The Role of Entrepreneurship in China's SMEs in Effecting Technology Transfer from Local Universities

A Thesis submitted for the degree of Doctor of Philosophy

By

Cao Jianghong

Kingston University

Faculty of Business and Law

Dr. M. J. Foster

Dr. L. Watkins-Mathys

July 2009

Abstract

The changed economic environment in China, since 1978, has encouraged more and more individuals to start new businesses. Many are necessarily small or medium-sized enterprises (SMEs). Until recently, research of the SME-sector in China has been limited. It is now an active area. This thesis examines the role of entrepreneurship, in China's IT-software SMEs, in effecting technology transfer from local universities.

An initial conceptual framework was generated to guide the investigation, based mainly on literature derived from western economies. The empirical phase of this exploratory study utilized a multi-strategy (mixed quantitative-qualitative) approach, using both secondary and primary data. The secondary data were used to depict the industrial background of the chosen sector, as it had developed. The primary data were collected via: a questionnaire among IT-software SMEs in two major clusters around Beijing and Shanghai and follow-up interviews with questionnaire respondents.

There were three main findings as follow:

- Chinese software SMEs tended to be reluctant to adopt new technologies from local universities; there was a perceived knowledge gap between the parties.
- Those entrepreneurs, who did undertake such technology transfer, felt the process was badly impeded by lack of available finance, and expressed fears about poor protection of intellectual property rights (IPR) in China.
- The majority of the sampled SMEs acted opportunistically, taking advantage of government schemes to earn rapid returns mainly using extant technologies.

In addition to these findings, and their more detailed elaboration, another significant contribution of the thesis is the development of a revised conceptual framework. This can act as a guide to future research, by whomever, on the role of entrepreneurship in the Chinese IT-software sector.

TABLE OF CONTENTS

Chapter Three Literature Review

Chapter Four Research Methodology and the Methods Adopted

Chapter Five Quantitative Analysis

Chapter Six Qualitative Analysis

Chapter Seven Discussion of Findings

Chapter Eight Conclusions

List of Tables

List of Charts and Diagrams

Abbreviations

BSA	Business Software Alliance
CSIA	China Software Industry Association
CAS	Chinese Academy of Sciences
CMM	Capability Maturity Model
HEIs	High Educational Institutions
ICT	Institute of Computing Technology
IT	Information Technology
IPO	Initial Public Offering
IPR	International Property Right
JV	Joint Venture
MNCs	Multi National Companies
MOST	Ministry of Science and Technology
OECD	Organisation for Economic Co-operation and Development
PC	Personal Computer
PESTL	Political, Economic, Social, Technical and Legal
PRC	People's Republic of China
SaaS	Software as a Service
SMEs	Small and Medium Sized Enterprises
SOEs	State-Owned Enterprises
STIPs	Science and Technology Industry Parks
TVEs	Township and Village Enterprises
VCs	Venture Capitalists
WTO	World Trade Organization

Acknowledgements

Completing this thesis has been a long, at times painful, but ultimately enjoyable journey. Its very completion would not have been possible had I had not received the excellent support and encouragement from my research supervisors, Dr John Foster and Dr Lorraine Watkins-Mathys. I sincerely appreciate their constant and knowledgeable academic guidance and their patience in reading and amending my work; especially towards the end of the journey.

The data collected from China to facilitate this research was crucial to my thesis. I am very grateful to my friends in China who facilitated my collection of the survey data and helped me to obtain the interviews. I should particularly like to thank the entrepreneurs, officials and bankers who, as participants, contributed their valuable time and provided their thoughts on and insights into the relevant topics.

Last but not least, my grateful thanks are given to my family: especially my parents and Terry. Their understanding and support over the years have enabled me to carry on and complete the project.

Chapter One Introduction and Overview

1.0 Introduction

The purpose of this thesis is to examine whether it is possible for entrepreneurship to effect technology transfer from universities to certain types of firms in China (the PRC). In particular, the thesis will focus on small and medium sized software firms operating under the Chinese context, created as a consequence of China's strategy to rejuvenate the country's productivity through its science and technology policies and introduction of economic reforms.

Prior to the late 1970s China had a centrally planned economy, under which agriculture was collectivized, industry was nationalized, and the private sector was eliminated. Therefore the state determined the allocation of economic inputs and outputs and maintained a monopoly over production and distribution. Adults living in cities normally took the 'Iron Rice Bowl' of lifetime employment under the 'danwei' system and enterprises provided housing and benefits to employees, restricting their ability to live outside of the system (Huang, 2008).

However since then, China has experienced structural economic change, from a centrally planned economy to a market oriented economy, and has become economically one of the fastest growing countries in the world (Bernanke, 2006).

Inevitably, the huge structural change created uncertainty and disequilibrium that constituted a breeding ground for new business opportunities and new ventures. Meanwhile the Chinese government has permitted and encouraged a wide variety of private enterprises to develop, notably some preferential policies and projects have been issued especially for high-tech enterprises. Indeed, the Chinese people have witnessed an unprecedented opportunity for carrying out entrepreneurial activities. The implication with regards to this study, consequently, is to explore the entrepreneurship in China from certain perspectives and to make a contribution to the literature because of this particular environment.

In order to provide a contextual background for this research, this opening chapter justifies, in its first section, the preference for this research by probing the rationale for this study and its target industry setting. Section Two presents the problem statement, the research aims and objectives, and thereby discusses the research's focus. The third, and last, section briefly summarises the structure of this study by giving an outline of the thesis.

1.1 The Rationale for Conducting this Study

1.1.1 The Motivation for Studying Firms in China

The widening of the economic reforms started in the late 1970s has subsequently made China very attractive to entrepreneurs. The reforms include the following aspects: a shift in farming work to a system of household responsibility in order to start a gradual elimination of collectivized agriculture; liberalization of prices; fiscal decentralization; increased autonomy for state enterprises, which increased the authority of local government officials and plant managers in industry thereby permitting a wide variety of private enterprise in services and light manufacturing; the foundation of a diversified banking system; the development of stock markets; the rapid growth of the non-state sector, and the opening of the economy to increased foreign trade and foreign investment. China has generally implemented reforms step by step, including the sale of equity in China's largest state banks to foreign investors, and refinements in foreign exchange and bond markets in the mid-2000s (Index Mundi, 2006).

In order to increase productivity, China has emphasised raising personal income and consumption and introducing new management systems. The government has also focused on accepting foreign trade as a major vehicle for economic growth. China's GDP has increased tenfold since 1978, largely due to economic reforms including the liberalisation of their economy. According to some economists, Chinese economic growth has in fact been widely understated during the 1990s and early 2000s. This has been due to the failure to fully factor in the growth driven by the private sector and a tendency to exaggerate the extent to which China is dependent on exports (*The Economist*, 2008).

Entrepreneurship, as one of the oldest activities, is the process of discovering or identifying new business opportunities and exploiting these possibilities in new ventures for economic gain. Entrepreneurship has been researched across various disciplines and consequently scholars have developed several different approaches to this topic in the Western academic world. However, owing to China's cultural revolution, the interest in researching entrepreneurship in China had not been as extensive as in Western economies. The study of entrepreneurship in China is therefore still in the relatively early stages of research within the field of Chinese management.

The lack of adequate and appropriate theoretical underpinning from Chinese academics in this field gives on the one the hand limited empirical evidence to support conceptual abstractions for further research, but on the other hand provides vast opportunities for researchers to explore the phenomena in China. Further, the economic reforms in China afford a unique opportunity to study how Chinese entrepreneurs respond to such phenomena and the nature of their entrepreneurial activities.

However there have been limited theoretical contributions from Chinese empirical studies on entrepreneurship until more recently. Fortunately, for this thesis the researcher was able to refer to the abundant contributions from Western sources to build up an initial conceptual framework accordingly and guide the study.

This thesis contributes to understanding the nature of entrepreneurial activities happening among small and medium sized Chinese firms by analysing the motivations of their founders to become entrepreneurs, and how these firms respond to their environment and how their running is managed within the Chinese context. The intention of the researcher is to both contribute to the entrepreneurship literature, by identifying the pattern of how Chinese high-tech entrepreneurs manage their businesses, in particular their attitudes towards technology transfer from universities, and to assist policy makers to consider whether all the relevant policies work effectively and practically. It systematically and empirically identifies the antecedents to strategic responses of entrepreneurs from Chinese small and medium sized software enterprises as they assess and react to the opportunities and changing institutional environment brought by the economic reforms.

1.1.2 The Justification for Researching the Software Industry

The industry chosen for this study is the software industry. It was selected for the following reasons: Firstly, on a global scale society has become more knowledge oriented and economic rejuvenation brought on by the impact of information technology has become a trend. China has also been actively developing its software, semiconductor and energy industries. The Chinese government recognizes how important a role information technology could play in modern society and has identified software as a critical industry, essential to the economic progress and national security of China according to its 10^{th} five-year plan (2001-2005).

The government has assisted the industry in many ways. The Chinese government had an early influence on the software and hardware industries by providing sponsorship for national research efforts on "core technologies" considered essential to the nation's computer industry (Tschang, 2002). For example, the projects include various large scale government funded projects working on the development of Chinese competence in core computer technologies, such as the Ministry of Science and Technology's 863 research programme, and other government research projects that have become the basis for Founder, Legend and other companies. A series of government "Golden" projects were started to expand the country's e-commerce and infrastructure and the various sector applications, e.g. e-government. For example the "Torch Programme" was approved by the government (for further details on the 863 research programme and the Torch Programme please see Chapter Two, Section 2.3.1). Consequently, several national high-tech industrial development zones have been established across China, providing firms with first-rate infrastructure like roads, buildings, electric facilities, and also a variety of preferential taxes and collective services.

Through constant improvement of the software and hardware environments, China's new and high-tech zones have created the sort of conditions necessary for scientific and technological innovation and industrialization, resulting in a high concentration of new and high-tech enterprises. All the efforts made by the Chinese government encourage the creation of new ventures and form a particular institutional environment within which high-tech entrepreneurs can run their businesses (Science & Technology, 2004).

Secondly, the open policies and comeback of national examinations have encouraged more and more Chinese people to go to university, both in China and overseas. These well-educated people absorb large amounts of new and high-tech knowledge and deal with concepts reflecting work and lifestyle in an advancing society and new economy.

Theoretically speaking educational institutions are important mechanisms that diffuse information, thereby facilitating the transmission of information which generates opportunities (Aldrich and Wiedenmeyer, 1993). Thereby, it is also embodied among China's university graduates who may encounter, access and exploit entrepreneurial opportunities.

According to Liao and Sohmen (2001) Chinese entrepreneurs have evolved into three categories alongside of and as a consequence of the economic reforms in China. These categories are described as follows:

The first category of entrepreneurs existed before reform and throughout the 1980's, consisting of very small-scale activities in retail and services such as street vendors, businesses known as 'getihu'. These people are perhaps more accurately referred to as 'self-employed' rather than 'entrepreneurs'. Typically they were seen to have a low social status, often criminals and illegal migrants, with a poor education. They started out on their own because they were excluded from the state system and while some achieved success beyond their expectations, for most business was just a means of survival.

The second group appeared in the late 1980s. They were more highly educated individuals, previous engineers or state-owned enterprise (SOE) managers, operating on a larger scale out of choice rather than necessity. The enterprises built up by them, known as 'siying qiye', operated in all sectors, especially the production of inputs for SOEs.

The third type is the overseas educated, or trained, Chinese who returned to China to start businesses. According to Liao and Sohmen, there has been a greater emergence of entrepreneurs since 2001, in the flourishing Internet sector, with a third category background despite operating in a different environment, under different constraints and having distinctive characteristics to each other.

The entrepreneurs in high-tech industries are mainly from the second and third categories. They have the ability to seek imbalances that emerged during the huge structural changes, especially with regard to some of the preferential policies in the IT industry. They have become a fast growing entrepreneurial group in China, and it is for this reason that the researcher has chosen to focus this research on such high-tech entrepreneurs.

1.2 Research Aims and Objectives

1.2.1 Establishing the Research Aims and Objectives

The changing economic pattern resulting from market liberalization, economic reforms and promotion of development of the private sector has provided a breeding ground for entrepreneurial activities. Even though some research has been carried out in the relevant field, there is little evidence of research carried out from the perspectives of the small and medium sized companies in order to demonstrate the innovative activities between them and local universities, especially within the Chinese context. Relevant evidence and detail will be revealed in Chapter Three.

Hence the researcher aims to explore if entrepreneurship among small and medium sized software firms is able to positively affect technology transfer from universities in China.

This thesis has two research objectives:

1) To explore and explain the attributes/nature of entrepreneurship in small and medium sized Chinese software firms.

2) To evaluate how entrepreneurship among the sampled small and medium sized software firms affects technology transfer from local universities.

With regard to the definition of small and medium sized firms, the researcher has chosen to apply the European definition. Thus a small sized company is defined as having less than 50 employees and a medium sized company as having less than 250 employees (European Commission, 2003). The samples of software SMEs will mainly be selected from Beijing and Shanghai. The reasons for this will be explained later.

1.2.2 Setting the Operational Objectives

In order to meet the aims and research objectives of this thesis, the following research has five major operational objectives:

1) Firstly to provide an overview of the development of the IT software industry in China, taking note of policy and legislative issues affecting the promotion of Science and Technology, in particular technology transfer from universities to industry.

2) The second is to examine extensive theoretical literature, concepts and expositions that facilitate the development of a suitable conceptual framework for evaluation within this thesis.

3) The third objective is to design a data collection method that draws on the conceptual framework and research methodology, and then carry out the field work accordingly.

4) The fourth objective is to process and analyse the data that results from such field work. The outcomes will help us to understand the nature of entrepreneurship in those Chinese software firms and the status of their technology transfer from universities.

5) The fifth objective is to critically evaluate and discuss the results with regards to the conceptual framework and the methodology adopted in this study, and to identify the contributions to knowledge made by this research.

Finally, an equally important aspiration for the researcher is to both assist policy makers and to contribute to entrepreneurship literature by identifying the behaviour of small and medium sized high–tech entrepreneurs, especially with regard to technology transfer within the Chinese context. As this is an exploratory study, the research is premised upon theory building rather than theory testing, although a partly quantitative method is adopted. The research is carried out using a multi-strategy method (questionnaire survey and semi-structured interviews) and philosophically it sits between positivism and interpretivism, being slightly biased towards positivism. It will also contribute to a practical understanding of the entrepreneurial nature and technological issues occurring among Chinese small and medium sized software businesses.

1.3 Structure of the Study

The following provides a summary of the organisation of this study and the contents of each chapter.

Chapter One: Introduction and Overview. This Chapter furnishes information regarding the impetus for this study and the research focus. It introduces the research context, presents the research aims and lists the objectives.

Chapter Two: Industry Background. This Chapter highlights the economic reforms and developments following the late 1970s with a brief introduction of the macro-economic climate within China since then and its effects on the software industry. It also provides a comprehensive description of the status of the software industry in terms of its sources of human capital, financial support and government intervention, and how these impact on industrial development.

Chapter Three: Literature Review. This Chapter reviews the entrepreneurship literature with reference to the research focus given in Chapter One. Hence the literature review is mainly covered by the contributions regarding the definitions of an entrepreneur, the concept of strategic entrepreneurship, the cluster theory, financing issues and the technological issues related with high-tech enterprises. This chapter then also provides the conceptual framework drawn from the theoretical contributions to guide the question design. The framework focuses on: entrepreneurship in an individual, namely the definition of an entrepreneur; how to create and successfully expand a business; and entrepreneurship as a function, which is the impact brought on the market. It also demonstrates that there are some obvious connections between entrepreneurship and environment (institutional environment is emphasised specifically), and between entrepreneurship and networks.

Chapter Four: Methodology. This Chapter specifies the link between the conceptual framework and research methods, the research design, and the research instruments used to collect the information. It also describes the procedure by which data was gathered and analysed.

Chapter Five: Quantitative Data Analysis. This chapter deals with the data collected from the survey. SPSS is used as a tool to identify Mean, Frequency, and Correlation from the responses, which quantitatively provide information about the subjects' reasons for becoming software entrepreneurs, the frequent benefits of running businesses and correlation of some factors affecting technology transfer.

Chapter Six: Qualitative Data Analysis. This chapter draws themes from each interview question and analyses them. The interviews are conducted among entrepreneurs selected from the survey, officials and bankers. The outcomes from entrepreneurs reveal their personal entrepreneurial patterns including what motivated them to be software entrepreneurs, how they respond to the institutional environment and how they manage their businesses. The output from the interviews with officials and bankers demonstrates their perspectives regarding the status of Chinese software industry development, the effectiveness of the relevant government policies and the relevant loan policies from state-owned banks.

Chapter Seven: Discussion of Findings. This chapter is devoted to discussing the outcomes from the previous two chapters and identifying the patterns of Chinese software entrepreneurial activities, especially those related to technology transfer, by comparing the outcomes from the previous two chapters.

Chapter Eight: Conclusions. This chapter draws conclusions on the extent to which entrepreneurship, as embodied in Chinese small and medium sized software firms, affects technology transfer from local universities for Chinese small and medium sized software firms. It reflects on and discusses the major research findings, identifies the limitations of the study, and develops several possible directions that can form the foundation for future research.

Chapter Two Software Industry in China

2.0 Introduction

As described in the aims and objectives, the research conducted is based on China's software industry. It is therefore necessary for the researcher to evaluate the industry's development status. This could also be helpful in understanding the environmental element, which is addressed as one of the important factors affecting entrepreneurship.

The researcher will describe the industry's development by giving a brief introduction to the following issues: the profile of Chinese software industry, government support, the software market, human capital, and the issues regarding technology and financial capital.

2.1 The current status of China's software industry

In China's 10th Five-Year Plan (2001-2005), software was identified as a critical or "pillar" industry. The government considered that this industry should be promoted along with more established industries such as computer manufacturing, telecommunications, lasers, and aerospace engineering. Furthermore the software industry was considered essential to economic progress and national security (China, 2006).

At the beginning of the 21st century, China's software remained a small, underdeveloped and extremely fragmented sector that consisted of thousands of small, under-capitalised firms with few competitive advantages compared with the foreign corporations that dominated the market (Tschang and Xue, 2003). At that time its exports were negligible, despite the fact that Chinese software output had grown on average by a rate of over 30% annually since 1995 and was predicted to continue this rapid growth for several more years (Hu et al., 2008). With regard to

Wen's explanation of China's 11^{th} Five-Year Plan (2006-2010), software would become a core industry and get more attention and support from the government (Hu, 2005). Furthermore, owing to the high growth rate of the Chinese software industry China now has a global and dynamic IT manufacturing sector, and the Chinese software industry does now pose a threat to the more established producers like Japan and India (Quan, 2007).

Here the author is going to give a rough picture of the industry by reviewing its origin and development. Section 2.1.2 will cover the development of the industry in more detail, including the industrial structure and characteristics, the regional distribution of companies, firm size characteristics and some main activities.

2.1.1 Origins of China's software industry

The origins of China's software industry are partly connected with the broader Information Technology (IT) industry, and in particular the Personal Computer (PC) industry. Therefore it is worthwhile to approach this topic by reviewing the PC industry.

In 1958, China had its first computer built by the Institute of Computing Technology (ICT) at the Chinese Academy of Sciences (Xu, 1992). However at that time the institutes of research were isolated from the market, due to the barriers between them and Chinese organisations. Therefore there was little commercial R&D, except on some software development projects scattered and carried out in state-owned research institutes.

The earliest and most well known Chinese IT companies have derived from a variety of sources; generally the more technological companies come from various government research institutes, universities, and "green field" start ups (Lu, 2000).

A few famous Chinese hardware firms made an earlier start, predominantly as spin-offs from universities. This was usually due to a combination of software and hardware technology. This combination has also given rise to software divisions, or even software spin-offs. This was the case in the formation of some well-known PC makers, as we will now discuss, and more relevant information concerning them can be found by accessing their websites as given below.

One very famous example is Founder, which started business based upon research on font processing and pictographic publishing systems from Beijing University. (http://www.founder.com/index.html)

Legend (arguably now China's best known indigenous IT company) was also started by a number of professors leaving the Chinese Academy of Sciences' (CAS) Institute of Computing Technology in the late 1980s, eventually to shape another leading PC brand. (http://www.lenovo.com.cn/)

In the late 1980s, Founder and Legend were authorized to commercialise software products. Some simple information systems, with little attention given to integration or overall design, were also developed by Chinese programmers at some famous Chinese research institutes, such as the Institute of Software at the CAS.

Another university spin-off firm is Stone, which originates from Tsinghua University. Stone also got a start in the software-hardware nexus, specifically designing Chinese character software to be combined with a Japanese printer. This start, coupled with cost advantages, meant that the company was able to gain strong market share and also take advantage of talent from the CAS which was crucial to its products. (http://www.stone-group.com.cn/)

It can be observed from the above cases that the early issues of software and hardware production were heavily entwined, since many of these companies developed technologies that involved some amount of software, often embedded in hardware. There has been a strong influence from research institutes, government spin-offs, and universities in the formation of the more recent pure software firms and also within hardware. Various institutes of the Chinese Academy of Sciences - such as the Institute for Computing, the Software Institute, and even the Institute for Natural Resources - have nurtured a number of start ups in the information security, operating systems and geographic information systems areas respectively (Tschang, 2002).

