05$ ($t > 1.96$)

Figure 7. Final model.

Hypothesis 1 predicted that organizational learning culture would have a positive direct effect on job satisfaction ($\gamma = 0.94$, $t = 12.40$, $p < 0.05$). This result is consistent with prior studies on the relationship between organizational learning culture and job satisfaction (Chang & Lee, 2007; Egan et al., 2004).

Hypothesis 2 predicted that organizational learning culture would have a positive direct effect on organizational commitment ($\gamma = 0.36$, $t = 2.45$, $p < 0.05$). The results are consistent with earlier empirical research (Lim, 2003; Wang, 2005; Xie, 2005) and show a direct positive effect of organizational learning culture on organizational commitment and an indirect effect of organizational learning culture through job satisfaction on

organizational commitment. Hypothesis 3 predicted that organizational learning culture would have a direct effect on turnover intention ($\gamma = 0.13$, $t = 0.59$, $p < 0.05$). However, this study did not show a significant relationship between organizational learning culture and turnover intention. However, organizational learning culture may have an indirect effect on turnover intention. If so, Hypothesis 3 is accepted based on the results of indirect effects. Hypothesis 4 predicted that job satisfaction would have a positive direct effect on organizational commitment ($\beta = 0.41$, $t = 2.74$, $p < 0.05$), and it had the same results as previous studied (Bartlett, 2001; Griffeth et al., 2000; Lok& Crawford, 2001). In support of Hypothesis 5, a direct negative effect of job satisfaction on turnover intention was observed. The results also show that job satisfaction has a direct effect on turnover intention. In contrast, organizational commitment does not reveal a significant direct effect on turnover intention ($\beta = -0.07$, $t = -1.01$, $p < 0.05$). Thus, Hypothesis 6 is not supported.

As can be seen, all of the hypotheses predicted direct effects between the independent variable and dependent variables. However, an indirect effect appears when the influence of an independent variable on the dependent variable is mediated by an intervening variable. Inconsistent with Hypothesis 3, organizational learning culture has no direct effect on turnover intention but shows a strong indirect effect on job satisfaction and organizational commitment. Further, the test statistics for model mediation (indirect)

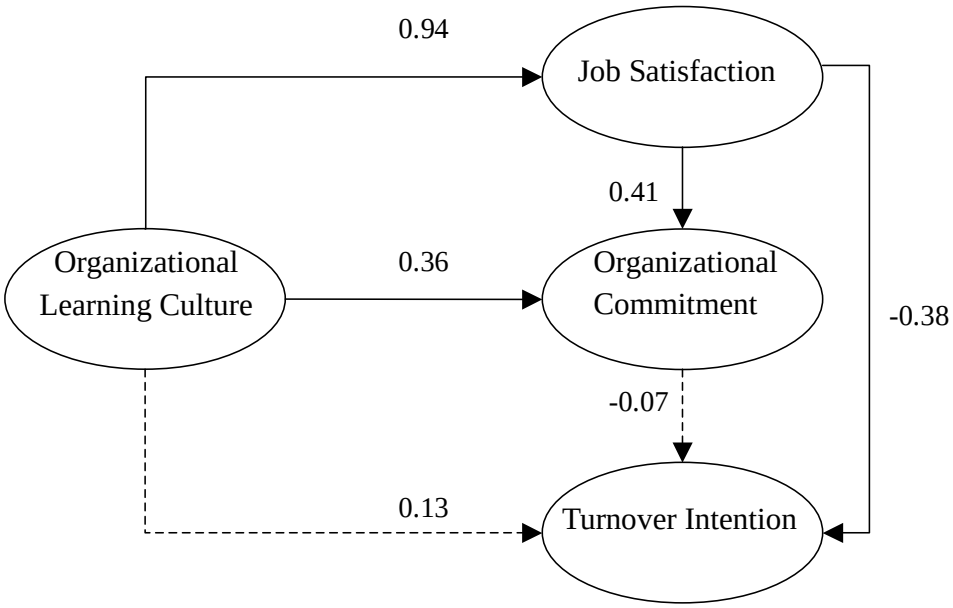
effects show organizational learning culture → job satisfaction → turnover intention (-0.479, $p < 0.05$); organizational learning culture → job satisfaction → organizational commitment →turnover intention (-0.029, $p < 0.05$); and organizational learning culture → organizational commitment → turnover intention (-0.025, $p < 0.05$). The total indirect effect of organizational learning culture on turnover intention was -0.53 and is statistically significant as shown in Table 21. In the same vein, the indirect effect of job satisfaction on turnover intention mediated by organizational commitment was assessed and did not show a negatively significant relationship as presented in Table 21. To summarize the most salient feature of the analysis, the mediations occurred when testing the effect of organizational learning culture on the endogenous variables.

Summary

To answer the research questions, several statistical analysis tools were applied. First, descriptive statistics and correlations were presented. The descriptive statistics show that all sub-scales of organizational learning culture and job satisfaction were similar in means and standard deviations. The results of organizational commitment reveal a low score for continuance commitment. The correlations among the four constructs of organizational learning culture, job satisfaction, organizational commitment, and turnover intention, were significant and positive except for turnover intention which was negative in every case.

The hypothesized structured model was tested and compared with three alternative models. As a result, the hypothesized model was found to be the best-fit model based on the estimated parameters with theoretical relationships. The results indicate that organizational learning culture has a significant and positive relationship with job satisfaction and organizational commitment. However, none of the organizational learning culture subscales is significantly related to turnover intention, nor is organizational commitment significantly related to turnover intention. In contrast, the relationship between job satisfaction and turnover intention is significant and negative. Moreover, the tot al indirect effect of organizational learning culture on turnover intention mediated by job satisfaction and organizational commitment presented a negatively significant relationship.

The hypothesized model, which was supported as the best fit model, is shown again in Figure 8.



Note: → significant path; ⇢ non-significant path; $p < 0.05$ ($t > 1.96$)

Figure 8. Hypothesized model.

CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the research process and results of the study. It also discusses the research findings in light of previous research and examines the contributions to and implications for HRD practice. The limitations of this study and the directions for future research are also presented.

Summary

In competitive dynamic environments, knowledge and technical skills are highly prized. Therefore, learning becomes the core process for the creation and transfer of knowledge (Harvey & Denton, 1999), especially for R&D professionals. Based on the literature, a learning organization is the most popular intervention in HRD practice because it can assist R&D professionals in building their capability through knowledge. However, there has been limited empirical research on the impact of organizational learning culture on the performance and turnover of R&D professionals especially.

Purpose and Hypotheses

The purpose of this study was to investigate the relationships between organizational learning culture, organizational commitment, job satisfaction, and turnover intention of R&D professionals in the high-tech industry in Taiwan. The anticipated results would provide empirical evidence for developing a learning organization that can

improve the performance of R&D professionals. The main research question was: “What are the influences of organization learning culture on the retention of R&D professionals in Taiwan?” Several sub-questions were addressed to guide this study:

1. To what extent does organizational learning culture influence job satisfaction?
2. To what extent does organizational learning culture influence organizational commitment?
3. To what extent does organizational learning culture influence turnover intention?
4. To what extent does job satisfaction influence organizational commitment?
5. To what extent does job satisfaction influence turnover intention?
6. To what extent does organizational commitment influence turnover intention?

To address these research questions, a quantitative research design using a survey was employed. Based on the literature review, the hypothesized model and research hypotheses were formulated. The research hypotheses were:

Hypothesis 1: Organizational learning culture positively influences job satisfaction.