According to Tschang (2002), the early Chinese hardware firms were short of capability in systems and applications software, even though they had established themselves in the market for both personal computers and highly specific types of software technologies, such as character recognition. Previous to the 1990s the Chinese software industry barely existed with just a few products focused on the local market.

The growth of the internet in China commenced at the end of the 1990s and brought with it both hype and money to China's emerging software industry. The effect this growth had resulted in the software industry experiencing inflated salaries, a flurry of investors and unrealistic expectations of growth. This distracted Chinese software developers from a necessity of mastering the processes and techniques needed for developing mature software designs and integration, such as systems thinking, component-based design, and object-oriented design and development capabilities. In addition it could be observed that customers, financiers and policymakers were also caught up in the hype of the software industry, which tended to distort their behaviour (Brizendine, 2002). The limited capabilities of the Chinese software industry, and its superficial understanding of software processes and technologies, left the industry relatively vulnerable, especially in the event of China's internet bubble bursting. The weaknesses of China's software industry, however, remain hidden owing to the continued growth of the industry.

2.1.2 Development of China's Software Industry

Today the Chinese economy is stronger than most would have predicted in the 1980s, and over the years many high-tech companies have established software arms. Taken as an example, the Legend Group changed its software arm and renamed it Digital China. (This can be confirmed from its website, as stated in section 2.1.1).

This change occurred due to the rise of the hardware sector which eventually increased the demand for computers in Chinese business and society. Furthermore demand has also been increased by the fact that a large number of firms have been required to dedicate resources to systems integration and the configuration and installation of hardware and software in different custom arrangements for their customers (Tschang, 2002).

The new type of software firm, much like Stone in the area of hardware, has come about largely through the actions of private individuals. With the increase of venture capital in China, there have been increasing numbers of firms formed by individuals from a variety of backgrounds (Gartner, 2001).

The Chinese software industry appears to be moving forward on many fronts. The software industry represents a fairly large proportion of the overall computer industry. Given the rapid growth of markets for software products and services in China during the last decade, there is now great potential for further development of the Chinese software industry, including a significant growth of indigenous software firms. The value of the output from the Chinese software industry grew from 4.4 billion yuan in 1992 to a total of 110 billion yuan in 2002, with an annual growth rate of 38%, which is four times the growth rate of China's GDP (Xinwen jujiao, 2003). Table 2.1 shows the high growth of output value for the software industry and its exports during the period 2000-2007. It is worth noting that the average rate of growth of software exports is greater than that of the whole software industry. Additionally, the development target for 2010 is to reach revenue of 1300 billion yuan, raise software export to 12.5 Billion US$ and increase the number of employees of the software industry from the current 1500 thousand to 2500 thousand (Ju, 2008).

Table 2.1 High Growth of Software Industry during 2000-2007 (annual growth rate in brackets)

Year	Revenue (billion yuan)	Annual Growth Rate	Software Export (million US$)	Annual Growth Rate
2000	59.3	-	400	-
2001	79.6	34.2%	720	80.0%
2002	110	38.2%	1,500	108.3%
2003	163	48.2%	1,800	20.0%
2004	242	48.5%	2,800	55.6%
2005	390	61.2%	3,590	28.2%
2006	480	23.1%	6,060	68.8%
2007	583.4	21.5%	10,240	69.0%

Source: Ju (2008) New Steps of China's Software Industry. Talk presented at IPA Forum, 28th October, 2008. Tokyo

The Chinese government has become increasingly aware of the importance of software in the development of the information technology industry and ultimately in economic growth. As discussed below, Chinese Science and Technology (S&T) have provided policies to support the prioritising of software research and development for decades, but promotion of the growth of software firms intensified in the 1990s, and policy support for the software industry as such culminated in the circular issued by the State Council in 2000: "Some Policies on the Encouragement of Software and IC Industries" - often referred to as circular 2000 No. 18 (Guowuyuan, 2000).

Since then this high priority position, designed to support the further development of software, has been underscored by the "Programme of Action for Promotion of the Software Industry" for 2002-2005 issued by the General Office of the State Council, which is normally referred to as document 2002 No. 47 (Guowuyuan, 2002). These policy measures indicate a high level of ambition in terms of creating a viable domestic software production base and more extensive exports of software services.

Taking into account the growth of the Chinese software industry in recent years, and its importance from the perspective of Chinese government, one is tempted to see China as a major growth pole for future software development in the Asia-Pacific region. Meanwhile the reforms of the S&T system have led to new opportunities for high technology entrepreneurship, and in addition many new spin-off firms from research organizations or universities have entered into software production (Baark, 2004).

However, a more cautious assessment of the future role of the Chinese software industry in global markets is encouraged due to its specific characteristics. Since China entered WTO the foreign vendors have expanded greatly, which may even threaten the hitherto impressive growth of domestic software firms in the rapidly expanding Chinese market. In other words, the future of China's software industry depends on a wide range of factors and involves many uncertainties (CCTD Consulting, 2003).

2.1.2.1 Industrial Structure and Characteristics

As a result of these transformations, the Chinese industrial structure usually appears as a new multi-tiered system and Chinese IT software industry is structured in a certain tier of this system. Deng and Dart (1999) investigated various types of Chinese enterprises based on their size, location, ownership and sector, and suggested substantial difference among these enterprises. They are summarised as a three-tier structure and according to Ernst (2005) the structure could be displayed as follows:

Tier one consists of central government controlled firms. These firms are primarily in sectors with a certain degree of natural monopoly or market power and are referred to as large-sized state-owned enterprises (SOEs). The central government shares ownership stakes with the public and with strategic investors, floating some of the companies on the stock market. The government intends to maintain substantial control of this type of enterprise. On the other hand, this type of enterprise has in fact always been under the government's protection and, generally speaking, it is not predicted or anticipated that a dramatic shrinkage of this centrally run tier of large firms will occur in the immediate future.

These large, centrally controlled firms might be able to take advantage of their size, but actually they still differ in various ways. Almost all firms on the central list have a clear business focus in one or two sectors. If turning to the IT industry, it could be observed that central government telecom firms mainly dominate the telecom market in China. Four large telecom firms (China Telecom, China Mobile, China Unicom and China Netcom) are subordinate to the central government. They also experienced re-organisation, and their businesses were transferred off one operator and given to another. This was in the interest of creating stronger, competitive companies that will adopt advanced 3G telecommunications technology.

There is rarely a software company appearing in this tier. However, as previously mentioned, large state-owned companies are normally the target customers of software companies. This is because the choices of those large telecom firms, with regard to technological standards, domestic preferences, and business rules, can largely manipulate and shape the strategic options of developing China's IT software and hardware industry.

In tier two there are diverse and highly competitive firms with a strong international component. Despite their distinct origins, these firms represent a new type of business organisation. The firms on tier two may come from the state sector, from foreign investment, and increasingly from domestic Chinese start-ups as well.

A significant proportion of these firms may have started their business from the state sector, but when they were "state-run" they usually fell under local government control. This type of firm was rarely in monopoly sectors: they were much more exposed to competition than firms in monopoly sectors. As a result, they were much less profitable and, perhaps coincidentally, there was a much less compelling strategic rationale for public ownership. The result is that starting from the mid-1990s local governments have tended to privatise or close down these firms.

At the turn of the 21st century, management buyouts have been permitted more frequently in small and medium-sized firms. Subsequently, this sector is now rapidly restructuring and privatising. As a result firms on this tier have incubated a new Chinese capitalism rapidly bringing new production forces and attracting new interest groups which are coming more into existence.

Following this, hybrid forms are rapidly being created that link privatising state firms with foreign-invested (especially Hong Kong and Taiwan invested) firms and native entrepreneurs. This could be the most dynamic sector of Chinese industry today. Released from state control, with powerful local interest groups supporting the emergence of new companies and with China's booming economy providing ample opportunities, this segment of industry is experiencing wonderful growth and implying the future of 'Chinese capitalism'.

Most of China's IT industry is in this tier because IT firms require a high degree of flexibility to adjust to rapid changes of technology and markets. In order to reap the benefits of an increasing vertical specialisation that transforms the global IT industry, Chinese IT firms surely need to consider how to get their own robust manufacturing, innovation and management capabilities developed properly and rapidly. An essential condition for developing such capabilities is to be able to heavily interact with multi-national firms to understand their global production and to join in innovation networks. It is unlikely that a strong IT industry can be developed by one country or company since the pace of innovation world-wide appears to be extremely fast.

In China some IT firms can be found in the second tier. They represent the type of firms who tend to be relatively flexible and realise the importance of identifying so called niche markets. Hence, normally in order to fill the gap between China and the rapidly advancing global frontier, these Chinese firms can identify a niche in which they can cooperate with multi-national firms for mutual benefit. This is instead of simply following the development map of Japan and Korea in the past. If such a niche can be exploited, then technology transfer, assimilation, and learning can occur much more rapidly.

By looking at the development of China's IT exports, we can observe and track this process more easily. China's fifty largest high tech exporters are predominantly foreign-invested, especially Taiwanese firms, and contain few Chinese central government-controlled firms. There are only two joint ventures involving central government firms, Great Wall's joint venture with IBM in Shenzhen and Putian's collaboration with Ericsson in Beijing. Both are dominated by the foreign partner (Ernst and Naughton, 2005). Moreover, as new waves of innovation have washed over China, these innovations have increasingly been associated with production in the Yangtze and Pearl River deltas, which leads to the end of the days when Zhongguancun, in Beijing, dominated Chinese innovative technology firms. Now, Chinese software firms need more flexibility, which includes the ability to move away from Beijing where central government influence is still strong (Fang and Jiang, 2004).

In the course of their multiple transformations, firms mentioned above have come to exemplify the "hybrid ownership" which is also shown to be a distinctive feature of China's second tier of industry.

Tier three covers companies of small-scale sectors. These companies used to be township and village enterprises, and have recently experienced important changes. As for township and village enterprises (TVEs) themselves, they have become almost entirely privatised; and as a result have partially lost their ties with local communities. Thus firms within the small-scale sector appear to be much more flexible in terms of their labour markets, and strongly tend to be geared towards industrial clusters and focus their business on flexible specialisation.

These industrial clusters, which have often been characterised by hundreds of small firms competing and collaborating, have grown up to serve export markets in sectors of both high and low technology. There is a town in Zhejiang gathering hundreds of small electric hand tool component producers and assemblers. Thus, openness and flexible specialisation is an increasingly important characteristic of China's small-scale sector as well as in coastal areas.

Within the work of Ernst (2005) more examples are given. One discussed by him is that some small sized enterprises have appeared which collaborate the characteristics of flexible specialisation and high technology in a cluster like the one around Dongguan, in Guangdong's Pearl River Delta, where more than 95% of the components of a desktop computer are produced within a 50 mile radius. Most of the production is from foreign invested firms, of course, but small-scale firms also play an important suppliers role.

Furthermore, Ernst elaborated that in China, as in many developing countries, small-scale industry normally represented low-technology, primitive, family firms. Ernst also stated that large-scale industry covered virtually all of modern industry, and that there was a clear separation between large scale and small scale industry. However this is no longer the case, because considerable movement across the boundary of tier two and three can be seen in a way that would not have been conceivable a couple of decades ago. For example, relatively sophisticated industrial sectors where clusters of small hi-tech firms, linked by subcontracting networks, can be alternatives to larger firms. Normally software firms would be involved in this situation.

As previously mentioned, the Chinese government has been aware of the importance of software in the development of the information technology industry and ultimately in economic growth. It is therefore significant that executive support comes from the government, such as the building up of STIPs. These generate high-tech clusters and aim to attract some well-educated overseas returnees and local qualified persons to have software start-ups within. Currently, in China, there are a large number of software start-ups, small sized and located in STIPs across the country. There are also hundreds of software companies that have spun off from universities, and are usually located nearby. However it appears that currently in China, multinationals have not had a great impact on these domestic Chinese firms, either in terms of employee experience and training or by being clients for the firms. The biggest impact appears to be in terms of competition, at the high end of products and services, with multinationals having secured about two-thirds of the domestic product market.

In comparison to their Western counterparts most of the Chinese software companies are still in the developing stage, especially in terms of technological capability. However the industry has a very strong domestic product and service focus. A significant number of the firms known as having better capabilities and business models are product-focused. The percentage of product-based software companies is quite high, accounting for about one third of the total in 2000. The services component is the largest in total sales, where services can range from outsourcing computer services to systems integration. Exports are lower, relatively speaking.

The following table gives clear information about China's software industry breakdown by major sales sectors in year 1999 and year 2000.

Table 2.2 The Industry Breakdown by Major Sector: Sales, in Billion Yuan (one billion yuan approx. equal to 146 million US$ in 2009)

	Software Products	Services	Exports	Total
1999	18.2	23.9	2.1	44.2
2000	23.8	32.2	3.3	59.3
Rate of growth (%)	31.8	35	57	34.3

Source: CSIA(2000)

Some aspects of the Chinese economy are expected to have positive influences on the industry's growth. The situation will be demonstrated in the following section.

2.1.2.2 Regional Dispersion of Industry

The industrial regional dispersion could be investigated by referring to various aspects. This section elaborates on the status of Chinese software industrial regional dispersion through exploring some factors such as the shares of software revenue. This can generally indicate the overall size and output of software industry in various cities, the status of the workforce employment, the R&D expenditure and the advantages of locating due to various benefits from foreign investment and international links.

As stated by Baark (2004) Beijing, Shenzhen and Shanghai represent dominant sites of new firms, and the early development of China's software industry was concentrated in this relatively small number of localities.

In terms of overall size of software industries and output in various categories, Beijing and Shenzhen are still occupying major shares of software revenue in China. Beijing, with its Zhongguancun "Silicon Valley" district, keeps its dominant role in software industry of China, especially in sales of software and system integration services. Shenzhen is a very important centre for embedded software and software exports. However Shanghai remains one of the advanced centres for high technology industries in China.

When considering the aspect of workforce employment, Beijing and Shenzhen represent the largest workforce employed in software industries, with more than double the number of people employed in these industries than in Shanghai, Guangdong, Zhejiang or Shandong. Significantly, both Beijing and Shenzhen boast around 12,000 software researchers, with the other four localities having from around 1600 to 4300 researchers each (CSIA, 2003). However, statistics available for R&D expenditure in the software industries reveal a slightly different pattern of concentration.

Beijing (2.17 billion yuan), Shenzhen (4.15 billion yuan), and Shanghai (2.12 billion yuan) remain the three top spending localities, and in comparison to these three cities most other software centres only spend under one billion yuan. The importance of Shenzhen, in terms of R&D expenditure, is significant and may be related to the existence of research-intensive telecommunication software industries and outsourcing of R&D from Hong Kong (Britto, Cassuikato and Stallivieri, 2007).

The profiles of Beijing and Shenzhen reveal the significance of the research infrastructure and the entrepreneurship unleashed by reforms of the S&T sector as a basis for the development of the software sector.

So far, Beijing is the largest software producing district, with a relatively full range of products balanced with packaged, industrial, and security software, as well as exports. Beijing's prominence is partly due to its status as a centre for government and leading educational and research institutions, as well as the base for a number of well-known computer firms. The software industry in Beijing is concentrated in Zhongguancuan, in the Haidian district. In Beijing there are two leading universities, Beijing University and Tsinghua University, as well as the headquarters and large facilities of a number important early IT companies, such as Founder (Tschang, 2002).

Other regions with heavy concentrations of high-tech also focus on software firms, e.g. Shenzhen (where Huawei is headquartered) near Hong Kong and Guangdong in the southern coasted area. Subsequently, localities that benefited from foreign investment and international links have been critically important. This can also be observed in the case of Shenzhen. Comparatively, Shanghai has fewer companies. It is a leading centre for attracting overseas investment, mainly focusing on finance, and high-tech industries, including electronics and semiconductors. Additionally the infrastructure, universities and government support there are also very strong (Tschang, 2002). Nevertheless, despite these advantages, Shanghai is still not known for any sizeable software companies compared to Beijing or Shenzheng, except the recently listed game company Shengda.

However it appears that Shanghai will do better at integrating services with other sectors, such as finance and manufacturing, as well as consulting due to its better facilities for foreign languages (such as English), exposure, and better links to foreign investors. Additionally, Chinese local software activity also appears to be quite dispersed across the country (Tschang, 2002), and some cities, like Nanjing in the Jiangsu province, that do not have large numbers of firms may have at least one large well-known software firm such as Nanjing's Nari-Relays Group Co.

2.1.2.3 Firm Size

As mentioned before, the Chinese software firms originally come from four models. They are:

1) The model of spin-offs from the government-funded research institutes in the Chinese Academy of Sciences – as represented by Legend, a PC language card maker that became a full-fledged PC manufacturer.

http://www.lenovo.com.cn

2) The model of university-researched technologies being

commercialised by private enterprises which were funded partly by the university and partly by other agents – as represented by Founder, which started by developing electronic publishing systems but is now also a major PC manufacturer.

http://www.Founder.com.cn

3) The model of spin-offs from a state run firm – represented by Great Wall, a PC manufacturer.

http://www.greatwall.com.cn

4) The model of a green field start-up – represented by Stone Group Corporation, a company that was started by university graduates and whose first products were word processing products.

http://www.stone-group.com.cn

According to the CSIA (2000), there are about 5700 software producers in the country (out of the more than 10,000 firms dealing with software), but of the 5700 firms, only about 50 have above 1000 employees, and 70 percent have fewer than 50 employees. About 30 percent are government-owned, 60 percent are privately owned, and the remaining 10 percent are mixtures. When ranked by sales, the top 69 Chinese software firms comprised about 25,700 million yuan in sales in 2001, which is under half of the total output of the software industry (CSIA, 2000).

An obvious characteristic, in terms of the size of Chinese software firms, is that the Chinese software industry consists of many small firms (Klotz, 2004). According to Klotz there are several reasons for China having many small software companies. It is partly due to the fact that the industry is still in an early stage of growth and the fact that they have not yet mastered the art of managing growth in technological capability, process, project size and project quantity in order to take on more complex projects.

Klotz stated that the conventional belief also suggests that many smaller firms are not growing, i.e. are not making much money. The explanation for this is that China's software industry has largely focused on domestic markets, which may act as a further constraint on its size.

However because of the increasing forces of foreign competition, government promotion, and also the diffusion of the internet bubble, as elsewhere in the world, both enormous capital and hype were brought to China's infant software industry. Therefore firms within the Chinese software industry have shown a fast growing momentum with numbers and sizes in terms of their sales, as demonstrated in the following table.

Table 2.3 Distribution of software enterprises' sales from 2002 to 2004
Unit: company

Sales	2002	2003	2004
Over 1 billion yuan	12	17	21
0.5 to 1 billion yuan	10	13	19
0.2 to 0.5 billion yuan	19	42	60

Source: www.csia.org.cn/home/data/output-full/d050101.jpg

Nevertheless, in comparison to the IT sector, the Chinese software sector is still in a weak situation. This is because the development of a dynamic software industry, unlike computer or semiconductor manufacturing, requires more than the ability to mobilise resources quickly. It requires soft and intangible skills such as creativity, technical experience and managerial know-how as well as the capacity for commercialisation.

2.2 Government Influence

The Chinese government recognises that its software industry is still in an infant stage, in terms of technological capabilities and firm size. It is also a critical industry which is essential to economic progress and national security (Guo, 2001), the government therefore assists the industry in many ways. This can be demonstrated by reviewing the policies and projects the government has launched in order to encourage the development of the software industry, and further what has been achieved, by referring to the building of IT infrastructure and science parks.

2.2.1 The policies and projects

Besides the influence on the software industry, the Chinese government has also had an early influence on the hardware industry. This is shown by its sponsoring of national research efforts on "core technologies" deemed essential to the nation's computer industry. For example, the projects have included various large scale government funded projects for developing Chinese competence in core computer technologies, such as the Ministry of Science and Technology's 863 Research Programme, and other government research projects that became the basis for Founder, Legend and other companies. A series of government "Golden" projects were started to expand the country's e-commerce and infrastructure, and various sector applications, e.g. e-government (Klotz, 2004).

In August 1988, approved by the State Council, the Ministry of Science and Technology (formerly called State Science and Technology Commission) took charge to implement the "China Torch Programme". The programme was established to keep in line with the general policy of reform and open up to the outside world, with a view to exerting the potential advantages of China's scientific and technological capabilities. It was also designed to promote commercialisation, industrialisation and internationalisation of new and high technology research products thereby to achieve the mission of revitalising the country through Science and Education. Eight items constitute the main content of the programme. Among them, there are four items which are relevant to developing the software industry. These items are about the establishment of the software industry base, an innovation fund for small technology-based firms, international business operation of new and high technology industry, and personnel training. Along with the implementation of the "Torch Programme", several national high-tech industrial development zones have been established across China, which provide firms with first-rate infrastructure like roads, buildings, electric facilities and so on, and also a variety of preferential taxes and collective services. Among them, the first zone was established in 1988 as a trial in Beijing's Zhongguancun (Gu, 1999).

On 24th July 2000, the government took a very big step in launching a policy package in "Document No. 18". This is the most important central government policy for the software industry to promote the "Software and Integrated Circuit Industry Development" (Guowuyuan, 2000). The document's policies for software companies include:

1) Value-added Tax (VAT) refund for R&D and expanded production;

2) Tax preferences for newly established companies;

3) Fast-track approval for software companies seeking to raise capital on overseas stock markets;

4) Exemption from tariffs and VAT for software companies' imports of technology and equipment;

5) Direct export rights for all software firms with over one million US$ in revenues;

6) Right to set salary levels and to grant bonuses to investors.

In 2002, the government then launched another very important Document called "No. 47" called "The principle of rejuvenating the software industry"(Guowuyuan, 2002). Document No. 47 explicitly states that domestic software products should be the first purchasing option for government procurement. It requests that in the government's information engineering project, the minimum share of money for software should be no lower than 30% of the total investment. It also includes training and education of the software industry in the government's agenda and requests that during the fifth five year plan (2001-2005), the government should spend more than four billion yuan on R&D in the software industry.

2.2.2 The achievement of building relevant infrastructure and science parks

Over the years, the government's efforts in the high-tech industries can be observed by the impressive achievements of having built a national telecommunications infrastructure and the widespread adoption of IT. In particular, wireless phones and related telecommunications products are key elements.

In 1991, to meet the challenge of worldwide technological revolution and develop China's new and high-tech industries, the State Council officially approved the establishment of the first batch of 26 state-level new and high-tech zones, and issued a series of related policies. In the following year another 25 new and high-tech zones were approved. In 1997 the construction of the Yangling New and High Agro Technology Development Zone was approved. At present, along with the Beijing New Technology Experimental Zone, there are 53 state-level new and high-tech zones in the country (Science & Technology, 2004).

The construction and development of new and high-tech zones keeps the development of China's software industry in line with the current trend of the new technological revolution and international competition. It also constitutes an important part of the implementation of strategies to develop China through science and education in the near future. After ten years of construction and development, the new and high-tech zones have been improved significantly. They have been improved in many respects, such as: reform and development, construction of an innovative system and of the enterprise incubation capacity, the fostering of innovative personnel, and making important contributions in order to attain the second-stage strategic objective of China's socialist modernisation drive (Science

& Technology, 2004).

By constantly improving the soft and hard environment, China's new and high-tech zones have created favourable conditions for scientific and technological innovation and industrialisation. This has also concentrated a large number of new and high-tech enterprises. According to statistics, by the end of 2000 China's new and high-tech zones had registered 20,796 enterprises, including 1,252 with an annual output value exceeding 100 million yuan, 143 with an annual output value surpassing one billion yuan, and six with an annual output value topping 10 billion yuan (Science & Technology, 2004). Among these enterprises were some large local companies and some foreign invested enterprises (FIEs).

The new and high-tech zones have also become major contributors to the IT industry. Around 50 to 80 percent of high-tech products (such as program-controlled exchange, optical-fibre cable, computers and related devices, software, and network products) are produced by enterprises in new and high-tech zones. In recent years nearly 6,000 research results at the provincial-municipal level or above have been industrialised in new and high-tech zones, and high-tech products with independent intellectual property rights or enterprise-owned technology make up more than 80 percent of the total output of new and high-tech zones (Science & Technology, 2004).

Nearly 300 scientific and technological enterprise incubators are located in new and high-tech zones. These incubators provide sites, facilities, consultation and other services for scientific research personnel and students who have returned from overseas to establish small or medium-sized technology-based enterprises, organize venture investment, and actively help these enterprises open financing channels (Science & Technology, 2004).

According to Harwit (2000), a typical Chinese incubator has one or several floors of a publicly owned office building. The business plans and market potential of incoming tenants are checked to decide whether they fit in with the incubator's industry specialisation.

Harwit also categorises the Chinese incubators into three main types: university incubators, returned overseas students incubators and SOE-highlights incubators. His view of the role of such incubators is that they are prepared in order to contribute to China's high-tech economy.

Through all these efforts the Chinese government anticipates that the goals as stated in the 10^{th} Five-Year Plan will be achieved: this is by increasing domestic companies' share of the Chinese software market to 63%, almost double the current share, and expanding software exports to $1 billion, a ten-fold increase, by 2005.

Table 2.4 China's Top 10 Firms in Software, Revenue in 2005 and Year founded

In million US$ (one million US$ = 7.87 yuan in year 2005)

Name of Firm	Software Revenue	Year Founded
1. Shenzhen Huawei Technologies Co., Ltd. 华为技术有限公司	1,932	1988
2. Haier Group 海尔集团公司	966	1984
3. Shenzhen Zhongxing Telecom Co., Ltd 中兴通讯股份有限公司	808	1997
4. UTStarcom Co., Ltd UT 斯达康通讯有限公司	761	1991
5. Digital China Co., Ltd (Legend Group spin-off) 神州数码中国有限公司	587	2000
6. Insigma Technology Co.,Ltd. 浙江浙大网新科技股份有限公司	534	2001
7. Panda Electronics Co., Ltd. 熊猫电子集团有限公司	517	1936
8. Peking University Founder Group Co. 北京北大方正集团	349	1986
9. Inspur Group 浪潮集团有限公司	330	1945
10. Hisense Group 海信集团有限公司	312	1969
Some Major China-based Packaged Software Providers		
Beijing UFSoft Group Co., Ltd.	127	1988
Kingdee International Software Group	74	1993

Source: http://tech.sina.com.cn/it/2006-05-30/1013964757.shtml

2.3 Technology issue

2.3.1 Product vs. Service

It is necessary to clarify the distinction between 'product' and 'service' in order to understand the issue of technology in China's software industry. According to Tschang, software products will sometimes be customised, and are therefore known as 'customisable products'. In order to understand this kind of product, it can be described as a product more closely resembling a service than a packaged product. This is because it may involve making just a few 'copies' or versions of a product, but it would not be termed systems integration. Some products, like certain firms' enterprise resource planning software packages, have to be customised by as much as 50 percent. This will depend on the level of sophistication of the customer, and the degree to which specifications have to be changed for each customer (Tschang, 2002).

Tschang tried explains a software product in detail as follows. Customisable products possibly involve a higher level of firm autonomy. Therefore the software developer may have to do higher end work with greater responsibility, which includes the requirements analysis and initial high level design stages. The ownership of the intellectual property also allows the developer to make customised copies for additional customers.

Some of the 'product' work that firms claim to be doing is done on a custom basis and charged on a project basis. However this work it is not being developed in the same way as 'packaged products' with brand names, hence the outputs are more appropriately called customisable products, or even services. Also, when the industry was at an early stage, and when branding was still a problem for many firms, the creation of customised products was a more effective strategy for promoting their capabilities.

The notion of services also varies widely, from systems integration to 'IT solutions' and export services. In terms of export services, for China's software firms it can also embody a wide range of activities, from work that just utilises programming talent to work that requires partial product development activity. This is because sometimes requirements analysis or systems design is not outsourced to a service company (Tschang, 2002).

More definitions about software services can be found on the internet, including one definition of "Software as a Service (SaaS)" as "a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet" (TechTarget, 2009). The benefits of the software service model were further listed as follows: "easier administration; automatic updates and patch management; compatibility which means that all users will have the same version of software; and global accessibility" (Blogcatalog, 2009).

2.3.2 The technical capabilities of China's software firms

In China many of the largest Chinese firms are working on either systems integration or a combination of products and systems integration. Nine of the thirteen largest firms in Shanghai (above 100 million yuan in revenue) are systems integrators (i.e. doing a lower value added kind of work). In Beijing only five out of the seventeen firms are involved in systems integration, and the rest have software business either in products or some mixture of systems integration and products. This implies a lower level of capability among the Shanghai based firms, looking at the way in which they run their businesses (Tschang, 2002).

Given that it is still in its infancy, the Chinese software industry suffers from several problems, such as: the low ability for commercialising software research into products; the shortage of software talents in high-end business and hence less diversification of products than some other more economically developed countries.

The Chinese government has paid attention to these facts and has made efforts to strengthen software R&D and enhance software education, as designed in China's tenth five year plan. In terms of how to strengthen R&D from the government perspective, it was clearly stated that in the government support sector it was necessary to establish a software industry base, providing funding to small technology-based firms to push forward innovation (Torch Programme), and spending more than four billion yuan on R&D in the software industry from 2001-2005 (Document No.47) (Ju, 2008).

In the 10th Five-year Plan, the government strategically link software education with the industry's designation. In 2001 the State Department of Education authorised the launch of 35 models (university-based Software Institutes) which were financed by China's banks and some domestic as well as foreign companies (EOL, 2009).

The first six software institutes in Beijing are associated with some famous domestic universities like Peking University and Tsinghua University. These institutes have used international textbooks and adopted a corporate management model. They are free to offer courses based on market demand, which is different from China's traditional, government controlled educational institutions. This great change embodies the ability of the Chinese government to reallocate resources quickly and on a large scale (IDC, 2001).

During the 1990s, a clear trend emerged showing that many graduates from China's most elite universities went abroad to pursue higher degrees. It is not easy to find accurate data to show the return rate during recent years, however Chinese policymakers have undoubtedly made substantial efforts to promote technical and business exchanges that involve overseas students and have also devoted enormous resources to this. These efforts embody several aspects such as activities designed to involve scientists, researchers, business people and policymakers in cross-regional exchanges of know-how and information; and the opportunities provided for overseas mainland professionals to build relationships with their domestic counterparts (Zhang and Li, 2001).

Additionally, the Chinese government has encouraged Chinese overseas students to return and start their technological enterprises in China, while some local high-tech firms compete to recruit returning students. Many municipal governments have established "Returning Students Venture Parks" within new and hi-tech zones. Meanwhile in the USA, especially in Silicon Valley, an economic downturn has been experienced, which has increased the attraction of the promised lucrative market opportunities in China. The reality seems to be that there have been more and more overseas Chinese returning, to either join multinational companies in China's operations, start businesses or work for businesses started by other returnees (Ju, 2008). However wherever they work, they are expected to become an important source of technical and managerial skill for the Chinese software industry in the future.

2.4 Software market

2.4.1 Domestic market

It is obvious that China already has a large domestic software market which attracts a great number of domestic software firms as well as foreign software firms.

There are several reasons for the size of the software market in China. The Chinese economy is a major factor motivating the software industry's growth. For example, the strength of the manufacturing sector, which uses software in many products besides computer equipment (like telecommunications equipment, some of which is now 50% software, consumer electronic products, and automated machinery), provides a high demand for software within China. There are about 20 million small to medium sized enterprises in China, which provide a substantial business user base (Tschang, 2002). This base was expected to increase the domestic software market from 10 billion to 100 billion since 2000 (CSIA, 2000).

The consistently increasing proportion of the population of China owning personal computers provides another important source of demand. An increase in the use of PCs could comfortably sustain the expansion of a number of domestic manufacturers. The low costs of Chinese PCs have caused US, Japanese and even Taiwanese manufacturers to either lose market share or be forced into local joint ventures. Although currently the domestic PC-user base is still small as a proportion of the total population, there appears to be enough of a critical mass of business and household users to also sustain a viable population of software firms. Most importantly the uptake rate is growing rapidly year by year (Choi and Nailer, 2005).

Furthermore, the government procurement has also risen and hence contributed to the expansion of the market size. This is especially manifested at the regional and municipal government levels, and thus enables local firms to bid for and supply IT systems (Quan, 2007).

The following table shows the market shares of some countries, including China, in terms of their software production in the world market. From this table we can observe that the USA, Western Europe and Japan have all had relatively large production levels from 2000 to 2004. Production levels have appeared to be consistent with global growth levels, although it is interesting to note that there has been a slight decline in the dominance of the USA and Western European countries as the production of other countries has increased. By contrast, despite its comparatively minute software production, China has managed to maintain a steady increase in its production and market share.

Table 2.5 Shares of several countries among global software production
Unit: billion US$

	China	USA	Western Europe	Japan	India	Korea	Global	Annual Growth
2000	7.17	240.00	186.00	57.2	8.85	8.32	596.00	
Share	1.20%	40.2%	31.20%	9.60%	1.48%	1.39%	100%	
2001	9.60	261.20	198.00	66.05	10.23	9.9	621.9	4.35%
Share	1.50%	42.0%	31.80%	10.60%	1.60%	1.60%	100%	
2002	13.3	279.70	215.90	71.2	12.2	16.83	696.5	12.0%
Share	1.91%	40.1%	31.00%	10.22%	1.75%	2.42%	100%	
2003	19.3	296.70	224.80	78.5	16.0	20.1	748.0	7.39%
Share	2.58%	39.6%	30.05%	10.49%	2.14%	2.69%	100%	
2004	27.81	311.50	238.20	83.2	20.0	20.7	782.6	4.63%
Share	3.55%	39.8%	30.44%	10.63%	2.58%	2.65%	100%	

Source: www.csia.org.cn/home/data/output-full/d050101.jpg

2.4.2 The influence of multinationals

The Chinese software market used to be dominated by foreign corporations like Microsoft, IBM and Oracle with packaged software sales accounting for over 65% of total sales, due to their well-known brands and established products. Therefore it is clear to see that multinationals offer very strong competition in the packaged software sector, especially in middleware and certain consumer software, such as operating systems and office productivity products (Suttmeier and Yao, 2004).

However, recently the market has grown increasingly competitive. Some big local software firms like Ufsoft and Kingdee (the only two domestic software companies ranked in the top ten in China) occupied 60% of China's accounting software market. Being local firms they have specialised knowledge of Chinese financial practices and additionally can benefit from the preferential purchasing policies of the Chinese government. Thus, by 2002, Ufsoft's business had made huge developments, and as a result improved its ranking from 7th to 4th for packaged software sales, rising to levels just slightly below those of IBM, Microsoft and Oracle (Saxenian, 2003).

As previously mentioned, although this improvement exhibits a rapid growth rate, the Chinese software industry is still quite immature, with less diversified products compared to other developed countries. The products cover three main segments which are: platform software, middleware software and application software.

The main domestic Chinese software players are extremely fragmented, with thousands of very small enterprises. These enterprises normally have less than 50 employees. Due to operating on such a small scale, they are much more flexible than large enterprises, but their power and influence on the market is limited. Mainly they just focus on developing niche applications and are very domestically-oriented, accounting for nearly 90% of software products sold in the local market (Saxenian, 2003).

Nevertheless, the local software firms still hold some strength to expand business in the domestic sector while facing strong competition from multinationals.

Having local domain networks and knowledge, the local firms have the ability to work with domestic product manufacturers to specifically design products for local industries and domestic businesses because they deal with end users on a local basis.

2.4.3 International markets

Software exports have grown rapidly, but still constitute only a relatively small share of the total software production in China. Compared with Ireland (12.7 billion US$, 2003) and India (9.9 billion US$, 2003), China's software exports remain small.

CSIA produced statistics on the contribution of Chinese software exports to the total software production in China from 2001 to 2005. These are shown in the following table.

Table 2.6 Share of software exports among total software production in China (2001–2005)

Unit: billion US$

	Total software production	Exports revenue	Occupancy
2001	11.6	0.88	7.5%
2002	16.2	1.81	11.3%
2003	23.4	2.41	10.3%
2004	35.0	3.39	9.7%
2005	43.8	4.83	11.0%

Source: www.csia.org.cn/home/data/output-full/d050101.jpg

(Exchange Rate follows the Year of 2009).

The vast majority of Chinese software exports in 2002 are taken up by Japan (60%) and other South East Asian countries (21%). However, the markets in the USA (12%) and Europe (6%) have become more important destinations for software exports (CSIA, 2003).

The reason for Japan's large uptake of Chinese exports is the similarity in cultural background, the use of double byte coding for characters (or pictograms/ideograms), and traditional business ties, particularly in the North-Eastern provinces of China. Dalian and Shenyang have developed several firms with strong export orientation towards the Japanese market. One of the leading Chinese software firms, NEU-Soft in Shenyang, survived its early years on the basis of outsourcing contracts for Japanese clients, which in 1991 constituted of two-thirds of the company's revenue. Later, the company entered into a joint venture with the Japanese auto-electronics firm Alpine. However, given that the firm subsequently achieved a successful expansion in the domestic Chinese market in the late 1990s, exports only provided ten per cent of its revenue in 2000 (Kroeber, 2001).

Shenzhen is also a leading centre for software exports, capitalising to a considerable extent on its geographical proximity to Hong Kong and its relationship with Taiwanese producers. In recent years Shanghai has made great efforts to catch up with high-tech industrial development through formulating aggressive plans to attract foreign clients and investments in its software industry, including setting up extensive facilities in the Pudong Software Park. Despite these efforts, software exports only accounted for less than nine per cent of the production value of software industry in Shanghai in the past. The reasons put forward to explain this are a lack of interest in developing overseas markets, a lack of skilled software project managers and innovative products, and, especially, a lack of internationally acknowledged certification for quality of management and products – such as a license under the Capability Maturity Model (CMM) – is holding back the export potential of Shanghai's firms (Zou, 2002). The high demand from the domestic market is also a strong factor, and indeed several firms, like Shanghai Huateng Software Systems that was established in a joint venture with US-based Tandem Computers and which did a great deal of outsourcing in the early 1990s, have now abandoned much of their export work to focus on more lucrative domestic markets in the financial sector (Kroeber, 2001).

At the same time, it is clear that much of the demand for Chinese exports has hitherto been based on labour cost considerations and to some degree also on the Chinese language capabilities of programmers. Given the manpower shortages that continue to characterise the Chinese software industry, it is unlikely that China will be able to emulate the Indian success in entering and expanding in overseas markets. An evaluation of offshore markets elaborates that the cost advantage of outsourcing to China is high, given that IT salaries are in the range of 3000-8000 US$ and that access is essentially given to highly competent university graduates (Britto, 2007). However, other sources show that "Software companies now exist in China not just because of labour quality but also because it is a buyer's market. More simple work that can be done in India can now also be done in China, but scalability and value chain growth will take time." (neo IT, 2003, p11). For more advanced and reliable services most international clients will still turn to Indian suppliers (neo IT, 2003). The software exports data of China and India is shown below:

Table 2.7 Software exports revenues compared between China and India
Unit: billion US$

	2000	2001	2002	2003	2004	2005	2006
China	4	7.3	17	20	28	40	-
India	62	86	74	95	130	172	720

Source: www.csia.org.cn/home/data/output-full/d050101.jpg

2.4.4 Piracy issue/IPR

Although the Chinese software market is potentially large and attractive, it still faces some obstacles affecting its development. One of the most obvious problems is software piracy. It is perhaps more accurate to say that the single most controversial issue for software vendors in China is the rampant copying that takes place in many Chinese cities. Foreign vendors have always complained about the widespread nature of illegal copying of software products in China, but Chinese software companies have increasingly joined the chorus (Peoples Daily, 2003). In December 2001, as one of the leading Chinese software firms, Beida Founder sued two Beijing companies that had installed Founder's software in their typesetting equipment and it won the lawsuit. As a result Founder were awarded 600,000 yuan in compensation (Baark, 2004).

The piracy rate in China is relatively high compared with that of other countries (as shown in Table 2.9), and this implies a widespread disregard for intellectual property rights in China. Part of the reason could be that China has a long historical culture of learning by copying, and emulation of classical works. Further, the price differential between legal software and pirated copies in many developing countries, including China, encourages the market players to promote pirated copies to customers to seek higher profit.

However, in China there are two other factors contributing to the diffusion of pirated copies of software programs. One is the poor implementation of existing laws, and the other is that some local government officials actually protect some of the firms that thrive on production of pirated software in order to maintain higher regional production output – 'market imperfections' which Foster (2009) describes as 'grit' in the system. With China's admission into the WTO, China has been expected to further protect intellectual property rights, and in particular improve software products. Nevertheless, a survey conducted by the Business Software Alliance (BSA) only shows marginal improvement. Meanwhile the ingrained habit of accepting copyright infringement has become embedded in Chinese culture and is now a social norm, it is therefore difficult to combat piracy and break such habits (People's Daily, 2003).

Without doubt the widespread existence of software piracy in China as a phenomenon has shaped the development of the Chinese software industry decisively. For many years software firms have been forced to bundle software with hardware, or with services, in order to expand markets and maintain profit rates. The importance of systems integration or embedded software in the business portfolio of most major software firms bears witness to this tendency.

The following table reflects how serious the piracy in China is. It is also interesting to note that the piracy rate in China is second only to that in Vietnam.

Table 2.8 Piracy Rates Out of Business Software Revenue by Country, 2000

Country	%	County	%	Country	%	Country	%	Country	%	Country	%
Vietnam	97	Russia	87	Greece	64	South Korea	57	Italy	46	Japan	38
China	92	Bolivia	81	India	62	Poland	54	South Africa	45	Germany	23
Indonesia	88	Thailand	79	Brazil	59	Taiwan	52	France	40	UK	22

Source: Access Asia, p56

It is inevitable for piracy to push players to compete by cutting prices rather than by improving quality of features. The Chinese government has kept announcing plans to crack down on software piracy. In 2000, Document 18 outlined harsh penalties for piracy, which included several penalties such as fines of 5-10 times the value of the pirated software. This certainly appears to indicate that the Chinese government had a strong desire to protect intellectual property and promote software development at that time (Saxenian, 2003).

2.5 Human capital

Human resources are a key factor for sustaining any economic and social developments. Education and training has been one of the China's priorities for years. Adult literacy had increased to 93.28% in 2000, as shown in Table 2.10.