Hypothesis 2: Organizational learning culture positively influences organizational commitment.

Hypothesis 3: Organizational learning culture negatively influences turnover intention.

Hypothesis 4: Job satisfaction positively influences organizational commitment.

Hypothesis 5: Job satisfaction negatively influences turnover intention.

Hypothesis 6: Organizational commitment negatively influences turnover intention.

Data Collection and Data Analysis

Four existing and established scales were adapted to form an instrument to address the research hypotheses. Two pilot tests were conducted through an on-line survey to ensure the existence of high reliability and the appropriateness of the survey for the intended context. Finally, 71 items in the instrument were confirmed, including 64 items for measuring all constructs with a 5-point Likert-type scale and 7 items for examining demographic variables.

The final internal consistencies (i.e., coefficient α) of the four constructs are provided in Table 10 (in Chapter 3). The four constructs have satisfactory reliability estimates, ranging from 0.81 to 0.95. The reliability of the sub-scales of organizational learning culture and organizational commitment indicate that most of the sub-scales in the organizational learning culture and organizational commitment demonstrated

acceptable reliability, ranging from 0.65 to 0.81, except for the embedded system (α = 0.67) and system connection (α = 0.65), which were below 0.70.

The measurement model was used for confirmatory factor analysis. The main focus of a measurement model is to evaluate the reliability and validity of each construct. First, the first-order measurement models of all four constructs were examined separately. Then, the second-order measurement models of two constructs, organizational learning culture and organizational commitment, were assessed. Finally, the overall measurement model was assessed to test the overall fit of the hypothesized model.

The overall CFA was measured by 22 sub-scales of the instrument, including seven dimensions of organizational learning culture, nine items of job satisfaction, two sub-scales of organizational commitment, and four sub-scales of turnover intention. The overall fit of the hypothesized model was evaluated by three types of tests to verify the validity of the scale. The first test involved the composite reliability of each scale (coefficient alpha). The reliability of all scales ranged from 0.65 to 0.95. The second test involved an examination of the item reliability that uses factor loadings for each item. This test indicates the amount of variance in a measure due to the construct rather than to error. Of all the items included in the analysis, only the value of continuance commitment was lower than 0.5. The results of factor loadings demonstrated that the factor loadings of all the items are highly satisfactory and have adequate validity. The last test involved the

overall fit index, and the overall measurement model fit was highly acceptable, χ^2 (203) =1070.28, p =0.00, χ^2/df=5.27, RMSEA=0.10, CFI=0.96, GFI=0.81, NFI=0.95, NNFI=0.95, RMR=0.084.

To increase the response rate, the data were collected using both an on-line survey and a paper questionnaire. Of the 775 R&D professionals who were invited to participate, 475 responded; of these, 418 from 65 firms completed the survey, for a 53.9% response rate. The response rates for the online survey and paper questionnaire were 30% and 74.7%, respectively. With regard to demographic information, the majority of the respondents (61.7%) had graduate school education, and more than 80% of the respondents were male. A large group of respondents (71.3%) indicated that they worked in non-supervisor positions. For organization information, the majority (66.1%) worked for an organization with fewer than 1,000 employees, and 39.2% of the organizations had operated for fewer than 10 years. Data analyses were applied, including descriptive statistics, correlations, and structural equation modeling (SEM). SPSS 16 and LISREL 8.7 were employed to examine the results.

Results

Means and standard deviations were calculated for each of the four constructs. The means and standard deviations were about equal, except for a low score on turnover intention (M=2.66, SD=0.93). These R&D professionals had a low degree of intention to

leave the organization, not surprising given the economic environment at the time of the survey.

The correlation analyses involved the seven dimensions of organizational learning culture, job satisfaction, two sub-scales of organizational commitment, and turnover intention. As expected, there was a significant and positive correlation among the seven dimensions of organizational learning culture, job satisfaction and organizational commitment. All of the correlations were significant with a range of 0.60 to 0.71, with the exception of continuance commitment. Although the relationships between the seven dimensions of organizational learning culture and continuance commitment were positive, the correlation range of 0.18 to 0.36 reflects a weak relationship. Overall, these results indicate that organizational learning culture is more strongly related to job satisfaction than to continuance commitment.

The correlations between the seven dimensions of organizational learning culture and turnover intention were all negative. In particular, strategic leadership correlated most strongly (r = -0.47) with turnover intention, followed by embedded system (r = -0.39). Further, the correlations between job satisfaction and affective commitment were stronger (r = 0.70) than those for continuance commitment (r = 0.36). Job satisfaction also had a strong negative relationship with turnover intention (r = -.47). In the same vein, affective commitment and continuance commitment were negatively related to turnover

intention. Because sub-scales of each construct were highly correlated with each other, tests for multicollinearity were run, resulting in negative results, indicating that multicollinearity was not a problem.

The hypothesized structural model was tested. Three alternative models were used to test the relationships among the mediator, exogenous variable, and endogenous variable. All of the alternative models were compared with the hypothesized model, but they did not provide a better fit for the data. More specifically, in terms of the ratio of X^2/df, the hypothesized model was the lowest among the structural models. Thus, the hypothesized model was accepted as the final and best model based on the significance in the estimated path coefficients presented in Figure 7 (in Chapter 4). These results indicate the strength and the sign of the theoretical relationships.

To address the research questions and test the hypotheses, the percentages of explained variance (R^2) for each endogenous variable and the path coefficients of the hypothesized model were assessed. The data show that substantial portions of the variance are explained for job satisfaction (88%), organizational commitment (55%), and turnover intention (16%). In spite of these results, there is considerable support for the hypothesized model as the specific linkages in the model received differential degrees of support.

Hypothesis 1, organizational learning culture would have a positive direct effect on job satisfaction, was supported ($\gamma = 0.94$, $t = 12.40$, $p < 0.05$). Hypothesis 2, organizational learning culture would have a positive direct effect on organizational commitment ($\gamma = 0.36$, $t = 2.45$, $p < 0.05$). Hypothesis 3 predicted that organizational learning culture would have direct effect on turnover intention. However, this hypothesis did not show a significant relationship between organizational learning culture and turnover intention ($\gamma = 0.13$, $t = 0.59$, $p < 0.05$). Thus, Hypothesis 3 was rejected.

Hypothesis 4 predicted that job satisfaction would have positive direct effect on organizational commitment ($\beta = 0.41$, $t = 2.74$, $p < 0.05$). In support of Hypothesis 5, a direct negative effect of job satisfaction on turnover intention was observed. The results also showed that job satisfaction had a direct effect on turnover intention. In contrast, organizational commitment did not reveal a significant direct effect on turnover intention ($\beta = -0.07$, $t = -1.00$, $p < 0.05$) Hypothesis 6 was not supported.

As can be seen, all hypotheses predicted a direct effect between the independent variable and dependent variables. The total indirect effect of organizational learning culture on turnover intention was -0.53. In the same vein, the indirect effect of job satisfaction on turnover intention mediated by organizational commitment was assessed, and it did not show a significantly negative relationship. To summarize the salient feature

of the analysis, the mediations occurred when testing the effect of organizational learning culture on the endogenous variables.

Discussion

The main contribution of this study has been the integration of job behaviors to the management of R&D professionals and to bring empirical evidence to bear on the following question: What are the influences of organizational learning culture on the retention of R&D professionals? Thus, in order to explore the extent to which organizational learning culture makes a difference in job behaviors through its impact on job satisfaction, organizational commitment, and turnover intention, a conceptual framework for examining the relationship between organizational learning culture and job behavioral variables was developed in this study.