Table 2.9 Education Indicators in China

Indicators	1990	1995	2000
Adult literacy (% of over age 15 can read and write)	N/A	N/A	93.28%
Primary education (million) (enrolment from 6 to 12 years age)	122.4	132.0	135.5
Secondary education (million) (enrolment from 12 to 18 years of age)	51.1	61.9	78.2
College Education (million) (college enrolment)	2.1	2.9	4.1

Source: China Statistical Yearbook, 2001, China Statistics Press.

The importance of research organisations and universities as a breeding ground for software entrepreneurs was revealed in statistics pertaining to the background of employees in software industries surveyed in 2002. As much as 71 percent of the workforce has entered software firms from universities or research organisations, while 17 percent came from various vocational training institutes or on-the-job training programs. The remaining 12 percent were students who had returned from overseas (CSIA, 2003). This latter category represents the crucially important "brain circulation" identified by Saxenian (2003), and has recently been recognised as vital to new entrepreneurship in software parks and high-tech zones in China.

Table 2.11 shows the number of student enrolments in software subjects in 2004, and the relevant status from diploma student to PhD student.

Table 2.10 Student Enrolment Status

Unit: person

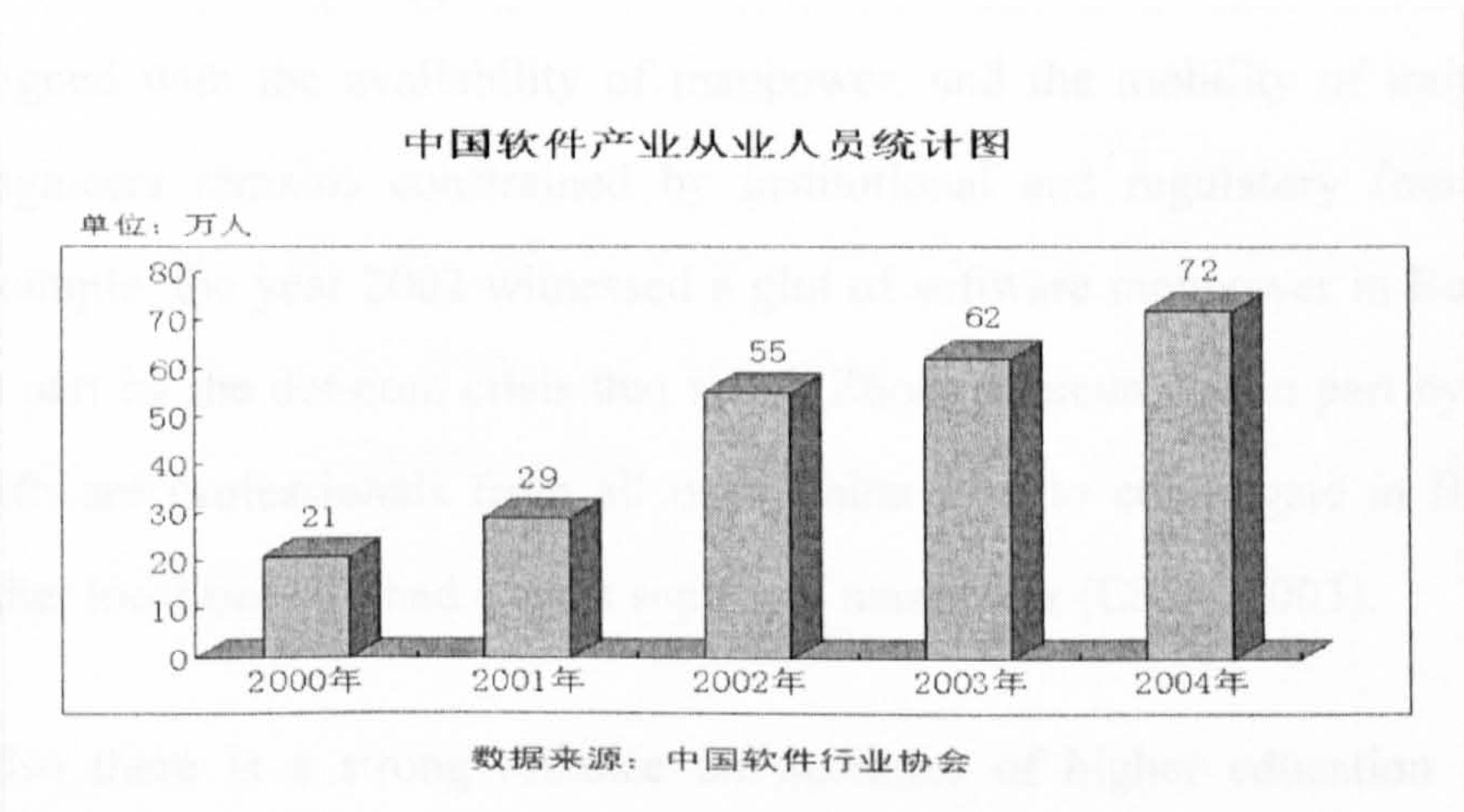
	Software subject	Relevant subject	Total
PhD student	5355	3839	9193
Master student	38520	19741	58261
BA student	51327	1042912	1094239
Diploma Student	55732	642692	698424

Source: www.csia.org.cn/home/data/output-full/d050101.jpg

This large IT student body generates huge numbers of graduates each year. In general, software engineer and IT technician have recently become popular careers. This has helped to maintain a steady increase in the number of software engineers. The growth details are illustrated in Table 2.11

Chart 2.1 Software Employment in China

Unit: 10 thousand people



Source: www.csia.org.cn/home/data/output-full/d050101.jpg

Chart Title: Statistics Chart of Employment in Chinese Software Industry

Translation: Graph shows employees in software industry in China 2000-2004, Source is Chinese Software Industrial Association (CSIA)

Nevertheless, many Chinese software firms are concerned about the shortage of highly skilled software professionals. This might be because the supply of highly qualified computer and software graduates remains limited. In China most universities have few software programmes or departments, and those that do tend to emphasise traditional engineering fields rather than computer science. Local companies, therefore, mainly recruit software engineers from Computer Science and Applied Mathematics departments.

This has resulted in a real shortage of high-level system architects, designers and project managers, and thus limits the presence of Chinese firms in the international software outsourcing business. Currently many people learn such skills while working for foreign-owned software firms or in joint ventures; the technological spill-over that occurs with mobility of human resources between foreign and domestic firms is one of the elements of China's strategy to upgrade its software sector. In addition to the limited specialist skills held among the workforce, problems have also appeared because the location of software industries is not fully aligned with the availability of manpower, and the mobility of trained software engineers remains constrained by institutional and regulatory frameworks. For example, the year 2002 witnessed a glut of software manpower in Beijing, caused in part by the dot-com crisis that shook Zhongguancun and in part by the fact that software professionals from all over China tend to congregate in Beijing, while other localities still had a short supply of manpower (CSIA, 2003).

Also there is a strong reliance on institutes of higher education and research organisations for training of potential software industry employees. This could be a problem in the long run, since the projected human resource requirements of the software industry in general show that there is a gap between supply and demand of approximately 20,000 people annually, who are unlikely to be supplied from universities and colleges.

Most of the major universities, including general universities such as Beijing

University, Tsinghua University and Nanjing University, have recruited around 800 students in software related subjects every year (CSIA, 2003), and the rate of growth that can be feasible for this type of education is limited. Moreover, the actual demand for skills is not necessarily oriented towards people with higher education degrees.

Thus the fact that around 77 percent of software professionals are graduates from university and college education indicates an important structural problem in the training of software professionals. Compared with other software producers, such as India, China has lacked training schemes for basic level technicians and there has been a tendency to employ people with relatively high levels of education for basic programming tasks in many Chinese software firms. According to one source, 16 percent of software engineers engaged in elementary programming had a PhD degree (Business Alert, 2003). Accordingly, several initiatives are being implemented to boost the short-term training of software professionals, including collaboration with Indian and US training institutes and universities (CSIA, 2003).

For example, Baark (2004) describes that the Jade Bird Group, associated with the Beijing University, has set up a joint venture with India Aptech Co. to provide diploma courses and degrees for more than 22,000 people at 76 training centres in various cities in China. Furthermore, most of the large software firms in China have launched some sort of training facilities to meet the requirements from either their own business, or from the other software producers in China. Another example is that of Top Group, which established eight information technology colleges in software parks in China. The expansion of private training facilities for programmers has been expected to support China to achieve a more balanced framework for development of software manpower, and at the same time support the expansion of manpower resources as the domestic industry matures (Baark, 2004).

In terms of personal income, generally speaking Chinese software developers earn a relatively low salary. In 2000 the annual salary for a BA degree-holder in Computer Science was approximately $7,300 in Beijing, which is quite low when compared to international standards. This problem was reflected by the very high employment turnover rates, which were as high as 20-30% annually. The problem was also magnified by the trend of human capital appearing more interested in finding jobs in foreign companies or joint ventures, because they often provide higher salaries and can offer the opportunity to go abroad (Saxenian, 2003).

2.6 Financial capital

As with many private enterprises in other industries, the privately owned software enterprises find it difficult to obtain financial support from Chinese banks in comparison to large state or collectively owned software enterprises. This may be because the Chinese banking industry has been dominated, until very recently, by banks which are themselves SOEs. It was only in 2003 that foreign owned/invested banks acquired the right to make loans in RMB (Carcia-Herrero, Cavila and Santabarbara, 2006).

Given this situation, the majority of privately owned software firms were self-financed and this could hinder any further development. The main reason for Chinese banks being reticent in providing financial support to privately owned firms was the fact that they could be open to more of a risk than was traditionally the case when investing in state-owned firms. Especially, as software firms are normally credited lower due to the fact that the majority of their assets are intangible and intellectual and are therefore less reliable for banks to lend against (IFC, 2002). However, this may change as the banking sector is reformed, part of which is the recognition that many SOEs are essentially insolvent and the government's consequent desire to drive them to become viable or to close down.

In Western countries, venture capital is an important mechanism for financing new technology ventures. However in China it is not currently a realistic option for software firms. The domestic venture capital firms are organised differently by local governments, universities and enterprises, with funds coming from the public sector. Many Chinese fund managers have low-levels of technical and business understanding of the software industry, and hence lack the ability to objectively evaluate potential projects and ideas (White, Gao and Zhang, 2002). Consequently, if they are honest and keen on maintaining their jobs, they choose to invest in SOEs since they perceive there to be no risk, even if the investment is likely to become a bad loan. On the other hand, some take the opportunity of making under-the-table deals with enterprises without being concerned about the real value of the projects. If this is the case it means that funds may not generate a full return.

International investors also appear less enthusiastic to finance start-ups in the Chinese software industry. There are several reasons for this. One is perhaps that the Chinese software ventures have so far been unable, or unwilling, to create realistic business plans for potential lenders, and are seen to have inadequate pools of technical and managerial talent. The other reason is that they are concerned about the funds remittance system, because foreign firms are not yet allowed to be listed on the Chinese stock market (in Market A), and the Chinese RMB is still not convertible (Saxenian, 2003).

These problems, existing in the Chinese financial system, affect the whole economy as well as the development of the software industry. Therefore China's economic society requires the development of a healthy financial system, as well as a reliable and well-functioning legal system, in order to fully realise its potential in the long run.

2.7 Conclusion

This chapter has briefly reviewed the features and current status of the Chinese software industry. To understand these features and the status of the industry it is crucial to conduct further research.

One of the most important changes to have taken place in China during recent decades is the broadening of players involved in innovation and their role in the development of new products and services.

In the traditional Soviet system, state-owned and controlled research institutes dominated the process; gradually, various forms of spin-off firm and other enterprises have become more important. The software industry has drawn extensively on this process, with the majority of firms originating in research organisations and universities. The orientation towards research is still very strong among Chinese software firms, and some key figures still adhere to the belief that technical sophistication is the core of competitiveness, despite the fact that successful firms are those that have responded well to market signals.

The policy adopted, initially in the 1970s and 1980s, for support to software development was extremely narrow, focusing exclusively on priority research projects. Throughout the last three decades of the century Chinese policymakers were focusing on hardware rather than software. For this reason, the commercialisation of software was not a serious priority, and the need for a good institutional environment (such as protection of copyright) and adequate financial resources for the emerging software producers was largely ignored – despite extensive rhetorical statements. On the other hand, the emphasis on hardware production and technology transfer in the IT industry has provided a significant impetus for software production in areas such as telecommunication and embedded software. The potential for additional interaction between software and hardware in the Chinese industrial system is a distinguishing feature that may prove beneficial in the long run.

Human resources for the software industry in China have primarily relied on research institutes and universities. However, in the rapid expansion of the industry and for the future, it is unlikely that universities or other higher education institutes will be able to provide sufficient numbers of well-trained software engineers, or indeed the right kind of software professionals for the industry. The swift expansion of training opportunities in programs run by domestic schools – often with a foreign curriculum and/or instructors - promises to improve the skill levels of the many technicians that are required for expansion of the software sector. Returned overseas students have come to provide a new and entrepreneurial component of human resources in software.

The problem of software piracy probably biased many Chinese software producers towards bundling hardware and services with software development. Although the problem has abated somewhat, with stricter control of intellectual property rights, the consequences of piracy still appear to cripple domestic producers of software as much as, if not more than, foreign software vendors. The Chinese government has undertaken new policies that seek to provide better incentives and environments for the growth of the industry, such as software zones. However, the importance of rapid IT diffusion in Chinese society should not be overlooked, as the market for software has grown rapidly in connection with the spread of microcomputers and mobile phones. The Chinese government has also utilised public procurement policies and its current campaign for the spread of information within Chinese society ("Informatisation") in order to generate important new markets for the domestic software industry.

Inadequate access to financial resources has remained a serious constraint for the development of the industry. While funding through major state-sponsored research projects under the five-year plans and the 863 high technology plan has been important for the development of key software programmes, these resources did not help much in the commercialisation phase. It has been crucial for the industry that spin-off firms were able to accumulate their own funds through sales of IT hardware and services during the early part of their growth. In other words, retained profits from sales to rapidly growing hardware and service markets became a major source of finance during the reform period.

In recent years stock markets and venture capital funds have also supplemented these sources of finance. Nevertheless, many Chinese software firms continue to be constrained by the difficulties of raising adequate financial resources from conventional sources such as banks. Lack of funding for expansion plans has also served to retain a very large, and even growing, body of small firms which operate under workshop management, and which cannot undertake large and complex projects for domestic or foreign clients.

To sum up, China's software industry is small and underdeveloped in comparison to its computer and other information technology hardware industries, and particularly in comparison to the more mature software industries of some other countries. However the huge domestic market, and the close links to domestic users, could provide great potential for its development.

Therefore there is no doubt that China's software industry will continue to grow rapidly even though problems still exist, such as the lack of technical skills, management know-how and so on.

Along with expansion of foreign connections, Chinese companies have improved their management and process abilities. The level of technology has been greatly enhanced through joint ventures, as well as in the research labs and training programs set up by foreign firms.

The government's large-scale investments in R&D, education and training, and improvements in the physical infrastructure have already contributed greatly to the economy, and will increasingly benefit the software industry and make the scope of the software market broader. However can all these external efforts help to build up the entrepreneurial spirit? Or to what extent does the entrepreneurship in the Chinese software industry have an impact on technology transfer from universities? It is these issues that will now be probed in the research that follows, from both first- and second-hand data.

Chapter Three Literature Review

3.0 Introduction

As presented previously, the aim of the thesis is to examine to what extent entrepreneurship affects technology transfer in the IT software industry within the Chinese context. The literature review, therefore, mainly focuses on the topics relevant to entrepreneurship, clusters and technology transfer.

Since the middle of the eighteenth century, scholars have deliberated on research about entrepreneurship and consequently different approaches to this topic have been developed. However due to historical reasons, the interest in entrepreneurship and the study of entrepreneurship has not been as extensively researched in Chinese management studies as in Western literature. To this end, this chapter mainly reviews contributions made by Western scholars with some contribution from the Chinese scholars when appropriate. Drawing on the literature, the researcher has developed a conceptual framework to drive this research.

In order to make it more systematic and more suitable for the designed research direction set out in the Aims and Objectives (Chapter One, Section 1.3), the literature review covers three major topics: the entrepreneur and entrepreneurship, environmental issues and technology transfer. For each topic, more details will be covered.

How to define the central concepts of the entrepreneur and entrepreneurship is of particular significance as this is an intricate and difficult subject for the academic world, even though many scholars have made a significant contribution to it. The first topic presents the definitions of the entrepreneur and entrepreneurship as described by scholars from different Western schools, and discusses the topic from different disciplinary perspectives. The definitions and discussions consider entrepreneurship as three main elements; these are entrepreneurship as an individual, as a function and as a process.

When entrepreneurship is discussed as a function and as a process, theory about the creation and growth of a venture needs to be taken into consideration. Eventually, this brings the literature review to its second topic which is the environmental issue. This is because any firm must be surrounded by a certain macro and micro environment, the environment created or affected by the government policy, the cluster and the social network which could have various impacts on a venture developing.

The third topic covers the theory of technology transfer, as this thesis focuses on the extent to which entrepreneurship influences technology transfer. The samples for data collection and analysis are designed to be chosen from IT software firms, so the theory about technology-based firms will also be covered in this topic.

3.1 Definition of entrepreneur and entrepreneurship

3.1.1 Contributions from economists

The debate about how to define entrepreneurship among economists can be identified within two general categories: the classical economists and the neo-classical economists.

3.1.1.1 Contributions from the classical economists

There are several ways used to summarize the classical economists' contributions. For example, by categorising them according to their country of origin, such as the French School, the British School, the German School and the Austrian School. These are discussed in detail below.

The term entrepreneur comes from the French verb entreprendre. When we talk about entrepreneurship, the first economist who should be mentioned is Richard

Cantillon (1680-1734), who named people that take advantage of the unrealised profit opportunities as "entrepreneurs"; those who are willing 'to buy at a certain price and sell at an uncertain price' (Blaug, 1986, p220). He also noted that action of this kind need not involve manufacture and need not absorb the personal funds of the entrepreneur, although it may often do so. Therefore, for him, entrepreneurship is a matter of foresight and willingness to assume risk, and has a function quite distinct from that of both the capitalist and the manager. He viewed the entrepreneur as a risk-taker unable to calculate the risks involved in making decisions, but on the other hand more as an innovator, able to create demand and not just able to estimate demand.

Jean-Baptiste Say (1767-1832) is another famous French economist who read Cantillon and helped popularise his theory. By following Cantillon, he also distinguished between the entrepreneur and the capitalist. However, he focused more on the entrepreneur as a manager, who is required to estimate or forecast demand rather than the risk-taker discussed by Cantillon. Consequently Say's definition of entrepreneurship combines factors of production into an organism (Hebert and Link, 1988).

According to Herbert and Link (1988), the British economists had confused the capitalist with the entrepreneur and they had had a tendency to view economic progress as something automatic, until Adam Smith (1776) who changed this view and clearly separated the functions of the capitalist from those of the manager. He emphasised the fact that "profits" of the capitalist exclude the "wages" of management as a payment for "the labour of inspection and direction". This view led to the disappearance of the term "entrepreneur", or any of its English equivalents in the writings of another British economist, David Ricardo (Hebert and Link, 1988, p36-40).

Although Cantillon gave the first definition regarding the term of entrepreneur, it is the nineteenth-century German economist, Johann von Thunen, who provided a proper description of the entrepreneurial role. In his later edition, The Isolated State, Volume II (1966, p268-269) he defines the gains of the entrepreneur as being that which is left over from the gross profits of a business operation after paying

1) the actual or imputed interest on invested capital,

2) the wages of management,

3) the insurance premium against the calculable risk of losses.

Thunen (1966) distinguished between the returns to the entrepreneur and the returns to the capitalist by emphasising a residual. This residual he attributed to being a return for the individual's entrepreneurial risk, i.e. uninsurable risk. For him, the entrepreneur is both a risk-taker and an innovator. The return for an entrepreneur is seen as a reward for uninsurable risk-taking and entrepreneurial ingenuity as a problem-solver and innovator.

However, the Austrian economist, Menger (1871), did not treat the risk-bearing as an essential function of the entrepreneur. His view was that the entrepreneur is the one who is in charge of collecting the information and, through his decision-making, organises entrepreneurial activities which in turn could result in economic change. During this process, he suggested that an entrepreneur faces uncertainty with regard to the quantity and quality of the goods to be produced. So for him, the entrepreneur is a decision–maker in uncertain circumstances.

3.1.1.2 Contributions from the neo-classical economists

Neo-classical economics emerged at the beginning of the 20th century. It was brought in by the economists such as Alfred Marshall and Leon Walras. Neo-classical economics relates not to command economies, where governments decide on resource allocation, but to free or mixed market economies forced to operate autonomously and where the notion of equilibrium also plays a role.

Similarly, Mangoldt Marshall (1842-1924) viewed entrepreneurship as synonymous with business management and suggested that payment for this function could be seen as rent on ability. However, he added that business development requires knowledge of trade, technical knowledge, the ability to forecast, the ability to identify opportunities, cautious judgment, leadership capability and the desire to improve performance (Hebert and Link, 1988).

With regard to the notion of great equilibrium, Leon Walras (1834-1910) felt that the entrepreneur played virtually no role. He assumed that entrepreneurship is not itself a factor of production but rather a function that can be carried on by any agent, like the capitalist or the salaried manger. In any case, with a zero residual income, the total product is, according to neoclassical economists, "exhausted" when all productive agents have paid their marginal products. When perfect competition exists, the short-run and long-run equilibrium is attained and according to Walras "neither benefits, nor losses" are incurred (Hebert and Link, 1988, p63-64).

Despite the virtual dismissal of such importance, Frank Knight was probably the first neo-classical economist to identify a specific entrepreneurial function in a general equilibrium system. In his work Risk, Uncertainty and Profit, Knight (1921) discussed Thunen's distinction between "risk" and "uncertainty". He thought that many uncertainties of economic life could in fact be calculated, along with the extent to which they could be shifted, via insurance, to the shoulders of others. He, nevertheless, also identified other uncertainties, which he argued could not be reduced to objective measurement as they were seen as being unprecedented.

Having made a distinction between insurable and uninsurable risk, he proposed a theory of profit that related non-insurable uncertainty to rapid economic change and differences in entrepreneurial ability. The theory of uncertainty helps to establish the boundary between the manager and the entrepreneur. He suggested that in conditions of uncertainty the entrepreneur is required to have abilities of knowledge and judgment, foresight, superior managerial skill and confidence (Glancey and McQuaid, 2000).

Joseph Schumpeter (1883-1950), the Austrian economist made an important deviation from the general equilibrium model of neo-classical economics and attempted to construct a whole new type of economic theory by complementing Walras' theory. He looked at different aspects of entrepreneurship during different periods of his life, and, besides economic theory, he explored a range of approaches in doing so, such as psychology, sociology, and economic history. These will be presented fully later.

Ten years before the appearance of Knight's book, Schumpeter (1934) had contributed a wholly different view of the economic problem in his book The Theory of Economic Development. He developed his argument by constructing a model of an economy in which technical change of any kind was absent. Even though competitive long-run stationary equilibrium, as visualised in traditional theory, rules out both profit and interest, it was thought that only technical innovations and dynamic change can produce a positive rate of interest. In one of his latest editions (Schumpeter, 1961, p66), he defined "innovations" broadly as the introduction of new technical methods, new products, new sources of supply, and new forms of industrial organisation. Therefore according to Schumpeter, innovation creates new activities and markets, and entrepreneurship is the source of change. Due to an innovative act that possibly results in lower costs or higher prices, profit generates as a surplus or residual. This is both the price and the payment for the services of the entrepreneur, and furthermore was not considered as a reward for the risk.

Another Austrian economist, Ludwig von Mises, also started out from the idea that there is no place for entrepreneurship when the economy is in a stable and repetitive equilibrium cycle (Glancey and McQuaid, 2000). He presented the view that human action both influences and is influenced by the future. He viewed uncertainty in a similar way to Knight and contended that profitability is a consequence of such entrepreneurial behaviour. Differing from Schumpeter, he defined entrepreneurship as anticipation of uncertain events and not as innovation. In his world, the entrepreneur is exclusively driven by a desire to make money, and he or she makes profits by figuring out what the consumer wants. The better the entrepreneur is at this, the more profit he or she will make. Mises (1951) is one of the theoreticians of entrepreneurship who, quite early, stresses the role of "entrepreneurial errors" by pointing out that the entrepreneur can make money but also lose money.

3.1.2 Contributions from different disciplines

Within the different disciplines, such as sociology, psychology and management studies, there have been contributions made to entrepreneurship. The subsequent sections examine these contributions.

3.1.2.1 Contributions from sociology

There are broad contributions taken from the sociological view such as: entrepreneurship and crime, entrepreneurship as a social movement, entrepreneurship and ethnicity, and the issue of gender. However, as this research focuses on how entrepreneurship is able to affect technology transfer from universities for small and medium sized software firms in China, the above views are less relevant. Consequently they will not be presented in this research. Instead relevant views will be shown as follows.

We can find some of the most brilliant ideas on entrepreneurship within the social sciences made by Max Weber. However, the researcher will only focus on his contribution with respect to his analysis of the charismatic person i.e. the individual who makes other people want to follow him or her simply by virtue of his or her extraordinary personality. Although it must be noted that this view was criticised by authors such as Richard Swedberg (2000) in his work Entrepreneurship: The Social Science View of Entrepreneurship. Swedberg (2000) pointed out that, while charisma might work in the early stage, it is possible that it would not work well through all stages of mankind. This is because there would be a general trend of rationalisation within human society. Furthermore, science and method would replace myth and religion, and calculable thought would therefore limit the place for charisma in the modern world as well.

A comparative approach to entrepreneurship is often used by sociologists, unlike economists. S.M. Lipset (2000) in his article "Values and Entrepreneurship in the Americas" argued, by contrasting Latin America to North America, that cultural values deeply affected entrepreneurship and the level of economic development. In Latin America the value trend normally downgrades manual labour as well as commerce and industry due to being deeply influenced by early Iberian culture. However, in many parts of the United States, where Puritan values dominate, there is greater emphasis on work and moneymaking. The educational ideals have also differed, with humanist education being popular in Latin America, as opposed to engineering and science in the United States.

According to Swedberg (2000), Mark Granovetter is a sociologist who discusses an important element in many entrepreneurial ventures: trust. Granovetter argues that it may be difficult to develop confidence due to the isolation of people within certain social groups and societies. However to start a firm or cooperate in economic matters, confidence is absolutely necessary.

Sociologists have also looked at aspects of modern entrepreneurship such as "network". The article, "The Network Entrepreneur" written by Burt Ronald (2000), shows that entrepreneurial opportunities exist through a person's network if this is structured in a specific way.

To sum up, this section mainly reviews the contributions that sociology brings to entrepreneurship. These contributions cover the fact that, with "charismatic people", entrepreneurship can be associated with the cultural values in a society, and shows that trust is an important element for the creation and growth of ventures. In addition, building up of networks brings entrepreneurial opportunities.

3.1.2.2 Contributions from psychology

The field of psychology seems to have carried out more studies on entrepreneurship than mainstream economics or sociology (Swedberg, 2000).

The psychological studies of entrepreneurship are roughly divided into two groups by Swedberg (2000): one where the main goal is to isolate the entrepreneurial personality; the other, which is more socio-psychological in nature, where the personality of the entrepreneur is seen as decisively shaped by something from the outside. For example, the minority status of the parents or the way that children are socialised.

Hence psychological research has focused on the personality of the entrepreneur and his/her behavioural characteristics, suggesting that the entrepreneur is a risk-taker and social deviant, with a high need for achievement, an internal locus of control and autonomy.

More recent psychological research has shifted away from studying the personality of the entrepreneur and more towards studying the situations that lead to entrepreneurial behaviour. This is categorised as socio-psychological because this emphasises the interaction of the entrepreneur with his or her social surroundings.

According to Swedberg (2000) there are two studies of the latter category which have become famous. One is from McClelland's 'The Achieving Society' (1961) and the other being Hagen's 'On The Theory of Social Change' (1962).

Swedberg elaborated that McClelland links entrepreneurship with an individual's so-called need for achievement, while Hagen argues that people who have grown up and been nurtured in certain minorities develop a much stronger psychological tendency for entrepreneurship than those who have not. However, from Swedberg's perspective, the studies of McClelland and Hagen are generally seen today as discredited, "McClelland as well as Hagen try to bite off far too much in their analyses and especially disregard the complicated institutional environment that surrounds the entrepreneur' (Swedberg, 2000, p33).

The great scholar, Schumpeter, also contributed to entrepreneurship from the perspective of the social sciences. In his The Theory of Economic Development (1934), he concluded that the entrepreneur should have five main types of entrepreneurial behaviour. They are the introduction of a new good, the introduction of a new method of production, the opening of a new market, the conquest of a new source of supply of raw material, and the creation of a new organisation of an industry. Schumpeter also proposed a typology which is linked with the motivation of the entrepreneur. In his updated edition (1961, p93), he further contributes that there are three primary things that normally drive the entrepreneur. They are the dream and the will to found a private kingdom, the will to conquer, and the joy of creating.

3.1.2.3 Contributions from management studies

As previously noted it seems that traditional research on entrepreneurship has taken place at an individual level and from the perspective of personal traits and abilities. However research in this field has been carried out from the perspective of what the reasons are that motivate some individuals to start up their own business. Burns (2001) thought that these reasons can be summarised into two forms which are "push" or "pull" factors.

Chen (2006) conducted a survey by issuing questionnaires in China to identify, specifically in the Chinese context, what really motivates individuals to take the risk of starting up and managing private enterprises. The results suggest that the push factors are "did not get on well with management", "low economic benefits", "no chance to use skills", and "unemployment or job insecurity", and that pull factors are aspects such as "personal wealth", "achievement and personal development", and "a need for personal development and/or higher income" (Chen, Li and Matlay, 2006, p153).

Besides the research on entrepreneurship from an individual level, as shown above, the development of a new organisation and innovation are also often regarded as key factors in entrepreneurship (Gartner, 1988; Stopford and Baden-Fuller, 1994; Sharma and Chrisman, 1999). This means that the degree of novelty should be relevant, with the adaptation of key resources, to the environment which is applied by the organisation (that is, the strategy) and how the strategy is implemented (that is, the structure). Therefore in recent years there has been increasing interest shown towards the company at an analytical level. This contributes to the research on entrepreneurship (Brown, Davidsson and Wikland, 2001; Wiklund, 1999).

When considering entrepreneurship at management and company level, strategic entrepreneurship plays a great role. In other words this school of thought places emphasis on how an entrepreneur manages a company in order to achieve competitive advantages and success in the face of rigorous business competition. In theory scholars tend to analyse and conclude how a company manages its entrepreneurial activities by two approaches: deliberate strategy or emergent strategy. This will be discussed in greater detail in Section 3.2 of this Chapter.

In conclusion, over the years research on entrepreneurship has been characterised by an ambiguity about the meaning of the concepts of "an entrepreneur" and "entrepreneurship". Nevertheless, theoretically we can find various representative definitions given by some highly respected scholars. In this section, the literature review mainly covers the definitions of "an entrepreneur" and how the various schools of thought have defined entrepreneurs form different perspectives. The most well-known contributions are summarised below in table 3.1.

Table 3.1 Definitions of entrepreneurs

Scholars	Definitions
Cantillon (18^{th} century)	Opportunity-seeker, risk-taker
Say (19^{th} century)	Forecaster, project appraiser and risk-taker
Thunen (1850)	Risk-taker, innovator, problem-solver
Menger (1840-1921)	Decision-maker
Knight (1921)	Forecaster of future uncertainties
Schumpeter (1934)	Innovator, introducing new combination of resources

The literature above briefly reviews only a few of the concepts of "entrepreneurship", which was carried out from the perspective of entrepreneurship in an individual, Therefore the previous reviews are mainly about the concept of the "entrepreneur". More details are covered in the section of "Strategic entrepreneurship".

3.2 Strategic entrepreneurship

As described in the previous section, theoretically entrepreneurship has been discussed not just on an individual level, but also on a company level too. If considering it on a company level, it is vital to know how a firm is strategically managed by the entrepreneur.

Strategic entrepreneurship implies repositioning. The whole thing is a matter of creating lasting competitive advantages (Barney, 2002; Peteraf, 1993). The core of any strategy is to create competitive advantages, and in order to achieve competitive advantage the company must make choices; the company must have a strategic orientation to be successful, according to Porter (1985).

Consistently increased competition also requires entrepreneurial strategies which should be implemented by taking relatively strategic and entrepreneurial actions to achieve success (Ireland et al., 2001).

Strategic actions are actions which imply the development and use of already existing competitive advantages. At the same time these actions are supposed to be able to support an exploitation of future opportunities (Hitt et al., 2002).

Entrepreneurial actions are actions taken by a company to identify and attempt an exploitation of entrepreneurial opportunities which have been discovered or exploited before (Ireland et al., 2001).

Given this, as a strategy it is an integration of the entrepreneurial and strategic perspectives to form and implement entrepreneurial strategies which lead to progress and results (Hitt et al., 2002).

In other words, strategic entrepreneurship can also be described as entrepreneurial actions carried out in a strategic manner (Hitt et al., 2002). The process of integrating entrepreneurial and strategic actions, according to Ireland et al. (2001), is necessary in order for the company to achieve maximum progress and results.

When entrepreneurs carry out entrepreneurial actions in a strategic manner to pursue competitive advantage, it is a critical for them to be aware of the companies' resources and implement the integration of these resources.

According to Chandler & Hanks (1994), the company management must be able to transform resources into a capability that generates certain dividends to gain the competitive advantage. To have competence is therefore not just a matter of collecting various resources. In a strategic context, it is required that a company is to be involved in long-term or direction-oriented processes in order to develop competence. This is because it involves complex patterns of coordination among human beings. Perfecting coordination requires learning through repetition. This type of capability can however not simply be bought, it needs to be developed gradually (Teece, Pisano and Shuen 1997).

Eventually those who know how to integrate their resources, and how to adopt a competitive strategy therefore, have knowledge about various sources of sustainable and competitive ability (Andrews, 1971; Miles and Snow, 1978; Peteraf, 1993). This implies an understanding of why some companies perform better than others over a longer period of time.

In modern strategic management studies some scholars consider that generally speaking there are two basic approaches adopted by managers to integrate their resources. These are identified as deliberate and emergent approaches to strategy creation.

3.2.1 Deliberate approach - resource-based theory

Resources can be defined through various ways in literature. Often the definition of what is meant by a resource is understood as various perspectives and arguments in relation to the topic (Greene et al., 1997).

Hofer and Schendel (1978) categorise resources into different types. These are financial resources (cash flow, debt ability, equity access), physical resources (buildings, premises and equipment), human resources (scientists, engineers, production managers, sales personnel, etc) and technological capabilities (this is defined broadly, it is a description of how the various functional activities are carried out, encompassing high quality products, low-cost factories, a high degree of brand loyalty).

Penrose (1959) examines how to analyse and explain development and growth in a company. She starts this by looking at the internal resources and resources acquired externally in a way to ensure maximum profit. According to Penrose the business operation is characterised as being a pool of resources (1959).

Essentially her theory is the idea that there are always stocks of unexploited productive services, resources and specialised knowledge in a company, conducive to economic growth and expansion. All business operations have a growth potential, and by the term growth, it means an effective use of resources for the company and the economy as a whole.

In resource-based theory the focus is on the characteristic and expensive resources controlled by a company; these are difficult to copy. The ability of exploiting such resources gives the company an edge of competition (Barney, 2002).

There are also several ways of explaining differences in resource profiles. Nelson and Winter (1982) are concerned about the routine of companies and argue that the behaviour of companies, particularly with regards to the exploitation of the company's resources, become subject to routine over a period of time.

Dollinger (1999) says that a resource is valuable when it contributes to seizing opportunities and neutralising threats. It is seen as rare or unexampled if it is unique or costly to acquire. Lack of ability to substitute is also another main factor. This implies that the resources a company has cannot be substituted by any other available resources. What Mahoney and Pandian (1992) find in their extensive literature review is also consistent with the theoretic contributions mentioned above. In the resource-based theory, these theories constitute the basis for creating and sustaining competitive advantages among companies.

A great contribution to this topic is also made by the work of McGrath, Venkatamaron and MacMillan (1994). They presented the idea that resources can be combined through relatively unique routines, in which companies will develop lasting differences in their resource profiles and, as a consequence of this, in the strategic development potential over a period of time. This is also called an "advantage chain" model.

They identified five antecedent conditions, which are sequential and cumulative: casual understanding, team proficiency, new competencies, distinctive competencies, and competitive advantage.

In 1995 they had further developed this and emphasised the role of the team in defining and developing competencies necessary to create competitive advantage.

However, according to MacMillan, Siegel and Subbanarasimha (1985a), competitive advantages cannot normally emerge unless the team is able to develop competence in what they are doing. Two factors are suggested to be very important in gaining the competence required; these are "comprehension" and "deftness". At venture team level, "comprehension" indicates the process of understanding what combinations of resources are necessary to achieve targeted objectives, and "deftness" represents the process of creating working relations that allow the venture team to perform effectively.

Several relevant theories have also been concluded historically. Two five-stage models were separately raised by Churchill and Lewis (1983, p45-54) and Scott and Bruce (1987, p45-62).

Churchill and Lewis suggested that stage one is the organisational existence, which means staying alive by funding products or services and customers; stage two is organisational survival, which means establishing the customer base, demonstrating viability; stage three is either success-disengagement or success-growth, which means confidence in its market position and options for further growth; stage four is take-off which means opting to go for growth; stage five is resource maturity which embodies the characteristics of a large, stable company.

The five-stage model from Scott and Bruce summarises the changes in a firm associated with business growth. These stages are inception, survival, growth, expansion and maturity. They highlight issues relating to top management role, management style and organisation structure associated with each stage, and suggest that a firm can move from inception through to the fifth stage of maturity.

According to Gibb and Scott (1985), the internal environment includes the personal and leadership characteristics of the owner-manager: the owner-manager's age and its effect on his/her attitude to growth; occupational background; personal objectives; management style and decision-making; the level of the owner's education and training; and their personal values and attitudes.

Internal managerial factors influencing growth also include: the extent to which management labour is divided and the proportion of highly qualified personnel employed; the control system and the extent to which planning is considered and acted upon; the human potential of the organisation in terms of skills and the flexibility of the workforce; the financial situation of the business; the physical asset base of the business in terms of age and quality of machinery and equipment; availability of management time for coping with change; and awareness of the wider "macro" environment and of the task environment.

To sum up, scholars who advocate the deliberate approach in management studies, propose that normally managers should be aware and capable in planning their business development when their companies move from inception to maturity. The extent of their various personal and leadership characteristics, levels of qualifications, and personal values and attitudes actually bring them different 'comprehension' and 'deftness' when they decide how to integrate their resources. It is this difference which consequently varies each company in terms of the effective use of resources and the extent of business success.

3.2.2 Emergent approach

The traditional approach to strategic management emphasises a deliberate approach. However, it seems that the entrepreneur is not so concerned with where the business is going, but just makes sure it goes somewhere interesting. This is exemplified in Henry Mintzberg's seminal 1994 book 'The Rise and Fall of Strategic Planning'.

The critique of the planning approach is based on two arguments. The first is that empirical observation of business performance does not show a strong correlation with formal planning activity. Many businesses that do not carry out a lot of planning are as successful as those that invest heavily in it. The second argument is that the planning approach is theoretically flawed, because planning only works if the future can be predicted with some certainty.

This is rarely the case, especially for the fast-growing entrepreneurial venture in a dynamic, unpredictable environment. It also assumes that managers can control everything the extended organisation does. Experience of organisations suggests that managers (even entrepreneurs with strong leadership skills) cannot control every detail. As a result, emergent approaches to strategy creation should not be taken lightly.

Even if an entrepreneur does not have a definite, highly detailed plan in mind, he or she should certainly have a vision as to where the venture should be heading. Such a vision may offer a space into which the business might go, rather than a definite destination, but nonetheless it will control its destiny. A cognitive study comparing entrepreneurial intentions with actual outcomes by Jenkins (1997) suggests that many entrepreneurs adopt an emergent approach to strategy creation and are very skilful at using it.

Eden and Ackermann (1998) have suggested an integrated and participative approach to strategy creation in their book Making Strategy. They suggest that good strategies emerge from an interactive process that they refer to as the 'Journey' of strategy, where the word Journey is an acronym for 'Jointly, Understanding, Reflecting and Negotiating'. This is the process whereby individuals still have a responsibility for identifying and evaluating strategic options. However, these options are flexible and can evolve as they are implemented through the 'journey'. Making the strategy happen is as important as making it in the first place. In the context of the entrepreneurial venture, this process resonates with the entrepreneur defining, articulating and communicating his or her vision. What makes a manager entrepreneurial is the way he or she organises the venture and uses it to innovate and to deliver value to the customer in a way that existing players cannot.

At any point in time the venture cannot avoid strategy content. The strategy process is related to the way the business decides what is going to be done, while the strategy content relates to how the business actually runs (Beaver, 2007).

The strategy content of the business will evolve with a company's operations over time. In addition, various organisational and environmental factors will shape its running, which include both the internal and external factors. The internal factors are mainly constituted by the procedure and the way a company manages business internally. The external factors include the expectations and influence of external stakeholders, such as customers and investors. If these features are allowed to control decision making about the evolution of a business's strategy content, without reference to an overriding strategic context, then the strategy process may be said to be emergent, according to the terminology of Mintzberg and Waters (1985).

In order to develop and control the strategy process, the entrepreneur must also make some essential decisions, such as decisions relating to the development of the mission, the development of the strategy, the control of the resources, and the way objectives will be set, monitored and rewarded. These decisions will have a strong impact on the form, structure and system of a firm because they will influence the culture it develops. Consequently, they must be subject to constant revision and review as the business grows and develops. Jenkins (1997) used a causal mapping technique (a way of creating a visual representation of the connection of ideas in an individual's cognition) to compare entrepreneur's intentions (what they plan to do) and outcomes (what actually happened). He found that the causal maps were consistent with intentions, but not outcomes, which he interprets to suggest that entrepreneurial strategies may not be conscious and deliberate, but non-deliberate and intended. Rather than plan for a particular future, many entrepreneurs, it would seem, merely respond flexibly to new opportunities as they come along.

To sum up, many scholars have contributed numerous works on the theory of strategic entrepreneurship. Among them, Venkataraman (1997) came to a great conclusion using a deliberate approach view to the strategic entrepreneurship. According to him, entrepreneurship is about how, by whom, and with what consequences, opportunities bring future goods and services into existence which are discovered, created, and exploited. However advocators of the emergent approach suggested that the deliberate approach is a traditional way to observe the strategy of entrepreneurship. They thought that rather than plan for a particular future, many entrepreneurs tend to respond more flexibly to new opportunities as they come along.