In general, the results of the measurement model show strong support for the reliability and validity of all four constructs. The results of testing the relationships with six hypotheses are discussed in the following section. In sum, two distinct findings were discovered: (a) there is no significant influence of organizational learning culture on turnover intention, and (b) there is no significant influence of organizational commitment on turnover intention.

Organizational Learning Culture and Job Satisfaction

The result of organizational learning culture's influence on job satisfaction reveals a highly positive relationship (path coefficient: 0.94, $t = 12.40$, $p < 0.05$). This result is confirmed by previous studies (Egan et al., 2004; Lee-Kelley et al., 2007; Mikkelsen et al., 2000; Rowden & Ahmad, 2003; Tsai et al., 2007). This finding indicates that R&D professionals' job satisfaction is positively influenced by an organizational culture that provides continuous learning, inquiry and dialogue, team learning, empowerment, an embedded system, system connection, and strategic leadership, the seven dimensions of organizational learning culture (Watkins & Marsick, 1997).According to Drucker (1999b), knowledge workers are capital assets and need to be encouraged to grow. They are self-motivated more by the natural challenges of their jobs rather than financial rewards. Harpaz and Meshoulam (2004) indicated that the perceptions of employers in high-tech companies are oriented towards work achievement rather than money. Lin and Chang (2005) took it even further noting that organizations should continually provide their employees with learning opportunities and create tasks to challenge them. Therefore, R&D professionals perceive that a high level of learning culture increases their job satisfaction positively and significantly.

Further, due to global challenges, competition in the business world has made companies more dynamic and diverse than in the past. In order to increase competitive

advantage, managers and HRD practitioners in many organizations understand the importance of improving learning in their organizations (Lopez et al., 2005). The present study suggests that managers and HRD practitioners can consider learning as part of the organizational culture (Moynihan, 2005; Schein, 1993) and create a learning culture that will lead R&D professionals to perceive this culture positively along with other job satisfaction factors, such as pay, promotion, supervision, fringe benefits, contingent rewards, operating conditions, coworkers, nature of the work, and communication (Spector, 1985) to increase their performance.

Organizational Learning Culture and Organizational Commitment

The present study found that an organizational learning culture has a positive effect on organizational commitment (path coefficient: 0.36, $t = 2.45$, $p < 0.05$). When the organizational learning culture is perceived to be fulfilling, R&D professionals report a high level of organizational commitment. These findings are similar to previous studies about the benefits of a learning organization, noting that learning organizations have a positive effect on organizational commitment (Farrel, 1999; Maurer & Lippstreu, 2008; Mikkelsen et al., 2000; Pool & Pool, 2007; Terziovski, Howell, Sohal, & Morrison, 2000). Hence, top management with a high level of organizational commitment and work motivation results in higher levels of organizational learning. Organizations that create mechanisms and a favorable environment for learning and development increase

employee learning engagement and organizational commitment (Maurer & Lippstreu, 2008).

Due to the limited research exploring the impact of learning organizations on organizational commitment, this study has set up the need for a deeper examination in order to enhance previous studies' findings. The results show that an organizational learning culture has a positively significant effect on affective commitment; in contrast, an organizational learning culture has no significant effect on continuance commitment. While affective commitment affects emotional attachment and identification with the organization (Allen & Meyer, 1990), continuance commitment reflects employees' lost cost and investment when they leave the organization (Meyer et al., 2002). Thompson and Heron (2005) examined R&D workers and concluded that high levels of affective commitment were likely to create a higher quality employment relationship and higher level of knowledge. Bhatnagar (2007) confirmed that affective commitment appears to have a highly positive impact on organizational learning capability. As a whole, these findings suggest that R&D professionals are committed to their organizations because of their emotional attachment and identification, not because of their consideration of the costs. These results suggest that managers and HRD practices might aim at reducing continuance commitment while maintaining or enhancing affective commitment.

To sum up, managers could play a role in supporting and guiding the learning culture by serving as coaches, mentors, and knowledge facilitators to ensure the quality of the relationship between learning culture and employee commitment. Ipe (2003) showed that most knowledge sharing is informal, and the process depends on the culture of the working environment. Nonaka (1994) also claimed that encouraging creative individuals or offering a context in which individuals can create knowledge in organizations is very important. By supporting a learning culture, managers will create a climate in which their employees will feel obligated to reciprocate with creative contributions to the organization.

Job Satisfaction and Organizational Commitment

Job satisfaction and organizational commitment are two distinct constructs. While job satisfaction refers to an emotional effect on daily events related to the job and work situation (Gregson, 1987; Lock, 1976), organizational commitment emphasizes an emotional or non-emotional reaction to the whole organization (Lance, 1991). In the present study, the influence of job satisfaction on organizational commitment is positive and significant (path coefficient: 0.41, $t = 2.74$, $p < 0.05$). This finding is not surprising, as it is confirmed by previous studies (Bartlett, 2001; Goswami et al., 2007; Griffeth et al., 2000; Lok & Crawford, 2001). Specifically, Bartlett (2001) pointed out that job satisfaction is presented as an antecedent to organizational commitment when employees

participate in training. Similarly, education has a positive effect on organizational commitment through job satisfaction (Griffeth et al., 2000). Technostress is another work-related variable that affects job satisfaction and organizational commitment among workers in the field of information and communication technologies (Ragu-Nathan, Tarafdar, & Ragu-Nathan, 2008)

The results suggest that the relationship between job satisfaction and organizational commitment will help managers and HRD practitioners estimate which interventions or outcomes will significantly impact their employees' job satisfaction and organizational commitment. Managers can then effectively use these interventions or outcomes to create a high level of job satisfaction.

Job Satisfaction and Turnover Intention

Consistent with previous research (Hom & Griffeth, 1995; Joseph et al., 2007; Steel & Ovalle, 1984; Trevor, 2001), the findings reveal that job satisfaction's influence on turnover intention is significant and negative. Job satisfaction is a multidimensional construct. Managers need to identify the key elements that impact employees' level of job satisfaction within an organization, particularly as job satisfaction has been demonstrated to be a distinct predictor of turnover intention (Igbaria & Greenhaus, 1992; Igbaria & Guimaraes, 1993; Moynihan & Pandey, 2007; Spector, 1997).

The results of the present study suggest that the extent to which R&D professionals receive intrinsic and extrinsic rewards related to their jobs (Herzberg et al., 1959) will affect their intent to leave the organization. In the same vein, the empirical evidence of this study provides a better understanding of the factors contributing to the development of positive or negative work attitudes. This information may help managers monitor employees' attitudes on an ongoing basis. Hence, HRD practitioners should consider implementing organizational learning and establishing learning organizations that encourage job satisfaction and reduce the influence of external factors, thus increasing retention of R&D professionals.

Organizational Commitment and Turnover Intention

While many research studies have shown that organizational commitment is a predictor of turnover intention (Chang & Choi, 2007; Iverson, et al., 2004; Johnston et al., 1990; Mathieu & Zajac, 1990; Mowday et al., 1982; Tett & Meyer, 1993), the present study failed to find a significant influence of organizational commitment on turnover intention (path coefficient: -0.07, $t = -1.01$, $p < 0.05$). This result contradicts numerous studies and should be investigated further.

According to O'Malley (2000), employees who stay with their organizations are often not the most committed. Lin and Chang (2005) investigated 77 employees from two financial institutions in Taiwan and concluded that organizational commitment did not

have a statistically significant relationship on employee mobility (e.g., promotion, turnover, and retention). Nonetheless, the authors found that a learning orientation was a strong explanatory factor on employee mobility.

Due to limited research on R&D professionals regarding the relationship between organizational commitment and turnover intention, culture differences may be an alternative explanation for the results of the present study. In fact, cultural values have been shown to be one of the most important effects on an individual's attitude toward an organization (Lehman, Chiu, & Schaller, 2004). In an individualistic culture (e.g., U.S. culture), individuals are construed as independent, and their behavior is organized mainly in reference to their own feelings and actions, rather than in reference to others. By contrast, in collectivistic cultures (e.g., Asian cultures), individuals are construed to be interdependent, and it is commonly recognized that one's behavior is contingent on what another individual perceives to be the feelings and actions of the importance of teamwork (Markus & Kitayama, 1991). Using Meyer and Allen's (1991) organizational commitment model, several studies (Cheng & Stockdale, 2003; Wasti, 2003; Yao & Wang, 2006) have indicated that affective commitment and normative commitment are good predictors of organizational behaviors, especially in collectivistic culture.

Based on the data analysis of this study, the CFA results also suggest that continuance commitment had low loadings. It is possible that the Chinese translation did

not sufficiently reflect the meaning in the wording of the English version, or that R&D professionals in Taiwan interpreted these items differently than expected. Clearly, this study revealed that affective and continuance commitment are predictors of turnover intention. Accordingly, the theoretical and empirical evidence of organizational commitment, especially continuance commitment, is that it was found not to ffect turnover intention. In sum, all explanations lead to the conclusion that the relationships between organizational commitment and turnover intention are not significant.

Organizational Learning Culture and Turnover Intention

The results of this study show that organizational learning culture does not have a direct effect on turnover intention. Previous research on job satisfaction and organizational commitment contributed to a different understanding of these constructs and of their relationships with turnover intention. However, few empirical studies have comprehensively examined from an R&D professional's perspective the mediating role of these constructs on the relationships between organizational learning culture and turnover intention.

Egan et al., (2004) found that the link between organizational learning culture and turnover intention was mediated by job satisfaction. Balfour and Wechsler (1996) examined the association between learning and turnover intention and found that the association is based on the perception of organizational commitment. Rigas (2009)

surveyed 437 information systems professionals in Thailand and concluded that creating an innovative and supportive work environment and accommodating the need for individuals' professional growth increases job satisfaction and organizational commitment that, in turn, reduces turnover intention. Consequently, these findings suggest that organizational learning culture may play a determining role in shaping employees' turnover intention, but only when employees perceive their organization to be satisfactory or committed to them.

Important findings of this study are mostly in accord with the results of previous studies that pointed to the mediating role played by job satisfaction or organizational commitment in the relationship between organizational learning culture and turnover intention. Thus, the present study shows that fulfillment of an organizational learning culture does not have a direct link with turnover intention but, rather, has an indirect effect from job satisfaction and organizational commitment. To sum up, these findings imply that organizations establish a learning culture to encourage R&D professionals to reciprocate through job satisfaction or organizational commitment. Then, organizations may benefit from a low turnover rate because R&D professionals perceive a stronger emotional attachment to the organization which may reduce their intention to leave the organization.

Implications

The findings of the present study have several implications for HRD theory and practice. The theoretical implications emphasize the themes of organizational learning culture and job behaviors, and organizational learning culture in an R&D environment. Further, practical implications highlight the need to implement an organizational learning culture for R&D professionals and the factors that could affect organizational learning culture and job behaviors.

Implications for HRD Theory

Two main theoretical implications can be derived from the conceptual framework defined by this study. The first implication pertains to the finding that organizations with a high learning culture have a significant influence on R&D professionals' job behaviors. While literature flourishes with theoretical claims about the importance of learning organizations, research on this issue has yet to gain impetus. Empirical evidence on the influence of organizational learning culture on outcome variables like job behaviors is still limited. Previous studies have focused mainly on single behaviors, such as performance, job satisfaction, organizational commitment, turnover intention, or innovation. The present study makes a significant contribution as organizations involved in an organizational learning culture may enhance attitudinal and operational outcomes. In addition, the present study had three important job behavioral variables that were

measured separately from the source of the organizational learning culture and assessed the mediated effects between organizational learning culture and three outcome variables. As a result, the present study not only found direct effects of organizational learning culture on job behaviors, but also presented the indirect effects of organizational learning culture.

The second theoretical implication provides a new theme for research using organizational learning culture factors as predictors of R&D professionals' job behaviors. The strengths of the study include research at the R&D professional level, whereas much previous research has been in human resource management and R&D management. Previous research in the area of HRD by Egan et al. (2004) and Lee-Kelley et al. (2007) investigated a sample of IT workers from the IT industry in the U.S. and U.K., respectively. These authors confirmed organizational learning culture as a predicator of job satisfaction and turnover intention. Thus, this empirical study will broaden the research field in HRD, particularly for R&D professionals across different organizational settings in Asian cultures and provide further insights about organizational learning culture on R&D professionals' performance.

Implications for HRD Practice

Many studies have indicated that R&D performance is derived from organizational processes and managed by the organization's leadership (Jasswalla &

Sashittal, 1998; Keller, 2001; Thamhain, 2003). These notions were also supported by this study because organizational learning culture highly influences job behaviors, and strategic leadership was the most significant factor among the seven dimensions of organizational learning culture. Thus, HRD practitioners can play a significant role by engaging R&D management in building a successful learning environment. Several strategies can be implemented to develop a learning organization, and these strategies engage a variety of organization variables, including climate, leadership, management, human resource practices, organization mission, job attitudes, organizational culture, and organizational structure (Senge, 1990).

Retaining highly educated R&D professionals is one of the major foci in the present study. According to a study of R&D professionals' turnover rate (Chang et al., 2008), the authors found that a high turnover rate for R&D professionals occurred because they were not given sufficient autonomy or opportunity to match their intrinsic needs for learning and achievement. Additionally, most respondents of this study were young and highly educated; the findings reveal that these professionals tend to have low levels of satisfaction in their current organizational learning cultures. These negative levels of satisfaction are associated with a high level of turnover intention. Due to the unique characteristics of R&D professionals, HRD practitioners need to provide an effective learning organization to satisfy these young and highly educated professionals.

Organizations can reinforce organizational learning in numerous ways, including building an effective learning organization, sharing vision with their employees, encouraging team learning in organizations, creating cross-functional work teams and peer discussion groups, and promoting knowledge acquisition and sharing (Marquardt, 1996; Watkins & Marsick, 1993). Although learning organizations have been widely discussed, including definition, description, and measurement in a variety of academic research studies, the accessible literature is more focused on definitions and descriptions rather than on measurement (Jamali & Sidani, 2008). Moreover, the concept of a learning organization came from western cultures, and it is still under development and lacks empirical study, particularly in global environments (Chang & Lee, 2007; Lien et al., 2006). Nevertheless, this study has presented empirical and valid evidence that HRD practitioners can adopt and apply their tasks in Taiwan. The DLOQ (Marsick & Watkins, 2003) is very useful for assessing the dimensions of learning organizations, and it can assist HRD practitioners in identifying their organizational strengths and weaknesses by evaluating their implementation of their own learning organizations.