Strategy is also usually defined as a company's adaptation to the environment (Porter, 1985), as internal and external environment can have an impact on business growth. The following section gives some indication of environmental impact on entrepreneurship.

3.3 Environmental impact on entrepreneurship

3.3.1 Environmental issues

The literature on entrepreneurship presents several reasons why a person may be motivated to create a new enterprise. These include: need for achievement, desire to increase their independence, to increase their locus of control, to make a contribution to the development of the community where the owner-manager lives, to increase the status and legitimacy of the owners and the business in social and business networks, to generate a store of wealth for the owner and his or her family, to provide employment positions for family members and to ensure the survival of an independent business that can be transferred to the next generation of family members (see Chapter Three, Section 3.1.2). Whatever the reasons Cooper (1993) pointed out, it is established that business growth can be influenced by internal and external environmental factors.

The internal environmental factors tend to involve the resources of the owner-manage and the firm itself. This topic has been elaborated on in the previous section. Here we will discuss specifically theoretic contributions regarding external environmental factors, which cause firms' creation and firms' expansion.

According to Birley and Westhead (1993), the external environment includes: suppliers; buyers; the strength of competition; potential entrants; interest rates; company taxation; the degree of dependency upon a small number of customers; the extent of complexity in the markets served; sectoral trends; government policies; trends in exchange rates; and social, legal and political conditions. Moreover, the characteristics of the local environment where the business has its main operational premises may influence the ability of a firm to acquire resources and develop the business.

Practitioners and policy-makers are interested in encouraging the supply of entrepreneurs and new firms. Independent new and small firms are seen as a major source of job creation and are hence developed, even within transitional economies. Policy-makers and practitioners are, therefore, interested in encouraging venture creation.

As reviewed previously (Section 3.1), studies have traditionally explained the venture creation process more in relation to the traits, characteristics, resources and the skills of entrepreneurs.

However other studies have been carried out. Keeble and Walker (1994) contributed to these studies by exploring the relationship between environmental conditions and new venture creation. Venture creation can be explored at a micro- as well as a macro-level of analysis.

Gartner (1985) asserts that the process of new venture creation is a complex and multidimensional phenomenon. He views new venture creation as the organising of new organisations. To him individuals with specific skills are a key element of a new venture and, as an organisational entity, it requires consistent work to build up a new venture, which could not be produced instantly. Further, a new venture has to be seen within the context of its environment, where it seeks out resources and competes in the market place. Garner made a contribution on presenting a framework for describing the phenomenon of new venture creation. The framework includes the characteristics of individuals who start the new venture, the organisation that they create, the environment surrounding the new venture, and the process by which the new venture is created.

Gnyawali and Fogel (1994) considered an "entrepreneurial environment" as a combination of factors that play a role in the development of entrepreneurship with a conceptual framework, which could integrate existing literature on environments for entrepreneurship. They summarised the environmental conditions into five dimensions, which were: government policies and procedures; socioeconomic conditions; entrepreneurial and business skills; financial support to business; and non-financial support to business. They also explicitly linked the environmental dimensions to the process of new venture creation and formed their perspective that environments can encourage people to build up businesses.

Smallbone and Welter (2001) conceptualised entrepreneurship under transition conditions by discussing the situation in Central and Eastern European countries in the transformation from centrally planned to market-oriented economies. They specifically addressed the role of government in shaping entrepreneurship and subsequently the environment under transition conditions.

According to Smallbone and Welter, entrepreneurship in transitional countries takes various forms. They elaborated that it is important to consider the fact that entrepreneurial behaviour under such transition conditions is strongly influenced by external environment. However this is sometimes affected by the characteristics of the adopted educational system, the different stance taken by governments to encourage individuals to have their start-ups, and the various behaviours of politicians and government officials in their handling with private entrepreneurs. Therefore, even though the government plays a role in shaping the environment in transitional countries, it is still necessary for entrepreneurs to have creativity and flexibility in adapting to hostile environments for survival.

In their research of 'Chinese entrepreneurship and small business development: an overview and research agenda', through summarising several works undertaken by Li (1998), Krug and Hendrischke (2002), Peng (2000), Tan (1996) and by Yang (2004), Li and Matlay (2006) had an overview of the institutional environment in China. They elaborated that the institutional environment in China has its unique feature as a result of a combination of socialist legacy, high context culture and transition economy, which also holds a paradoxical feature in terms of the way it possibly affects entrepreneurship. This appears because on the one hand the institutional environment can constrain or penalise those who break rules, and on the other hand it can offer entrepreneurs a considerable opportunity to experiment and explore.

Liu and Jiang (2001) also addressed environmental issues that are closely related to the government in their article 'Technology transfer from higher education institutions to industry in China: nature and implications' and demonstrated that government policy is the main driver in creating the economic environment. This environment could give either constraints or impetus to technology transfer in China.

Cooper (1985) has explored the characteristics of an individual's employer or "incubator" before he or she starts their own business He found that an individual's decision to join a particular incubator organisation resulted in particular knowledge of a geographic location, as well as knowledge about a particular industry. He noted that large rather than small firm incubators had spun off more new firm founders. It seemed that the possible founder of a non-technical firm was less tied to the experience, skills, networks and resources which normally could be provided by an incubator organisation. Based on this, he argued that policymakers and practitioners concerned with encouraging the formation of new technically based firms must appreciate the possibility for high technology incubators. Thereby intervention methods are suggested to remove barriers to the formation of high technology firms in some environments.

Nowadays the advanced economic world faces more and more competition. Many scholars have carried out a great deal of research on how a cluster could be a means of enabling a nation, or a region, to achieve long-term competitiveness within specialised industries. Hence it is also necessary to review literature regarding the cluster concept and social networks in order to better understand how environments could have an impact on entrepreneurship.

3.3.2 The Cluster Concept

In the last few decades, there has been increased interest in the cluster concept. There are several reasons for this, but the major reason is its causes and effects. Basically, the notion of the cluster can contribute to the understanding of contemporary patterns and processes of industrial transformation and regional development. The adoption of the cluster has been a dominant policy approach since the early 1990s in OECD countries as well as in many developing countries. It can be observed that there is a shift in industrial and regional policies towards adopting cluster-based economic development strategies (OECD, 1999, 2001).

3.3.2.1 Definition of the cluster concept

The term 'cluster' means different things to different researchers and policymakers. There are various definitions available, for example clusters may be described as groups of related firms encompass one or more of the following dimensions: formal input-output or buyer-supplier linkages; geographic co-location; shared, business-related local institutions; and evidence of informal co-operative competition (Feser and Bergman 2000, p1-21).

In the earlier scientific literature on this subject, clusters were defined as sectors related through formal production linkages, regardless of geographical proximity. When such clusters did exhibit a high degree of geographical concentration, they were referred to as industrial complexes (Czamanski and Ablas, 1979).

More than a decade later, suggested that a cluster is: a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. The geographic scope of a cluster can range from a single city or state to a country or even a network of neighbouring countries. Clusters can take varying forms depending on their depth and sophistication, but most include end-product or service companies; suppliers of specialised inputs, components, machinery, and services; financial institutions; and firms in related industries. Clusters also often include firms in downstream industries (that is channels or customers); producers of complementary products; specialised infrastructure providers; government and other institutions providing specialised training, education, information, research and technical support (such as universities, think tanks, vocational training providers); and standards-setting agencies. Government agencies can significantly be considered part of it. Finally, many clusters include trade associations and other collective private sector bodies that support cluster members (Porter, 1998b, p.199).

In his definition, Porter emphasises the interconnectivity of downstream and upstream companies in a cluster and the role played by governments, universities and specialist training providers in supporting the cluster activities.

Redman (1994, p37) denotes a cluster as 'a pronounced geographic concentration of product chains for one product or a range of similar products, as well as linked institutions that influence the competitiveness of these concentrations (e.g. education, infrastructure and research programs)'. This is similar to, though perhaps somewhat broader than, the definition adopted by Rosenfeld (1995, p12) "A cluster is a loose geographically bounded agglomeration of similar, related firms that together are able to achieve synergy, firms 'self-select' in order to increase economic activity and facilitate business transactions." Feser and Bergman (2000, p3) suggest that four features seem to recur frequently within literature on clusters:

1) formal buyer-supplier linkages,

2) geographic co-location,

3) shared business-related local institutions,

4) evidence of informal cooperative competition.

Enright (2000b) pointed out that cluster definitions usually vary along with various dimensions, as with regards to: geographic scope, breadth (horizontal industry scope), depth (vertical industry scope), activity scope, and capacity for innovation, competitive position, industrial organisation and transaction governance.

Therefore, as indicated previously, there exist many definitions of a 'cluster', as well as many ways of delimiting and describing the concept. Nevertheless four dimensions can be recognised (Malmberg, 2002; Nutek, 2001). These four dimensions are also considered to be tightly intertwined.

The first dimension relates closely to Porter's framework, i.e. the diamond model. This dimension is theoretical, showing how a cluster is a means of explaining which factors enable a nation or region to achieve long-term competitiveness within specialized industries (Porter, 1998b).

The second dimension (Malmberg and Maskell, 2001) is the use of the cluster concept as a generic term for theoretical approaches in economic geography and related disciplines aiming at explaining why firms agglomerate in specific locations (be it an urban area or a region).

The third dimension shares some similarities to the concepts of sectoral innovation systems (Malerba, 2001) or production channels (Doeringer and Terkla, 1996).

The fourth dimension of the concept is that the cluster approach provides a holistic approach to working with national and regional growth policies. In this context, the cluster approach is not just narrowly focused on firm-based strategies but more related with holistic regional economic development approaches.

The cluster concept has also started to attract attention among those bodies developing regional and industrial polices (OECD, 1999, 2001). Since the end of the 1990s Porter's cluster concept has been adopted by several government agencies as a model for promoting regional development. Lagendijk and Cornford (2000, p214) argue that by building a strong link between clusters and the notion of 'competitiveness', and by presenting graphic cluster maps, it paved the way for the successful career of 'clusters' as a regional development concept. Therefore Porter established the starting point for the application of the cluster concept by policy-makers, but Lagendijk and Cornford consider that it is through the 'successive translations' in industrial and regional policy that the concept has become a mobilising force.

Martin and Sunley give the following interpretation of the application of the cluster approach: "At one extreme are the 'top down' national mapping exercises that utilise selective types of data to identify, on an industry-by-industry basis, particular important localizations of specialised activities. At the other extreme are 'bottom-up' approaches that are only concerned with identifying clusters in a particular regional or local area, often in a highly qualitative, impressionistic way. In between are all sorts of combinations." (Martin and Sunley, 2001, p30)

The study of Raines (2001) about the application of the cluster concept in regional policy-making confirms this diverse picture by demonstrating that in practice the cluster approach is applied in initiatives ranging from policies for supporting small-scale business networks without a particular sectoral focus, to large-scale programmes targeting a specific, geographically limited industry.

To sum up, theoretically different scholars have interpreted the concept of the cluster in various ways, which eventually generates different definitions. Nevertheless, the various definitions can be summarised and categorised as four basic dimensions as described in the previous paragraphs.

Additionally cluster theory illustrates a regional policy approach to developing a specific industry that benefits from the connectivity, or network, of firms operating at different ends of the value chain and being supported by relevant government and educational bodies.

3.3.2.2 The cluster concept and competition

In advanced world economics, competition depends on productivity, not access to inputs or the scale of individual enterprises. Productivity relies on how companies compete and not on the particular fields they compete in. If companies employ sophisticated methods, use advanced technology, and provide unique products and services, they can be highly productive in any industry.

The quality of the local business environment can strongly influence the sophistication with which companies compete in a particular location. For example, the quality of transportation infrastructure and the level of employees' education can affect whether companies can employ advanced logistical techniques or not.

As reviewed previously, Porter's theory shows how a cluster is a means of explaining which factors enable a nation or region to achieve long-term competitiveness within specialised industries. This is expounded in further detail in Porter's article 'Clusters and The New Economics of Competition' (Porter, 1998b).

In this article, Porter points out that clusters affect competition in three broad ways:

First, clusters provide better access for employees and suppliers, access to specialised information, access to institutions and sharing of public infrastructure, and better motivation and measurement. This will mean that the productivity of companies located within clusters can be increased.

Second, clusters are supposed to be able to drive the direction and pace of innovation, which underpins future productivity growth. For example, the continuous interactions with companies located in the same neighbourhood, that is to say within the cluster, can help companies to absorb and update knowledge regarding technology, component and machine availability, service and marketing concepts.

In addition, local suppliers and partners can be closely involved in the innovation process, which ensures they will be able to understand more easily their customers' requirements. With support from suppliers and partners, companies within a cluster can carry out their experiments at lower costs and can delay large commitments until they are more assured that a given innovation will work out.

Thirdly, a cluster can encourage the formation of new business, which also enlarges and reinforces the cluster itself. There are a variety of reasons that clusters are attractive to a new business formation. For example, individuals working within a cluster can more easily observe gaps in products or services and therefore build up their own businesses by filling in the gaps. Comparatively they also have lower entry barriers than elsewhere.

To form an enterprise it is easier, if located within a cluster, to acquire needed assets, skills, inputs, and to get capital as well as local financial institutions and investors are already familiar with the cluster and this often makes them less concerned about their investment risk. Additionally, a cluster presents a significant local market, and an entrepreneur may benefit from existing relationships.

To sum up, by adopting the concept of clusters, a region or a nation could achieve long-term competitiveness. Porter gives an explanation that discusses in detail how long-term competitiveness is built up within a cluster. According to Porter, broadly speaking, companies located in a cluster are able to have better access to needed resources. Clusters can drive the direction and pace of innovations due to the fact that there are continuous interactions among companies in the neighbourhood, and between companies and suppliers. Furthermore, clusters can stimulate the formation of new firms.

3.3.2.3 The cluster approach implementation

As stated, the cluster framework introduced by Porter in 1990 has been widely embraced by government policymakers. It is seen by many as a useful approach for developing more integrated micro policies, which enhance economic development and complement macro policies designed to achieve greater stability in the general economic environment. Therefore how to implement this concept, or what the aspects of the cluster-implementation process are, comes to be an important issue. Basically the Porterian method is employed to demonstrate this process. It is mainly concerned by which clusters are initially "identified/selected" and then "characterised" and "assessed" to establish the need for public sector intervention.

Industry screening and selection is the recommended starting point for formulating cluster-based policies. Essentially Porter (1990) advocated the "top-down" method, that is competitive high points in the national economy are first identified by using two main measures. One is the world-market shares and the other is the flows of outward direct investment. However this has always been arguable, as Rosenfeld stated that the term remains in common currency and is loosely used to describe almost any and every kind of agglomeration of economic activity (Rosenfeld, 1995). This problem is increasingly recognised by academic researchers who are now developing cluster characterisations that are more directly relevant to policymakers (Young, Neil and Ewen, 1994; Rosenfeld, 1995; Enright, 2000a).

Enright (2000a) has identified nine dimensions to help policymakers understand the relative strengths and weaknesses of localised business activity associated with the industries identified via the initial cluster-selection process. These nine dimensions include descriptive aspects such as geographic scope, density and breadth as well as more analytical dimensions such as growth potential, industrial organisation and innovative capacity. Following this, Enright (2000a) further suggested that more focused cluster-promotion policies could be achieved if policymakers were to classify clusters according to their "state of development". Rosenfeld (1997) developed and applied Enright's work and generated a modified version, which gave greater emphasis to the role of social capital in clusters. This is characterised by successful innovation and entrepreneurship.

Porter makes comments on what sort of duty government is expected to take in some exceptional circumstances, such as when market failure is experienced for a relatively long period. According to him (1990) massive government intervention is required in order to stimulate the general level of economic activity.

However from a cluster perspective the main concerns have been twofold: first, to avoid, where possible, government intervention which distorts the market through inappropriate forms of public ownership and control, and the provision of inappropriate subsidies; second, to directly address market imperfections associated with information and coordination failures. Information and coordination failures appear because of various reasons that are difficult to identify and assess. Information flows may also be constrained by limited opportunities, both formal and informal, for key stakeholders to meet and interact (Enright, 2000a).

Where such problems are pervasive, cluster dynamics can be seriously affected. However, any local policymakers should have a very detailed understanding of all key interrelationships in a cluster to be able to identify and assess the number and nature of such imperfections. This is rarely feasible. Nevertheless, a new role has emerged for the public sector to act as a key influencer and shaper of the institutional landscape and as an expert broker, facilitator, and network manager (Peters and Hood, 2000; Cooke and Morgan, 1998).

In the real business world clustering takes many forms. Whatever form cluster initiatives take, despite certain problems and uncertainties, they can always be seen as useful regional development tools. Lundequist and Power (2002) suggest that four examples can be suggested as a successful means of clustering. The four examples are concluded as: A, industry-led initiatives to build competitiveness and competence within an existing base, which are suggested by Porter; B, top-down public policy exercises in brand-building; C, visionary projects to produce an industry cluster from 'thin air'; and D, small scale, geographically dispersed, natural resource based, temporal clusters that link, or dip, into global rather than national and regional systems and sources of innovation, competitive advantage and strategic assets.

The theoretical contributions reviewed above consider the advantages possibly brought by 'clustering', and how to apply this approach properly from the perspective of a regional and/or national government in order to have relatively successful clustering. Additional issues related with the natures of proximity taken from the concept of clustering will be discussed in the following section.

3.3.2.4 The complement issues related to the cluster approach

Before embracing the cluster approach, theoretically and in particular, local policymakers would consider what sorts of proximity benefits could be derived from clustering. These could also be helpful in explaining why successful clusters exist.

(1998a) also makes contributions on categorising various proximities between parties. He further identifies several benefits from these proximities which are held to drive the process of local agglomeration in the modern global economy as following.

According to Porter (1998a), the proximity of producers to large home-based markets which are advanced, sophisticated, and demanding, and whose needs anticipate those in the international market place, enables producers to perceive well, interpret, and respond to users needs. This is also a potentially important deriver of innovation and upgrade.

Proximity of producers to strong domestic rivals creates visible pressures to improve. The successful rivals may show how progress is possible and quickly prompt others to follow, because advantages may be short-lived. There may also be pressure to push costs lower, raise product quality, and introduce new products more rapidly. Competitive success locally can help attract new entrants, but where competition is based on rapid innovation, entry barriers may simultaneously be raised. Local rivalry can extend to key factor inputs and stimulate their rate of formation and upgrade; and related spill-over effects may help create national and industry-wide advantages.

Proximity of cluster partners and stakeholders to each other can continually enhance the process within which key factors are formed, deployed, and upgraded. A cluster focus helps to increase the centres of initiative, draw a critically large amount of attention and effort, and stimulate investment by both the public and private sectors.

For Porter, the full range of proximity benefits constitutes a complex and evolving system where each set of benefits depends on the state of the others. It is the interplay of all these benefits that often yields self-reinforcing advantages that foreign rivals find hard to nullify or replicate. Within this system, proximity to demanding customers and strong domestic rivals is seen as an especially important spur to innovation.

Other research into the nature of the innovation process has identified additional characteristics that promote the local accumulation of knowledge and clustering of related firms. This is needed for: incremental reduction in technical and economic uncertainty; continuous interaction among related firms; and face-to-face contacts in the creation and exchange of new knowledge (Freeman, 1991).

Additionally, Zander and Solvell (1995) established that the time and cost of repeated knowledge exchanges associated with development work may be reduced when this activity takes place locally. Taken together, this body of research provides a useful checklist of strategically important proximity benefits for the local policymaker to use in the cluster assessment.

Furthermore contributions to this can be found in McGray's work (1999). He stated that the chief selling points of today's IT expertise also revolve around proximity. That is proximity to a university, proximity to an influential market, proximity to competing and ancillary firms and proximity to new technologies and ideas.

Even though Porter does great research within this field and identifies a number of proximity benefits from the cluster, which is able to drive the process of local agglomeration in the modern global economy, he also contends that not all industries can or need take full of advantage of the complete range of proximity benefits from clusters in order to succeed as these benefits are mainly felt in knowledge-intensive industries (Porter, 1990). For knowledge-intensive industries that are required to compete in global markets, on the basis of differentiated strategies, and that are also innovation-based, Porter recognises that the full range of proximity benefits conferred by clusters are therefore needed.

However clustering is not the only element that induces such an environment for different industries distributed geographically. Social networks also have important functions such as being helpful in entrepreneurial opportunity recognition and organisation building. Theoretic contributions on this are now given.

3.4 The Role of Social Network in Entrepreneurship

Social networks influence the geographic distribution of industries because networks do not randomly link individuals. People appear to prefer to develop and maintain social ties with those of similar backgrounds to themselves and with related interests (Lazarsfeld and Merton, 1954). Geographic proximity also strongly influences the durability of relationships by reducing the costs of maintaining a relation, and proximity on both physical and social locations obviously increases the possibility of a chance encounter (Blau, 1977). By contrast, distance pushes up the direct expenses associated with engaging in the frequent and extended interaction necessary for the maintenance of social relationships (Zipf, 1949), in particular close personal ties. It also escalates the opportunity costs of interaction, in the sense that the number of equally preferred but more proximate individuals increases with distance (Stouffer, 1940). Therefore, individuals' social networks primarily maintain ties among those who live nearby.