Limitations and Directions for Future Research

The present study helps practitioners and researchers understand organizational learning culture among R&D professionals, but several limitations, including the research method, generalizability, common method variance, survey error, antecedents of

organizational learning culture, and economic environment, are addressed in order to guide the direction of future research.

First is the research method. The present study applied SEM to test the linear relationships among variables. SEM does not prove causality while emphasizing mediation (Bollen, 1989), but assumes causality (James, Muliak, & Brett, 1982). Further, SEM analysis generates parameter estimates that agree with theoretical relationships; however, this evidence is not sufficient to establish causality. In the present study, the results can not confirm the direction of causality regarding changes in organizational learning culture and job behaviors. Additionally, the present study used cross-sectional research to gather the data at a single point in time, which was an efficient and time saving method to measure the research hypotheses and conceptual models before proceeding to the next step of longitudinal research. Accordingly, the directions of the individual relationships conceived in this study are supported by previous studies. Future longitudinal research is encouraged to disclose the causal process of how organizational learning culture develops and how it influences various outcomes.

Second is generalizability of the results. Because the sample was limited to business enterprises in the high-tech industry, which emphasized electronic industries in Taiwan, the results may have restricted generalizability to individuals outside of the high-tech industry and outside of Taiwan. However, as the high-tech industry constantly

reports difficulty in retaining R&D professionals, this is an appropriate population of organizations for a sample. Moreover, due to the high turnover rates in the high-tech industry and increasing competition with general industries for skilled workers, the present study appropriately examined the perceptions of an organizational learning culture and how it affects high-tech industry R&D professionals' turnover intention. Thus, it may not be applicable to a more general population. Gathering data from different industries, such as the service industry or traditional industries, should be considered in order to extend the findings to other industries. Further, having multiple respondents from a given organization will have influenced the results of the study, further restricting its generalizability. This over-representation from some organizations will also have affected the results in this study.

Third, cultural differences could be another factor that impacts the generalizability of the results. Although the high-tech industry in HSP has a close relationship with Silicon Valley in the U.S., including its OEM relationship and intensive social and professional networks (Saxenian, 2004; Hu et al., 2005), these relationships diminish the degree of cultural differences for R&D professionals between the U.S and Taiwan. However, according to Hofstede (2001), Taiwan is a relatively high power distance and collectivist culture and may not demonstrate the same relationships between organizational learning culture and job behaviors as lower power distance and

individualistic cultures do. Consequently, cross-cultural or cross-national considerations need to be tested to determine the generalizability of this study's findings for R&D professionals and the applicable results in diverse business systems and organizational settings for future research.

Fourth is the possibility of a common method variance in this study. For example, the present study found that organizational learning culture correlated more highly with job satisfaction than did organizational commitment and turnover intention, showing differential relationships despite their common measurement source based on perceptual data. All of the data were collected using self-reporting and perception surveys from the same source to measure all constructs, which may raise the possibility of producing inflated correlations (Crampton & Wagner, 1994; Spector, 1987). As the constructs in this study were organizational and individual behaviors, it was essential to assess the perceptions of employees directly. Even though a single-factor test is useful in examining common method variance (Podsakoff & Organ, 1986), there is also value in employing multiple sources and multiple methods. Multiple sources containing employee self-reports, project progress reports, managers' evaluations, and organizational records would prove useful; the multiple methods could also include structured interviews and participant observations. These methods would help collect data and analyze the various relationships of organizational learning culture for future research.

Fifth is possible survey error in the instrument. The present study employed the use of purposive sampling, which can not be considered representative of the population because it may cause sampling errors. Nevertheless, the demographic questions described the sample as clearly as possible. For example, the percentage of graduate school graduates shows a highly significant percentage (61.7%) in this education category. The graduate school category could be further divided into two categories: masters degrees and Ph.D. degrees. Additionally, an invitation letter could more clearly define the characteristics of R&D professionals, which could reduce the coverage error that may have occurred in the selection of R&D professionals among all HR professionals. Regarding non-response error and measurement error, the variable of turnover intention might be a high non-response item because turnover intention is very sensitive in Taiwan's culture based on the results of the pilot test. Future research should take the above conditions into consideration.

Sixth, this study is limited to the consequences of organizational learning culture. The purpose of this study was to examine the relationships between organizational learning culture and job behaviors. Many empirical studies have demonstrated the impact of organizational learning culture, such as innovation, performance, and economic/financial factors. However, most studies have not addressed the extent to which organizational learning culture could be impacted. As each organizational factor is

strongly inter-linked, building and maintaining an effective learning organization could affect all fields of an organization. Future studies could identify the antecedents of organizational learning culture, such as organizational structure, leadership, human resource development, and business strategy. This approach could establish a comprehensive model of both antecedents and consequences.

Finally, this study was conducted during an economic recession when a number of employees were on unpaid leaves at that moment in the high-tech industry in Taiwan. The respondents' perceptions regarding turnover intention might not coincide with what their responses might have been in an economic environment in which it would be easy to move to another organization.

Concluding Remarks

In today's dynamic global business environment, learning organization plays a critical role in building a competitive advantage in the organization. The available literature on learning organizations has generally accorded more attention to exploring performance, innovation, and work attitudes. However, little empirical research has been found to establish a relationship between organizational learning culture and the three variables of job satisfaction, organizational commitment, and turnover intention.

The major findings of the present study are: (a) organizational learning culture has a positive effect on job satisfaction and organizational commitment; (b) job satisfaction

has a negative effect on turnover intention and a positive effect on organizational commitment; (c) organizational learning culture does not influence turnover intention; and (d) organizational commitment does not influence turnover intention.

The present study also provides significant contribution to support the argument that there is an indirect impact of organizational learning culture on turnover intention when job satisfaction or organizational commitment is considered as a mediator. It can be concluded that organizations with a higher level of organizational learning culture will lead R&D professionals to a lower level of turnover intention through the effect of job satisfaction and organizational commitment. Therefore, this study represents a guide to help managers and HRD practitioners understand the impact of being a learning organization by identifying its consequences in order to improve R&D professionals' performance. Finally, the findings of this study may well have implications for other countries and generate important themes in HRD.

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Appendices

Appendix A: Pre-notice Letter

December 10, 2008

Dear HR Professional,

We would like to invite you to coordinate a survey of the influence of organizational learning culture on job behaviors in your company. The purpose of the survey is to gather information about R&D professionals' perceptions regarding organizational learning culture, job satisfaction, organizational commitment, and turnover intention in their current work environment. This study is useful to HRD professionals by providing empirical evidence for the development of a learning organization that could improve the performance of R&D professionals. Your kind assistance will help us understand R&D professionals' needs in these areas.

Your responsibility for this survey is to identify the participants who are R&D professionals, distribute the survey to them (either by e-mail or hard copy), and collect the completed surveys. The survey will take about 10-15 minutes to complete. If your company agrees to join this study, please reply to me by December 21, 2008.

There are no immediate benefits or expected risks for participating in the survey. The survey is completely anonymous. The records of this study will be kept private. In any sort of report the researcher might publish, no private or company-specific information will be revealed to make it possible to identify your company. Research records will be stored securely and only the researcher and the researcher's advisor will have access to the data.

Thank you for your time and consideration. Your great input will make our research be successful. The researcher conducting this study is Hsiu-Yen (Grace) Hsu. If you have any questions, you may contact her at (612) 646-0193, or via e-mail at hsux0070@umn.edu. You may also contact the researcher's advisor, Gary N McLean, at mclea002@umn.edu.

Sincerely,
Hsiu-Yen (Grace) Hsu
Ph.D. Candidate
Department of Work and Human Resource Education
University of Minnesota

Appendix B: Cover Letter

December 19, 2008

Dear R&D Professional,

You are invited to complete a survey on the study of the influence of organizational .learning culture on job behaviors for R&D professionals in high-tech industry in Taiwan. You were selected as a possible participant simply because you were recommended by your company. The purpose of this study is to investigate the relationship between organizational learning culture, organizational commitment, job satisfaction, and turnover intention. The result is to provide an empirical evidence for developing a learning organization that could improve the performance of R&D professionals.

We are particularly desirous of obtaining your response because your perception in organizational learning culture will contribute significantly toward solving some of the issues we face in this important area of human resource development. It should only take you about 10-15 minutes to complete.

Your survey is at the URL below:
http://whre.umn.edu/index.php?page=survey.
Just click on the URL link listed above (or copy it into the address bar of your internet browser)

Your responses are completely confidential and anonymous in which no individual's responses can be identified. We will appreciate it if you will complete the survey by December 24, 2008.

If you have any questions or comments about this study, please feel free to contact me at (612) 646-0193, or via e-mail at hsux0070@umn.edu.

Thank you very much for helping with this important study.

Sincerely,

Hsiu-Yen (Grace) Hsu
Ph.D. Candidate
University of Minnesota

Appendix C
Construct Measures

Organizational Learning Culture

1. In my organization, people help each other learn.
2. In my organization, people are given time to support learning.
3. In my organization, people are rewarded for learning.
4. In my organization, people give open and honest feedback to each other.
5. In my organization, whenever people state their view, they also ask what others think.
6. In my organization, people spend time building trust with each other.
7. In my organization, teams/groups have the freedom to adapt their goals as needed.
8. In my organization, teams/groups revise their thinking as a result of group discussions or information collected.
9. In my organization, teams/groups are confident that the organization will act on their recommendation.
10. My organization creates systems to measure gaps between current and expected.
11. My organization makes its lessons learned available to all employees' performance.
12. My organization measures the results of the time and resources spent on training.
13. My organization recognizes people for taking initiative.
14. My organization gives people control over the resources they need to accomplish their work.
15. My organization supports employees who take calculated risks.
16. My organization encourages people to think from a global perspective.
17. My organization works together with the outside community to meet mutual needs.
18. My organization encourages people to get answers from across the organization when solving problems.
19. In my organization, leaders mentor and coach those they lead.
20. In my organization, leaders continually look for opportunity to learn.
21. In my organization, leaders ensure that the organization's actions are consistent with its values.

Job satisfaction

1. I like doing the things I do at work.
2. Those who do well on the job stand a fair chance of being promoted.
3. My superior is quiet competent in doing his/her job.
4. The benefits we receive are as good as most other organizations offer.
5. When I do a good job, I receive the recognition for it that I should receive.
6. Many of our rules and procedures make doing a good job simple.
7. I enjoy my coworkers.
8. I feel satisfied with my chances for salary increases.
9. Communications seem good within this organization.

Organizational Commitment

1. I would be very happy to spend the rest of my career with this organization.
2. I enjoy discussing my organization with people outside it.
3. I really feel as if this organization's problems are my own.
4. I think that I could not easily become as attached to another organization as I am to this one.
5. I feel like 'part of the family' at my organization.
6. I feel 'emotionally attached' to this organization.
7. This organization has a great deal of personal meaning for me.
8. I feel a strong sense of belonging to my organization.
9. I am afraid of what might happen if I quit my job without having another one lined up.
10. It would be very hard for me to leave my organization right now, even if I wanted to.
11. Too much in my life would be disrupted if I decided I wanted to leave my organization now.
12. It would be too costly for me to leave my organization now.
13. Right now, staying with my organization is a matter of necessity as much as desire.
14. I feel that I have too few options to consider leaving this organization.
15. One of the few serious consequences of leaving this organization would be the scarcity of available alternatives.
16. One of the major reasons I continue to work for this organization is that leaving would require considerable personal sacrifice — another organization may not match the overall benefits I have here.

Turnover Intention

1. I often think about quitting my current job.
2. If I can find a better job, I will leave this company.
3. I will look for a new job outside of this company within the next six months.
4. I will look for a new job outside of this company within the next year.

Demographic Information

1. What is your gender?
   ○ Male ○ Female
2. What is your age?
   ○ 30 or younger
   ○ 31-40
   ○ 41-50
   ○ 51 or older
3. What is your highest level of education completed?
   ○ High school
   ○ College (no degree)
   ○ University (degree)
   ○ Graduate school
4. Do you hold a supervisor position in your current job?
   ○ Yes
   ○ No
5. Are you a project leader in your current job task?
   ○ Yes
   ○ No
6. How long have you worked in your current position?
   ○ Fewer than 2 years
   ○ 2-5 years
   ○ 6-10 years
   ○ 11-15 years
   ○ More than 15 years
7. How long have you worked with this company?
   ○ Fewer than 2 years
   ○ 2-5 years
   ○ 6-10 years
   ○ 11-15 years
   ○ More than 15 years

Appendix D

Survey for R&D Professionals in High-tech Industry

This survey addresses your perceptions about your current job and your company culture. The survey is completely anonymous and confidential. Once your responses are entered into an electronic file, the original survey form will be destroyed. Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to withdraw at any time without affecting those relationships.

Demographic Information

The following questions are to obtain your personal information. Please indicate the item that best describe you.

1. What is your gender?

○ Male
○ Female

2. What is your age?

○ Less than 30
○ 30-39
○ 40-49
○ 50 or older

3. What is your highest level of education completed?

○ High school
○ College (no degree)
○ University (degree)
○ Graduate school

4. Do you hold a supervisor position in your current job?

○ Yes
○ No

5. How long have you worked with this company?

○ Fewer than 2 year
○ 2-5 years
○ 6-10 years
○ 11-15 years
○ More than 15 years

6. How many employees are there in your company (all locations)?

○ 0-300
○ 300-1000
○ 1001-3000
○ 3001-10000
○ More than 10000

7. How long has your company been established?

○ Fewer than 5 years
○ 5-10 years
○ 11-15 years
○ 16-20 years
○ More than 20 years

To what extent do you agree or disagree with each of the statements below. Please indicate your response in the appropriate space.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. In my organization, people openly discuss mistakes in order to learn from them.	◯	◯	◯	◯	◯
2. My organization enables people to get needed information at any time quickly and easily.	◯	◯	◯	◯	◯
3. My organization encourages people to get answers from across the organization when solving problems.	◯	◯	◯	◯	◯
4. In my organization, whenever people state their view, they also ask what others think.	◯	◯	◯	◯	◯
5. In my organization, people are given time to support learning.	◯	◯	◯	◯	◯
6. I would be very happy to spend the rest of my career with this organization.	◯	◯	◯	◯	◯
7. In my organization, people help each other learn.	◯	◯	◯	◯	◯
8. In my organization, people identify skills they need for future work tasks.	◯	◯	◯	◯	◯
9. In my organization, people are encouraged to ask "why" regardless of rank.	◯	◯	◯	◯	◯
10. When I do a good job, I receive the recognition for it that I should receive.	◯	◯	◯	◯	◯
11. I feel a strong sense of belonging to my organization.	◯	◯	◯	◯	◯
12. It would be too costly for me to leave my organization now.	◯	◯	◯	◯	◯
13. My organization supports employees who take calculated risks.	◯	◯	◯	◯	◯
14. In my organization, teams/groups are rewarded for their achievements as a team/group.	◯	◯	◯	◯	◯
15. My organization, encourage people to think from a global perspective.	◯	◯	◯	◯	◯
16. My organization recognizes people for taking initiative.	◯	◯	◯	◯	◯