For approximately 80 years there has been research supporting this principle. Beginning with Bossard (1932), a number of researchers have established that a relationship declines rapidly when the physical distance between two parties increases (Festinger, Schacter and Back, 1950). Studies of interaction patterns within organisations observe, in a similar manner, that employees communicate more frequently with co-workers in nearby offices (Allen, 1997).

More recently, researchers have begun to show that business relationships also follow this pattern. Kono et al. (1998) described that corporate board interlocks occur more frequently among firms with geographically proximate headquarters. Sorenson and Stuart (2001) stated that venture capital firms rarely invest far from their offices.

Social similarity is considered so strong in structuring interaction that it explains most of the variation in social networks (Marsden, 1988). Recent work has also elucidated potential benefits of an extended division of labour and information spill-overs (Arrow, 1962).

As reviewed in Section 3.3.1 (concerning venture creation), two factors must converge for a nascent entrepreneur to found a firm. One is opportunity identification. The potential entrepreneur must have the ability to perceive an opportunity for profit in a particular segment or market niche of the economy. Since much of the relevant information only exists privately, awareness of potentially profitable opportunity requires connections to those with the pertinent knowledge, typically those currently engaged in business in a particular industry. The other is organisation building. The individual that perceives an opportunity must build a firm, which needs to assemble the resources such as necessary capital, skilled labour and knowledge.

Various empirical researches confirm the importance of social networks to these two factors and can be reviewed as follows.

Since opportunity recognition and information search are important issues for starting a company, the entrepreneur needs to search information in order to identify and assess opportunities. At the same time however, although entrepreneurs may normally be quite independent and self-confident, they still require additional information and business contacts to develop and expand their businesses after starting firms. Therefore entrepreneurs are inevitably embedded in networks of social relationships. Floyd and Wooldridge (1996) think that networking allows entrepreneurs to enlarge their knowledge of opportunities, span of action, ability to gain access to critical resources such as customers, suppliers, finance, premises, etc and to gain knowledge. As Aldrich (1997) described, this knowledge could allow the entrepreneur to avoid or deal with business development obstacles.

Castells and Hall (1994) asserted that the combination of clusters of science-based knowledge, institutions and skilled labour encourages innovation. They explained that by reducing uncertainty and transaction costs, as well as enabling entrepreneurs to take full advantage of commercial and technical information, it is assumed that property-based incubator initiatives provide and gain access to structural elements which encourage synergy between technology-based firms.

In terms of the relational structure of exchange between individuals, Johannisson et al. (1994) proposed a model of emerging networks for Science Parks. Johannisson et al. suggest that a Science Park is a formal institution that is deliberately created to deal with collective concerns. They state that the formal administrative structure of a Science Park is created either to manage the property on the park and/or to manage the delivery of assistant activities and professional services required by firms located on Science Parks. So the Science Park management agreement can influence the ability of technology-based firms to acquire services and resources.

Recent studies in finance find that investors who invest locally earn unusually positive returns (Coval and Moskowitz, 2001; Garmaise, 2004). This is presumably because social networks bring them preferential access to data regarding the attractiveness of local opportunities.

Entrepreneurs in regions with a large population of firms in a particular industry also tend to occupy positions in communication networks. The reality is that this enables them to identify promising opportunities and assess market conditions in the industry.

On the other hand it also implies that the potential entrepreneur will be most aware of opportunities in the industry in which he/she works, particularly if he/she works for a firm situated within a regional concentration of similar firms. Many of the nascent entrepreneur's relationships will tie them to those with whom they work, making them most aware of opportunities in their own industry of employment. The breadth and depth of a person's social network, in particular, determines how they can absorb information which they have access to. Benefitting from being in close contact with diverse knowledge flows offers opportunities in bringing these ideas together and, further, into novel combinations (Schumpeter, 1942).

The creation of these combinations is the process by which entrepreneurs acquire a variety of resources to begin operation after they identify the opportunities in hand. Even in an emerging industry, capital and labour are needed to start this process. Some scholars maintain that social relations can facilitate the acquisition of each of these three key elements: tacit knowledge, financial capital and human capital.

Social networks may play a significant role in structuring the flow of tacit information. New firms that can access the existing knowledge in the industry enjoy a large advantage (Klepper and Sleeper, 2005; Klepper, 2001). Despite its value, the flow of tacit information cannot be transferred on its own in market-based exchange. Potential buyers may question the value of the knowledge, and sellers cannot easily smooth their concern without revealing their valuable information. Therefore social networks often prove useful in such circumstances because they provide the trust necessary for such an exchange occurring between buyers and sellers (Coleman, 1990).

Moreover, accessing this sort of information typically requires strong social ties. Basically tacit knowledge is also not easily transferred if there is a physical distance, however face-to-face contact makes it possible (Nelson, 1959). Industry-specific tacit knowledge exists primarily in the incumbent firms within an industry; thus, normally it is held by employees currently working in the industry. This situation explains why new entrepreneurs in an industry tend to originate from the current and ordinary employees already working within that industry (Sorenson and Audia, 2000).

In the study of labour markets, Granovetter (1973) elaborated that much of the information on the availability of jobs also flows within informal social ties. The potential entrepreneur normally first accesses social networks in order to identify opportunities within the economy. Though more efficient markets exist for the distribution of capital and labour, two factors could affect access to these resources. First of all, all new ventures represent fundamentally uncertain propositions, meaning that the undertaking of a new venture is risky. Secondly the level of risk in a new venture is also unknown which leads to heightened concern about the success of a project. Experimental studies have demonstrated substantially that even some investors who strongly bear risk show their negative attitude when they feel less capable of quantifying the risks (Fox and Tversky, 1995).

However social ties to capital holders could increase the possibility for an entrepreneur to obtain financial backing, because the perceived risk associated with investing can be reduced for an investor. There are two reasons for this, both facilitated by the entrepreneur's contact network. First, individuals place greater confidence in information collected from trusted parties, which makes investors more likely to rely on information obtained from entrepreneurs if they share a strong social bond. Studies of the venture capital industry find that venture capitalists prefer to finance investments that come to them through referrals from close contacts (Fried and Hisrich, 1994). Second, in the absence of a strong tie, consistent information across multiple independent sources might offer the investor some assurance regarding the reliability of their information in terms of the potential investment (Sorenson and Stuart, 2001).

Therefore the importance of social networks with access to capital further limits the choice of locations for new firm builders, since the venture capital critical to the financing of many high-tech industries does not exist everywhere. Hence its availability may constrain the spatial distribution of industries that rely on it for financing (Sorenson and Stuart, 2001).

Secondly resource holders also face an information asymmetry problem when assessing a potential entrepreneur. The hopeful founder is likely to know more about the quality of his/her idea than the investors and potential employees that they approach. Hence, new investors and employees cannot simply rely on the founder's judgment because he/she will tend to overstate the attractiveness of the proposition (Akerlof, 1970). These factors create friction in the flow of financial and human resources. Social networks can help to smooth such friction because a personal relationship with the potential founder will inspire greater trust among investors and employees for the success of the venture. It is therefore more probable for a hopeful founder to acquire useful resources from within his/her own social network.

Besides tacit knowledge and financial capital, the entrepreneur must also recruit staff to join the venture. Established firms are often considered the largest pool of labour for new ventures to acquire similarly available talents (Sorenson and Audia, 2000).

If entrepreneurs would like to acquire and persuade managerial and technical workers who already have secure positions to leave their current employers to join new start-ups, they need to be able to apply leverage within the network of industry contacts and give confidence to these employees. Again, strong social relationships help to build up the sort of trust which is necessary in obtaining these scarce human resources; particularly when facing rigorous competition in the labour market (Lovas and Sorenson, 2008).

To sum up, social networks play an important role in the entrepreneurial process, which significantly influences the dynamics of the geographic dispersion of industry over time. Theoretically speaking, entrepreneurs primarily arise from within the industry they operate in. This is because few outsiders have the embedding in the relevant social networks necessary to recognise new opportunities in the industry, and obviously only those already working within an industry have the necessary access to the intellectual, financial and human capital required to carry out their vision. These networks also bind entrepreneurs to specific locations where they can set up and develop their business. By remaining in a fixed location they have access to the resources and social support required to sustain their entrepreneurial ventures.

3.5 The issues concerning technology firms

3.5.1 Innovation and Technology Transfer

As reviewed previously, Schumpeter (1942) contributed a lot to entrepreneurship He introduced the concept of innovation, which could break 'equilibrium' and bring positive returns to an organisation. Schumpeter defined "innovation" broadly and made two assumptions about it. One is that large corporations generate most of the innovative activities in a society. The other is that this situation, regarding innovation, predominantly occurs in industries where competition is limited and high entry barriers can be expected.

However, another two scholars, Acs and Audretsch attempted to test these two assumptions. In their article "Innovation, market-structure, and firm-size" (Acs and Audretsch, 1987), they contrasted the data that they had collected with

Schumpeter's first assumption and concluded that, generally speaking, large companies are not more innovative than small ones. Furthermore in some industries large companies are more innovative while in others it is the small companies that are more innovative. Therefore they thought that instead of firm size being the dominant factor deciding innovative advantage, it was in fact the conditions under which large or small sized firms carry out their entrepreneurial activities. They concluded that within the manufacturing industry, large companies appear to have some innovative advantages in sectors where competition is limited, while small companies enjoy similar advantages in sectors more exposed to competition, which supports Schumpeter's second assumption.

In another article "Innovation in large and small firms", Acs and Audretsch (1988) continued to discuss the topic. Their discussion shows that the total number of innovations in an industry is negatively related to industry concentration but positively related to the intensity of R&D, the ratio of skilled employees and the proportion of large companies. An interesting observation is that industries with a high share of large companies exhibit more innovative activity despite the fact that it is mainly the small businesses that are responsible for this activity. A possible explanation is that where an industry is dominated by large companies, the small companies will have to be innovative in order to survive.

Acs and Audretsch (2003) also contributed their understanding to regional spill-overs of knowledge with reference to Audretsch's earlier studies. They considered, with regard to Audretsch's studies in the 1980s, that if looking at national or industrial level, countries with more highly educated people and industries with heavy R&D input were most innovative. However, when looking at firm level, the opposite is normally true, because small firms are innovative even without the R&D input. Hence Acs and Audretsch tried to determine where those small firms were obtaining their knowledge. Their theoretical conclusion is that the situation is related to location, because innovative activity occurs in geographic clusters, especially in knowledge intensive industries, and the reason is the need for tacit knowledge. Therefore it is important for firms to be positioned where they have access to this knowledge spill-over.

When talking about innovation, technology transfer should always be considered. In literature the elusive nature of technology and the multiple character of technology transfer are illustrated in diverse ways (Hawkins and Prasad, 1981). According to Kwan and Tam, Hayden in 1976 defined industrial technology transfer as "the quantum of knowledge by which such inputs as patent rights, scientific principles and R&D are translated into production and marketable industrial materials, components, and end-products" (Kwan and Tam, 1990, p28). The effective transfer of technology often requires an adequate infrastructure, which may include scientific institutions, R&D facilities, vocational, technical and management training institutes, and skilled personnel. It also requires a suitable cultural environment (Behrman and Wallander, 1976; Marton, 1986).

Due to the fast changing business environment on a global scale, innovation has become the strategic source in creating sustainable competitive advantages for firms. Firms, especially high-tech firms, are facing increasing challenges in accessing knowledge and acquiring sources to undertake innovative activities.

The role of universities has gradually become more significant to industries. The interaction between two organisations and the transfer of knowledge from universities to industries is conducive to the production of new knowledge, based on collaborative relations between knowledge generation and knowledge application (Gibbons et al., 1994). Economic activity increasingly involves partnership and interactive innovation based on collective learning between different players (Cooke and Morgan, 1998). The productivity of firms cooperating with universities is higher than those that do not have such a relationship. Those firms involved with research universities in particular feel the substantial benefits of increased productivity, profitability, and innovation (Coopers and Lybrand, 1995).

According to Wang and Zhou (1999), in China the research which has been conducted on technology transfer focuses on just two areas, as follows:

1) Making comparisons with technology transfer in different countries

2) Investigating the effect of government policy on technology transfer

(Wang and Zhou, 1999, p528)

Besides these two areas, we can see that some researchers have made efforts to examine the issues regarding technology transfer between universities and industries in China. Liu and Jiang (2001) thought that communications between universities and industry were a key obstacle for successful technology transfer, and that both universities and industries are facing significant challenges and opportunities for technology transfer in the changing economic context in China.

However due to working in different contexts, there could be a knowledge gap between university researchers and industrial managers. This knowledge gap is not only related to the specific scientific and technical information, but also to the less quantifiable 'know-how' held by university professors. Hence Zhou and Zhu (2008) called for the establishment of a more practical evaluation system for university technology transfer. According to them, this evaluation system should have a focus on the actual industrialisation and commercialisation of the technology rather than on the numbers of patent applications and patents granted.

Another two researchers, Wang and Lu (2007) conducted a study examining the nature of university-industry interaction in China. They found that different types of interactions were adopted during the process of university-industry R&D collaboration, depending on the degree of knowledge 'stickiness' and the knowledge gap between the university and the industry. They presented a strategic framework of successful knowledge transfer through the development of university-industry interactions in China. This framework summarises four stages of interaction: University-dependent low sticky interaction; University-dependent high sticky interaction; Mutual-dependent high sticky interaction; and Mutual-dependent low sticky interaction. Hence they claimed to contribute to the existing theories of university-industry knowledge transfer by identifying the specific types of interactions contributing to the different stages of commercialization and knowledge transfer (Wang and Lu , 2007, p131).

Nevertheless in China there has been less research conducted on examining how effective technology has been transferred between universities and software companies. Therefore the researcher aims to examine if entrepreneurship can positively affect technology transfer from universities especially in China's software industry.

Besides discussing innovation and technology transfer, it is also necessary to review innovative and technical resources and how important universities can be for companies. Section 3.5.2 discusses technology-based firms as the research focuses on software firms and samples will be collected from such firms.

3.5.2 How important Universities could be for technology-based firms

Macpherson (1992) has suggested that technology-based firms which develop formal links with external technical services present better levels of performance as a variety of characteristics. They include growth of sales, pre-tax profits, value-added and exports. According to him the most important thing is that successful product innovation should be associated with external contact to design specialists, R&D consultants, testing laboratories and university research departments; process innovation should be associated with links to management information services and database vendors.

Universities and other higher education institutions (HEIs) are important sources of new scientific knowledge and can encourage innovation in the sector as described above. Many HEIs actively commercialise their academic research in Science Park or incubator centres, HEI companies, independent spin-off enterprises through the formation of licensing agreements, and collaboration and joint ventures. Links with HEIs possibly enable industries to gain early access to technological knowledge, access to unique research skills and cost reductions through the delegation of selected activity. Van Dierdonck and Debackere (1988) suggested that several factors influence the development of HEI-industry links, such as culture, individual motivations, institutional stimuli and structural conditions.

Therefore technological strategy is an important issue for technology-based firms in relation to their performance. According to Zahra and Bogner (2000), five significant factors could be extracted to evaluate the effectiveness of the technological strategies applied: internal R&D investment; external resources; intensity of product technology; radicalism of new products; and copyrights, patents and protection of intellectual capital.

Bell (1993) thought that a variety of problems and obstacles could limit the development of academic-industrial collaborative arrangements to gain external resources. One particular issue concerns the locus of the entrepreneurial effort since academics may be good inventors but may not necessarily be good entrepreneurs.

3.5.3 Financing firms

After identifying opportunity and moving towards implementation, any start-up company needs support from debt or equity funding partners as discussed in the previous section. Normally there should be a variety of channels for entrepreneurs to acquire financial capitals. However in order to gain funding from banks, venture capital firms or angel investors, it is necessary to have a well-constructed business plan to satisfy these investors (Allred and Addams, 2006). Further possible support can be gained from social ties to acquire such funding for new companies as mentioned previously (Section 3.4).

The different roles played by banks and venture capitalists in providing funding, especially to high-tech firms, are compared by Audretsch and Lehmann (2004). Their study shows that banks usually have less ability than venture capitalists to offer adequate financial capital, especially to young high-tech firms. According to them, the research on this topic reveals that venture capitalists have three advantages, which are not held by banks, when writing complete contracts to clarify the obligations for all possible conceivable future contingencies between start-ups and venture capitalists or banks. These three advantages are:

First, venture capitalists share in both the upside and downside risks by taking an equity-linked stake in the firms financed by them.

Second, presumably venture capitalists will have technological expertise, which banks are not expected to have, and are therefore better able to identify the feasibility of a new project.

Third, venture capitalists can also actively involve themselves with the running of companies they fund by recommending consultants and accountants, monitoring the business operations, and guiding the exit decision. Meanwhile Audretsch and Lehmann (2004) do emphasise that an active stock market is very important for the development of venture capital.

MacMillan also focused on research of activities of the venture capitalist, (see for example MacMillan, Siegel and Subbanarasimha, 1985a). He attempted to answer the question: What criteria do venture capitalists use when evaluating venture proposals? In order to answer this question, he did research together with Siegel and Subbanarasimha in 1985. They found that many experienced venture capitalists paid attention to the quality of the entrepreneur (his or her experience and personality) when they determined whether or not they would invest. In terms of a business plan, they thought that even though it is necessary, it is not the sole reason why venture capitalists decide to invest. However, the business plan must show that the entrepreneur will fit the business, which indicates that the entrepreneur has staying power, a track record, can react well to risk, and is familiar with the target market (MacMillan, Siegel and SubbaNarasimha, 1985a, 1985b.). They furthermore indicated that venture capitalists systematically evaluate ventures in terms of six risk categories: 1. competitive risk; 2. risk of being unable to bail out if necessary; 3. risk of losing the entire investment; 4. risk of management failure; 5. risk of failure to implement the venture idea; 6. risk of leadership failure. These are the criteria which could be used by venture capitalists to evaluate venture proposals.

Actually in reality it is both important and hard work for any venture capitalists to evaluate new proposals. MacMillan, Siegel and Subbanarasimha (1985a, 1985b) also grouped venture capitalist into three clusters.

1. About 40% of the venture capitalists in the sample can be called "purposeful risk managers", indicating that they tried to ensure that various risks were well managed. The venture capitalists in this group seek entrepreneurs having demonstrated leadership skills and a product and market characteristics that clearly reduce risk to manageable levels.

2. 33% of the venture capitalists are termed as "determined eclectics". They show openness and are prepared to consider any deal.

3. About 25% of the venture capitalists are grouped as "parachutists". They showed willingness to support most ventures as long as they felt that they would have an easy way out if things went wrong.

MacMillan also collaborated with Dubini, using the database developed earlier, and figured out that the product and market characteristics are the entrepreneurial team characteristics which could help the ventures capitalist predict the ventures' performance.

Therefore in 1988, Dubini and MacMillan (1988) also identified firms as different groups according to their product and market characteristics with explanations of which could be most attractive firms for venture capitalists. These are:

1. High powered followers;
2. High tech inventors;
3. Low tech distribution players;
4. Dream merchants.

Among them, firms belonging to group 2 are the "darlings" of the venture capital industry, especially the high-tech firms with strong product protection coupled with new market potential. The entrepreneurial team's ability to manage risk and their capacity to pay attention to detail seem to be pervasive of success for these firms. The fourth group consists of high-tech firms with high product protection and uncertain long-term profits. For this group the strongest predictor of success is the entrepreneurial team's familiarity with the target market, which is not surprising due to the tenuous nature of the project and low market acceptance.

Recently, further interesting research has also been undertaken to investigate how some specialists could have financial backing to support their business. An example can be given from the study carried out by Wilson and Stokes (2005). Even though their main focus was to distinguish managing creativity from managing innovation, by interviewing a number of cultural entrepreneurs from the music industry, they still explored whether the interviewed entrepreneurs could properly access financial support. The relevant result from their study revealed that both banks and other financiers were found to have no enthusiasm in providing financial support due to their lack of understanding of the particular needs of those entrepreneurs' specific businesses.

To conclude, getting financial backing properly has been considered one of the most important concerns for any high-tech firm. Scholars have also undertaken research on this topic from different perspectives. The relevant literature reviewed above explains that basically high-tech firms can acquire financial capital from the variety of capital entities. However venture capitalists appear to be able to provide more financial support than banks, due to the three obvious reasons listed above. The literature above also covers explanations about the types of venture capitalists, the process of investment decision making and the various categories of high-tech firms according to their product and market target.

3.6 Theoretical emphasis, synthesis and the development of a conceptual framework for the research

3.6.1 Theoretical emphasis

The literature review has presented historical-theoretical contributions on entrepreneurship, the definition of an entrepreneur, the cluster theory, social networks and technology issues relating to technology transfer and technology firms. The following summary and synthesis will give more details about the theoretical emphasis in the literature review.

3.6.2 Summary and Synthesis from the literature review

Entrepreneurship has been studied by a variety of disciplines, and each discipline has its own way of viewing and examining entrepreneurship. However in order to apply the theory in future research we need to consolidate our stance. Thus far the literature review suggests a distinct focus on three areas: the definition of an entrepreneur, which is the manifestation of entrepreneurship as an individual

(Sections 3.2.1 & 3.2.2); the economic functions of entrepreneurship; and the creation and growth of a venture, i.e. entrepreneurship as a process (Sections 3.3 & 3.4). This also implies a pattern that indicates special individuals (entrepreneurs) are able to carry out entrepreneurial activities. These activities act as an economic function on the market, and comprise of a process of seeking and discovering certain opportunities, creating ventures and then trying to build up the venture in a strategic way.