To what extent do you agree or disagree with each of the statements below. Please indicate your response in the appropriate space.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
17. In my organization, leaders mentor and coach those they lead.	◯	◯	◯	◯	◯
18. Many of our rules and procedures make doing a good job simple.	◯	◯	◯	◯	◯
19. My organization encourages everyone to bring the customers' views into the decision making process.	◯	◯	◯	◯	◯
20. My organization uses two-way communication on a regular basis, such as suggestion systems, electronic bulletin boards, or town hall/open meetings	◯	◯	◯	◯	◯
21. I will look for a new job outside of this company within the next year.	◯	◯	◯	◯	◯
22. I feel 'emotionally attached' to this organization.	◯	◯	◯	◯	◯
23. In my organization, leaders generally support requests for learning opportunities and training.	◯	◯	◯	◯	◯
24. I will look for a new job outside of this company within the next six months.	◯	◯	◯	◯	◯
25. I feel satisfied with my chances for salary increases.	◯	◯	◯	◯	◯
26. One of the few serious consequences of leaving this organization would be the scarcity of available alternatives.	◯	◯	◯	◯	◯
27. My organization works together with the outside community to meet mutual needs.	◯	◯	◯	◯	◯
28. I enjoy discussing my organization with people outside it.	◯	◯	◯	◯	◯
29. My organization creates systems to measure gaps between current and expected performance.	◯	◯	◯	◯	◯

To what extent do you agree or disagree with each of the statements below. Please indicate your response in the appropriate space.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
30. In my organization, people treat each other with respect.	◯	◯	◯	◯	◯
31. I often think about quitting my current job.	◯	◯	◯	◯	◯
32. Communications seem good within this organization.	◯	◯	◯	◯	◯
33. My organization builds alignment of visions across different levels and work groups.	◯	◯	◯	◯	◯
34. It would be very hard for me to leave my organization right now, even if I wanted to.	◯	◯	◯	◯	◯
35. One of the major reasons I continue to work for this organization is that leaving would require considerable personal sacrifice — another organization may not match the overall benefits I have here.	◯	◯	◯	◯	◯
36. Too much in my life would be disrupted if I decided I wanted to leave my organization now.	◯	◯	◯	◯	◯
37. My superior is quiet competent in doing his/her job.	◯	◯	◯	◯	◯
38. I really feel as if this organization's problems are my own.	◯	◯	◯	◯	◯
39. In my organization, leaders share up-to-date information with employees about competitors, industry trends, and organizational directions.	◯	◯	◯	◯	◯
40. In my organization, leaders continually look for opportunities to learn.	◯	◯	◯	◯	◯
41. In my organization, teams/groups are confident that the organization will act on their recommendations.	◯	◯	◯	◯	◯
42. Right now, staying with my organization is a matter of necessity as much as desire.	◯	◯	◯	◯	◯

To what extent do you agree or disagree with each of the statements below. Please indicate your response in the appropriate space.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
43. I enjoy my coworkers.	◯	◯	◯	◯	◯
44. In my organization, teams/groups have the freedom to adapt their goals as needed.	◯	◯	◯	◯	◯
45. I am afraid of what might happen if I quit my job without having another one lined up.	◯	◯	◯	◯	◯
46. My organization helps employees balance work and family.	◯	◯	◯	◯	◯
47. Those who do well on the job stand a fair chance of being promoted.	◯	◯	◯	◯	◯
48. In my organization, people are rewarded for learning.	◯	◯	◯	◯	◯
49. This organization has a great deal of personal meaning for me.	◯	◯	◯	◯	◯
50. My organization measures the results of the time and resources spent on training.	◯	◯	◯	◯	◯
51. My organization makes its lessons learned available to all employees.	◯	◯	◯	◯	◯
52. In my organization, leaders ensure that the organization’s actions are consistent with its values.	◯	◯	◯	◯	◯
53. In my organization, teams/groups focus both on the group’s task and on how well the group is working.	◯	◯	◯	◯	◯
54. I feel like 'part of the family' at my organization.	◯	◯	◯	◯	◯
55. I think that I could not easily become as attached to another organization as I am to this one.	◯	◯	◯	◯	◯
56. If I can find a better job, I will leave this company.	◯	◯	◯	◯	◯
57. In my organization, teams/groups revise their thinking as a result of group discussions or information collected.	◯	◯	◯	◯	◯

To what extent do you agree or disagree with each of the statements below. Please indicate your response in the appropriate space.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
58. My organization gives people control over the resources they need to accomplish their work.	◯	◯	◯	◯	◯
59. The benefits we receive are as good as most other organizations offer.	◯	◯	◯	◯	◯
60. I like doing the things I do at work.	◯	◯	◯	◯	◯
61. I feel that I have too few options to consider leaving this organization.	◯	◯	◯	◯	◯
62. In my organization, people give open and honest feedback to each other.	◯	◯	◯	◯	◯
63. In my organization, people spend time building trust with each other.	◯	◯	◯	◯	◯
64. My organization gives people choices in their work assignments.	◯	◯	◯	◯	◯

The survey is now over, please check to see if all questions are answered, then return the survey.
Thank you for your time and participation!

Appendix E

高科技產業研發人員之問卷調查

各位先進您好:

我是徐秀燕，目前是美國明尼蘇達大學博士班候選人。首先感謝您的參與，這份問卷是調查學習型組織與工作行爲之間的關係。主要目的是研究學習型組織對高科技產業研發人員的工作行爲之影響。本問卷填寫時間大約需 10 分鐘。

本問卷採匿名方式進行，絕不公開個別之填寫資料，研究結果僅作爲學術研究用途，請您放心填寫，並請於 98 年 1 月 18 日前完成問卷填寫。參與本調查純屬自願性質，您的決定與否並不會影響您與研究人員與及您與公司之關係。在填寫過程中，您有權隨時終止填寫。

若您於填寫過程或事後有任何問題，請與下列研究人員聯絡。

徐秀燕 美國明尼蘇達大學博士候選人
e-mail: hsux0070@umn.edu
cell phone:0936785067 (臺灣)

指導教授 Professor Gary N. McLean
e-mail: mclea002@umn.edu
University of Minnesota- Twin Cities

若您有任何問題，

但希望與相關研究人員之外的單位聯繫。

請洽明尼蘇達大學研究審核中心:
Research Subjects' Advocate Line,
電話: 002-1-612-6251650
地址: D528 Mayo, 420 Delaware St. Southeast,
Minneapolis, Minnesota 55455,
U.S.A.

敬祝 新年愉快 萬事如意

徐秀燕 敬上
University of Minnesota- Twin Cities

個人基本資料

請在下列問題，勾選適合您個人目前之基本資料。

1. 您的性別
   - ○ 男
   - ○ 女

2. 您的年齡
   - ○ 小於 30 歲
   - ○ 30-39 歲
   - ○ 40-49 歲
   - ○ 50 或大於 50 歲

3. 您的最高學歷
   - ○ 高中
   - ○ 專科
   - ○ 大學
   - ○ 研究所

4. 您在目前的職位
   - ○ 管理職
   - ○ 非管理職

5. 您在現職公司的年資
   - ○ 低於 2 年
   - ○ 2 至 5 年
   - ○ 5 至 10 年
   - ○ 10 至 15 年
   - ○ 超過 15 年

6. 您現職的公司員工人數(含所有的地區)
   - ○ 0-300 人
   - ○ 300-1000 人
   - ○ 1001-3000 人
   - ○ 3001-10000 人
   - ○ 多於 10000 人

7. 您現職公司成立至今的時間
   - ○ 低於 5 年
   - ○ 5 至 10 年
   - ○ 11 至 15 年
   - ○ 16 至 20
   - ○ 超過 20 年

針對下列敘述填寫您同意程度。所有的問題並無標準答案，請準確回答。

	非常不同意	不同意	沒有意見	同意	非常同意
1.在我的公司裡，人們公開地討論所發生的錯誤，並從錯誤中學習。	○	○	○	○	○
2.我的公司能夠使人們在任何時候都能迅速又便利地獲得所需要的資訊。	○	○	○	○	○
3.我們公司鼓勵大家從整個組織內尋找問題的答案。	○	○	○	○	○
4.在我的公司裡，每當人們敘述自己的觀點時，也會問問別人是怎麼想的。	○	○	○	○	○
5.在我的公司裡，公司提供時間並支持我們去學習。	○	○	○	○	○
6.我很高興在我的公司度過自己未來的職業生涯。	○	○	○	○	○
7.在我的公司裡，人們互相幫忙學習。	○	○	○	○	○
8.在我的公司裡，人們會考慮未來的工作所需要的技能。	○	○	○	○	○
9.在我的公司裡，不論其職位高低，人們常被鼓勵問“爲什麼”。	○	○	○	○	○
10.當我表現優異時會獲得應有的賞識。	○	○	○	○	○
11.我對公司有強烈的歸屬感。	○	○	○	○	○
12.在不久的將來離開現職公司，對我而言會產生太大的成本。	○	○	○	○	○
13.我的公司支持謹慎小心行事的員工。	○	○	○	○	○
14.在我的公司裡，各小組或團隊因取得共同成就而得到共同的獎賞。	○	○	○	○	○
15.我的公司鼓勵大家從全局和整體的角度來考慮問題。	○	○	○	○	○
16.我們公司賞識主動進取、創新的人。	○	○	○	○	○

針對下列敘述填寫您同意程度。所有的問題並無標準答案，請準確回答。

	非常不同意	不同意	沒有意見	同意	非常同意
17.在我的公司裡，領導者會提供員工指導與協助。	○	○	○	○	○
18.我的公司的多數規章及制度可使員工輕易地在工作上有良好的表現。	○	○	○	○	○
19.我們公司鼓勵每一個員工把顧客的意見和觀點融入決策的過程之中。	○	○	○	○	○
20.我的公司定期進行雙向交流，例如：使用建議系統法，電子佈告欄，或召集公開會議等辦法。	○	○	○	○	○
21.在未來的一年內我會去找新的工作。	○	○	○	○	○
22.我有”感情上依附於”我的公司的感覺。	○	○	○	○	○
23.在我的公司裡，領導者大都支持學習和訓練的需求。	○	○	○	○	○
24.在未來的六個月內我會去找新的工作。	○	○	○	○	○
25.我滿意公司調薪的機會。	○	○	○	○	○
26.離開現職公司的負面結果是，我難以找到新的工作機會。	○	○	○	○	○
27.我的公司會與周圍社區協調，以滿足共同的需要。	○	○	○	○	○
28.我樂於同公司以外的人談論我的公司的情況。	○	○	○	○	○
29.我的公司建立系統方法來評量員工目前的績效和所期望的績效之間的差距。	○	○	○	○	○
30.在我的公司裡，人們相互尊重。	○	○	○	○	○
31.我常想辭去目前的工作。	○	○	○	○	○
32.我們公司內部的溝通良好。	○	○	○	○	○

針對下列敘述填寫您同意程度。所有的問題並無標準答案，請準確回答。

	非常不同意	不同意	沒有意見	同意	非常同意
33.我的公司強調不同層次和各個部門的願景規劃相互結合，達成一致。	○	○	○	○	○
34.對我而言，現在離開我的公司很難，即使我想離開。	○	○	○	○	○
35.留在現職公司的一個主要原因是，離開需付出可觀的代價，因爲其他公司的福利或許無法與我現有的福利比較。	○	○	○	○	○
36.如果我決定現在離開我的公司，我的生活將被嚴重擾亂。	○	○	○	○	○
37.我的主管相當勝任其工作。	○	○	○	○	○
38.我確實感到我們公司的問題就像是自己的問題。	○	○	○	○	○
39.在我的公司裡，領導者與員工共同分享有關競爭對手、產業趨勢及組織發展方向的最新資訊。	○	○	○	○	○
40.在我的公司裡，領導者不斷地尋找學習的機會。	○	○	○	○	○
41.在我的公司裡，各小組或團隊相信組織會依照他們的建議採取行動。	○	○	○	○	○
42.目前而言，我留在我的公司不僅出於願望，而且出於必要。	○	○	○	○	○
43.我喜歡我的工作夥伴。	○	○	○	○	○
44.在我的公司裡，各小組或團隊都有相當的自由度去調整他們的目標。	○	○	○	○	○
45.如果我離開我的公司且沒有人替補，我會擔心其後果。	○	○	○	○	○
46.我的公司幫助員工兼顧及平衡工作與家庭的關係。	○	○	○	○	○
47.在我的公司裡，工作表現良好者有公平的晉升機會。	○	○	○	○	○
48.在我的公司裡，人們因學習而得到獎賞。	○	○	○	○	○

針對下列敘述填寫您同意程度。所有的問題並無標準答案，請準確回答。

	非常不同意	不同意	沒有意見	同意	非常同意
49.我的公司對我來說具有或蘊涵著很多的個人意義。	○	○	○	○	○
50.我的公司對投入在訓練上的時間及資源所帶來的結果進行評估。	○	○	○	○	○
51.我的公司整理組織本身過去的學習經歷，以讓員工學習。	○	○	○	○	○
52.在我的公司裡，領導者會確保組織的行動與它的價值觀是一致。	○	○	○	○	○
53.在我的公司裡，各小組或團隊不僅專注在團體的任務，也會留意到整個團體之工作過程。	○	○	○	○	○
54.我對公司有”家庭成員”的感覺。	○	○	○	○	○
55.我不能夠輕易地融入另一個新的公司。	○	○	○	○	○
56.若能找到更好的工作我會辭職。	○	○	○	○	○
57.在我的公司裡，各小組或團隊在進行小組討論和蒐集資訊後，會修正他們的想法。	○	○	○	○	○
58.我們公司授予員工權力，去支配完成任務所需的資源。	○	○	○	○	○
59.我們的公司福利與大多數其他公司一樣良好。	○	○	○	○	○
60.我喜歡我工作的內容。	○	○	○	○	○
61.我在考慮離開現職公司的問題上，可選擇的餘地很小。	○	○	○	○	○
62.在我的公司裡，人們彼此之間給予公開又坦誠的意見。	○	○	○	○	○
63.在我的公司裡，人們願意花時間建立相互信任的關係。	○	○	○	○	○
64.我的公司在工作分配時，給予員工選擇的權力。	○	○	○	○	○

本問卷已結束,請詳細檢查是否都完成所有的答案,再繳回.非常感謝您的參與!