There have been various definitions of an entrepreneur (as summarised in Table 3.1), and those definitions are generated according to the personality and behaviour of particular individuals. Therefore, the literature review describes where the entrepreneurs are from, which indicates what their native traits may be; how social-surroundings and networks can generate entrepreneurship; and the nature of the behaviour of an entrepreneur – looking at the classical economists' view they are labelled as risk-takers by Cantillon (Blaug, 1986), and from the neo-classical economists' perspective they are either called decision-makers, as Menger labels them (Hebert and Link, 1988), or innovators, as Schumpeter suggests.

A definite feature of these individuals is that they do things differently. It is the role of the entrepreneur to seek and discover particular opportunities, and to take their actions under conditions of uncertainty and risk. These actions could either give rise to economic change according to the view of Menger (Hebert and Link, 1986) and Knight (Glancey and McQuaid, 2000), or create new activities and markets through innovation (Schumpeter, 1961). Therefore entrepreneurship is the source of change and it is recognised as having an economic function.

The process of seeking and unearthing opportunities to create a venture, and building up the venture, implies the importance of strategic entrepreneurship. Theoretically strategic management is discussed in terms of the deliberate approach and the emergent approach (see Section 3.3). Some scholars consider that entrepreneurs tend to be more emergent thinkers in terms of managing the business strategically (for example Mintzberg and Waters, 1985). But from the 'deliberate view' of strategy, Venkataraman (1997) concluded that entrepreneurship is about how, by whom, and with what consequences opportunities bring future goods and services into existence and how they are discovered, created, and exploited. This reflects the importance of ability, through which entrepreneurs then allocate and combine their resources.

To be a successful entrepreneur, an individual must be aware of the environmental drives too. Theoretically these include PESTL (political, economic, social, technological and legislative influences), the industry structure, and the market positions for the relevant players (Gnyawali and Fogel, 1994, see Section 3.3.1). In Section 3.4, contributions from Smallbone and Welter (2001) investigate how institutional environment can affect entrepreneurship under transition conditions. Furthermore the relevant contributions made by Li and Matlay (2006) are addressed in order to establish that this institutional environment could influence entrepreneurs in both positive and negative ways. Therefore they all implied that the specific institutional environment in transition economies inevitably requires entrepreneurs to be flexible enough to adapt to the environment in order to survive.

Porter (2000) also prompted the basic cluster conceptual theory. It provides another perspective in observing the environmental influence on entrepreneurship, which shows how firms develop in an agglomerate economic atmosphere (see Section 3.3.2.1-4).

In order to have in-depth research on where the term entrepreneur originates and how socio-environmental surroundings have an impact on entrepreneurship, the literature review also includes the role of social networks on entrepreneurship. The relevant literature shows that an entrepreneur's special personalities and behaviour are not only in-born, but also come from their social surroundings (see Section 3.5). The different social environments and cultural layers cause people to hold different values and interrelate in varying ways. Consequently the entrepreneur is embedded in networks of social relationships. Social networks are critical assets for the entrepreneur in terms of enabling them to enlarge their knowledge, which is required for seeking entrepreneurial opportunities and accessing critical resources. Furthermore, in China, the role of social networking (clarified in the literature as "guanxi") plays a role in inter-organisational relations.

Innovation is clarified as being able to break "equilibrium", creating new activities and markets according to Porter, and is also recognised as the most important issue with regards to the technology-based firms' growth (Macpherson, 1992). A technology-based firm's performance and growth are also considered to be very much related to its technology strategy (Zahra and Bogner, 2000) as seen in Sections 3.5.2 & 3.6.1.

Additionally, internal and external factors heavily influence growth as well. Internal factors include internal human resources, organisational structure, culture and so on. External factors are the various links outside. The links with universities enable a firm to gain access to technological knowledge, access to unique research skills and acquire innovative products. However some aspects such as culture, individual motivations and institutional stimuli could affect the cooperation between two parties.

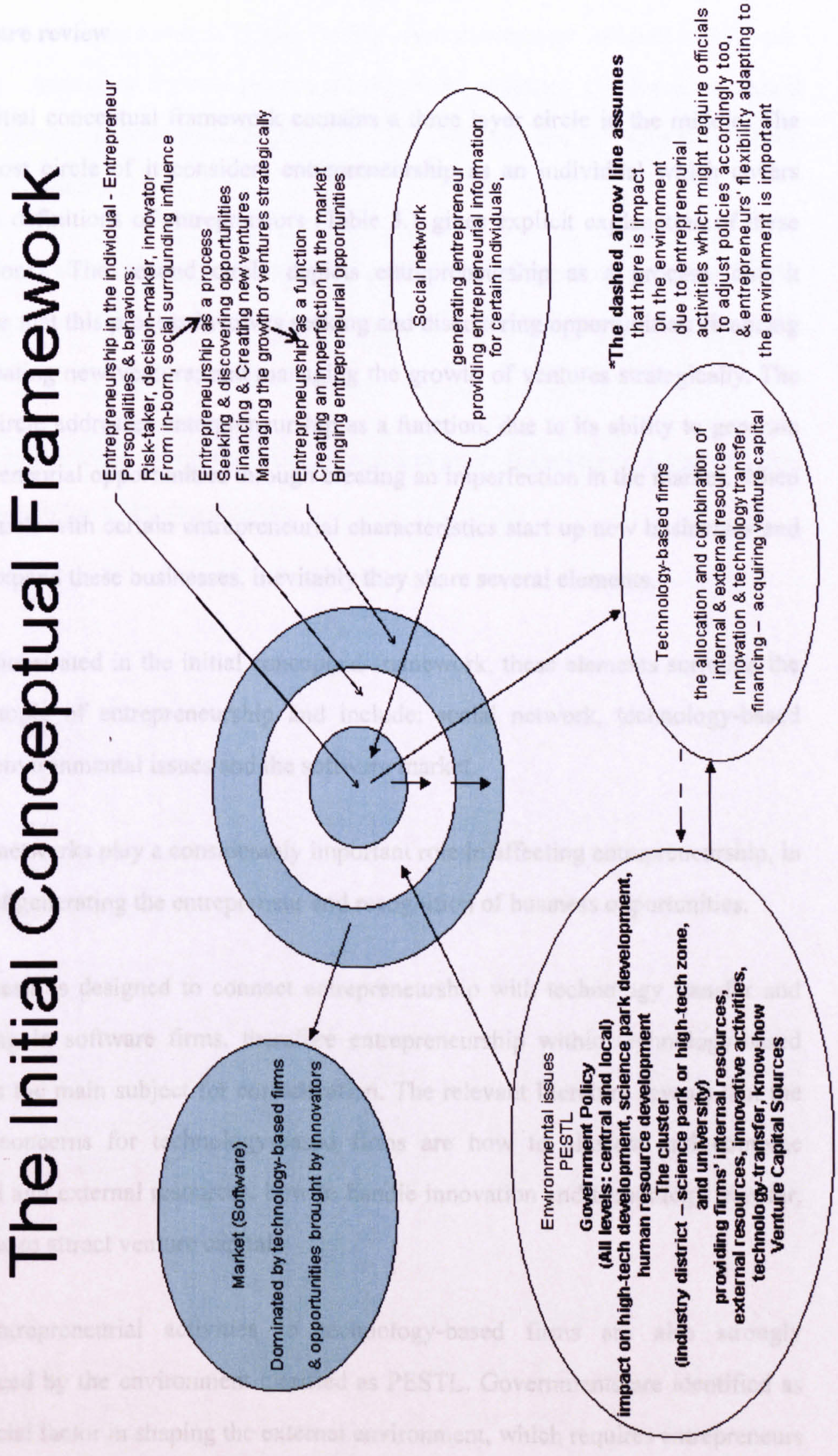
The literature review regarding technology-based firms also discusses the issue of financing (see Section 3.5.3). Venture capital is considered as one of the most important financing sources for the technology-based firms. Meanwhile the literature review also presents theoretical contributions about categorising the venture capitalists, clustering the various firms by different groups for venture capitalists to better figure out the ventures' performances and how to invest accordingly.

In conclusion, the literature review is carried out to generate the basis for structuring the interviews and survey. With the guide of the previous theoretic contribution, the data collected from the survey and the interviews is expected to reveal the process and the nature of Chinese software entrepreneurs' strategic thrust on creating and growing high-tech based firms.

The literature review also covered theoretic discussions about the importance of innovation for high-tech firms and technology transfer from higher education institutions. Some scholars emphasised that the effective transfer of technology often requires adequate infrastructure, which may include scientific institutions, R&D facilities, vocational, technical and management training institutes, skilled personnel and a suitable cultural environment (see Section 3.6.1).

The relevant information will be extracted by analysing outcomes regarding the nature of how Chinese small and medium sized software entrepreneurs grow their businesses. This is hopefully helpful in examining whether entrepreneurship can positively affect technology transfer or make technology transfer from local universities efficient in the small and medium sized Chinese software firms.

The researcher's understanding and synthesis of the theoretical perspectives relevant to the research are presented in the following initial conceptual framework (see Diagram 3.1 - The Initial Conceptual Framework)


The Initial Conceptual Framework
Entrepreneurship in the individual - Entrepreneur
personalities & behaviors:
Risk-taker, decision-maker, innovator
From in-born, social surrounding influence
Entrepreneurship as a process
Seeking & discovering opportunities
Financing & Creating new ventures
Managing the growth of ventures strategically
Entrepreneurship as a function
Creating an imperfection in the market
Bringing entrepreneurial opportunities
Social network
generating entrepreneur
providing entrepreneurial information
for certain individuals,
*The dashed arrow line assumes
that there is impact
in the environment
due to entrepreneurial
activities which might require officials
to adjust policies accordingly too,
& entrepreneurs' flexibility adapting to
the environment is important
Technology-based fims
the allocation and combination of
internal & external resources
Innovation & technology transfer
financing – acquiring venture capital
Market (Sofware)
Dominated by technology-based firms
& opportunities brought by innovators
Environmental issues
PESTL
Government Policy
(All levels: central and local)
impact on high-tech development, science park development,
human resource development
The cluster
(industry district – science park or high-tech zone,
and university)
providing firms' internal resources,
external resources, innovative activities,
technology-transfer, know-how
Venture Capital Sources

3.6.3 Explanation of the Initial conceptual framework extracted from the literature review

The initial conceptual framework contains a three layer circle in the middle. The innermost circle of it considers entrepreneurship as an individual which covers various definitions of entrepreneurs (Table 3.1 gives explicit explanation of these definitions). The second circle depicts entrepreneurship as a process, and it explains that this process involves seeking and discovering opportunities; financing and creating new venture; and managing the growth of ventures strategically. The outer circle addresses entrepreneurship as a function, due to its ability to generate entrepreneurial opportunities through creating an imperfection in the market. When individuals with certain entrepreneurial characteristics start up new businesses and try to expand these businesses, inevitably they share several elements.

As demonstrated in the initial conceptual framework, these elements surround the major topic of entrepreneurship and include: social network, technology-based firms, environmental issues and the software market.

Social networks play a considerably important role in affecting entrepreneurship, in terms of generating the entrepreneur and recognition of business opportunities.

This thesis is designed to connect entrepreneurship with technology transfer and sampling in software firms, therefore entrepreneurship within technology-based firms is the main subject for consideration. The relevant literature reveals that the major concerns for technology-based firms are how to allocate and combine internal and external resources, how to handle innovation and technology transfer, and how to attract venture capital.

The entrepreneurial activities in technology-based firms are also strongly influenced by the environment clarified as PESTL. Governments are identified as the crucial factor in shaping the external environment, which requires entrepreneurs to be flexible enough to adapt to the institutional environment for survival and to develop further, however it is also implied that government officials should pay constant attention to the changes in entrepreneurial activities. Governments should adjust relevant policies accordingly due to the primitive and pivotal nature of the software industry.

The entrepreneurs' various and specific capabilities of innovating and managing internal and external resources give rise to the discovery and/or generation of new opportunities in software markets.

This initial conceptual framework is expected to guide the research design and data collection in the following chapter.

Chapter Four Research Methodology and the Methods Adopted

4.0 Introduction

The previous chapter explains that scholars have done significant research on entrepreneurship since the middle of the eighteenth century in the western academic world. The conceptual framework in Chapter Three draws together a conclusion rooted essentially in the literature review, and hence it is based mainly on entrepreneurship in developed countries of the western economy.

Thus far there is not a great deal of knowledge about this topic in the Chinese context, post-1978 compared to the West, despite some relevant research having been undertaken as mentioned in Chapter Three, see for example section 3.6.2. However, in recent years, more researchers have begun to pay attention to the relevant issues in the Chinese context.

Moreover, whilst some research has already been undertaken into software entrepreneurship in China, notably small and medium sized firms, there has been little research into whether entrepreneurship could play a role in effecting technology transfer from universities. This relative gap in research provides the researcher with the opportunity to explore this phenomenon. Using the conceptual framework developed in the previous chapter to guide her research, the author aims to investigate whether entrepreneurship contributes to transferring software technology effectively from universities, thereby making a contribution to the field of entrepreneurship.

The first section of this chapter outlines the approach adopted by the researcher to conduct this research. It commences by explaining what research is; then a sub-section outlines the potential research approaches possible for a study such as this; followed by a further subsection which explains the research philosophy that eventually guided this research. Within this last sub-section, the researcher elaborates that a mixed approach embracing both discovery-oriented and empirical-oriented research approaches is considered to be ideal to explore and explain the relevant phenomena and meet the research aims. The section concludes with a brief discussion giving the advantages and disadvantages of the chosen approach.

The second substantive section explains briefly the respective data collected from secondary and primary sources.

The third section then describes in more detail the approach to collection of the primary data, elaborating the specific research instruments (survey and interview schemes) to collect this data.

The fourth section gives brief details of the techniques used to analyse the data collected. The analysis of the hard data was conducted using an outward/forward looking approach rather than being rooted in the positivist, "hypothesis testing approach" to provide an overall understanding regarding the nature of Chinese software entrepreneurship as existing reality. Therefore, the analysis of the data was designed to create an explanatory framework. This framework was anticipated to enable further questions to be probed in future research by the author, or others, rather than being used to engage in hypothesis testing (Hammersley, 1996). In addition, outcomes from the quantitative research (on data from documentary and survey sources) were used to guide the author in developing a qualitative, semi-structured interview framework based on open questions (Collis and Hussey, 2003).

This chapter concludes with a brief summary of the content developed.

4.1 Research Design and Methodology

4.1.1 Research Definition and Research Functions

According to the Concise Oxford Dictionary (C.O.D., 1964), research is "a process of search and enquiry [about some topic]" or "an endeavour to discover new facts by a course of critical investigation".

Bryman and Bell (2003) state that during this process of business research, any researcher must be concerned with certain key aspects. They are_being clear about:

what the aim or function of his/her research is, which may be to find ways of improving organisational performance through increased effectiveness and efficiency, or to increase the understanding of how organisations work, their impact on individuals and on society; and, who pays attention to business research, which may mean that the research is conducted for managers in organisations, to inform policy makers' decisions, or to further the academic development of a relevant field or discipline.

In Chapter One, Section 1.2.1, the researcher clearly explained the rationale for starting this research, and thereby established the research aims and objectives accordingly. The research aims and objectives reveal that the researcher intends to explore and explain the phenomena relating to whether entrepreneurship of Chinese software SMEs could effect technology transfer from local universities. Inevitably the outcomes from the research are expected to make a contribution to the field of entrepreneurship studies in the academic arena. But it is hoped also to give relevant, Chinese policy makers and SME managers useful advice of a practical nature.

4.1.2 Research Approaches and Philosophical Implications

Once a decision to undertake research in some area is made, there is then a choice to be made as to an appropriate research approach or choice of location within a paradigm to make sure the research is undertaken and brought to a successful conclusion (Kerlinger and Lee, 1999). Writers on such methodological issues typically distinguish between quantitative and qualitative research approaches when dealing in business research

According to advocates of quantitative methods, quantitative research is a research strategy that focuses on the quantification of the collection and analysis of data (Collis and Hussey, 2003). It entails a deductive approach to the relationship between theory and research and embodies a view of social reality as an external, objective reality (Groves et al, 2004).

By contrast, qualitative research is normally considered as a research strategy that focuses on discourse and understanding individual contexts, rather than quantification and generalization from data (Denzin and Lincoln, 2000). From a methodological point of view, it tends to be more inductive in approach, with the generation of theories occurring during and after the data collection and analysis (Hammersley and Atkinson, 1995). A qualitative approach focuses on the ways in which individuals interpret their social world. It presents a view of social reality that is constantly shifting and emerging, as it is being created by the individual (Cassell and Symon, 2004).

It is also stated by Bryman and Bell (2003) that quantitative and qualitative research differ with respect to their epistemological foundations and in other respects as well. They draw the differences between quantitative and qualitative research with regard to three basic areas: the role of theory in relation to research; epistemological orientation; and ontological orientation. The main differences between quantitative and qualitative research approaches as summarised by them are shown in a Table 4.1, which follows below.

Table 4.1 Fundamental Differences between Quantitative and Qualitative Research Strategies

	Quantitative	Qualitative
Principal orientation to the role of theory in relation to research	Deductive; testing of theory	Inductive; generation of theory
Epistemological orientation	Natural science model, in particular positivism	Interpretivism
Ontological orientation	Objectivism	Constructionism

Source : Bryman and Bell (2003, p25)

Basically the above table illustrates the differences between quantitative and qualitative research approaches from two aspects. One is to explore the nature of the relationship between theory and research, which means whether theory guides research (quantitative or deductive approach), or whether theory is an outcome of research (qualitative or inductive approach). The other aspect covers the epistemological and ontological distinctions between the quantitative and qualitative approaches.

The quantitative approach is affirmed to be important to conduct research of the study of social reality and beyond, known as positivism in an epistemological sense. From an ontological perspective meanwhile, it is used to conduct research which implies that social phenomena and their meanings have an existence that is independent of their social actors: this is typically known as objectivism.

A qualitative approach by contrast is used to carry out research wherein theory is itself an outcome of the research. It is interpretivist in an epistemological sense and ontologically it is seen as constructionist. This means that knowledge is viewed as indeterminate, and social phenomena and their meanings are continually being revised and accomplished by social actors.

This apparently dichotomous distinction of research strategies or paradigms tends to suggest that one must of necessity choose to follow one path or the other. However, Bryman (2004) also notes, wisely, that the two research approaches should not be viewed as being absolutely opposite and separated, rather they can, at least to a degree, be compatible and can be used in tandem. In other words, it may be possible, and even desirable, to develop a creative synthesis of these two, as often portrayed, polar paradigmatic positions. This is the approach adopted here as is now explained.

4.1.3 Research Methodology for this Study

For this study, in order to meet the research aims and objectives of the thesis, the researcher needs to 'paint a picture' of the Chinese entrepreneurial phenomena in small and medium sized software firms. This suggests the use of a more positivist approach on the one hand (Collis and Hussey, 2003). On the other hand, because entrepreneurial activities are about a process, it is also necessary to understand the decision making and interpret the future planning of the study's SMEs, which suggests the need for a more interpretevist approach (Cope, 2005). Moreover, in order to understand the context within which they carry on their business, besides collecting relevant, secondary, contextualising data, the researcher needs to collect some primary data by interviewing some officials and bankers in prestige positions which could make the overall data pool more reliable. Therefore, it would not be ideal to try to carry out this study by sitting firmly at either of the methodological poles outlined in the previous sub-section.

In this respect, a multi-method, or mixed, research strategy is necessary to fulfil the task, and the quantitative and qualitative aspects of the work can be seen to be complementary with each other.

In his discussions about the research development within the field of E-entreprenuership and E-business, Matlay (2004, p412) highlighted that 'in particular, triangulation (involving two or more quantitative and qualitative approaches) is missing from the Internet trading literature'. Therefore, by adopting both quantitative and qualitative approaches in the current research on entrepreneurship within the Chinese, IT-software industry, the researcher intended to and was also able to triangulate the data obtained via quantitative and qualitative means.

The subsequent paragraphs explain in greater detail how this multi-strategy approach was implemented for this study.

The author carried out a survey by designing a questionnaire that focused on the aspects identified in the conceptual framework (see Chapter Three, page 106) and used a deductive approach to create an explanatory framework, rather than to test the conceptual framework (Hammersley, 1996). Statistical data obtained from secondary sources together with the data from the questionnaire were used to bring out a static picture of the PRC IT-software industry. In addition, the questionnaire data generated a reliable guide to conducting the subsequent qualitative research strategy in terms of structuring interview questions, selecting interviewees, who are working in, and/or related to, the IT-software industry in China in order to understand better, and explore in greater depth, the phenomena of entrepreneurship and technology transfer from universities.

The survey was carried out by sampling relevant SMEs in Beijing and Shanghai, two of the three major centres of concentration in the PRC IT-software industry – the third being Shenzhen in South China. The questionnaires were issued with some help from the researcher's personal contacts who are quite familiar with the sampled population. This ensured that the questionnaires were delivered with some precision to the appropriate targets, and eventually helped to deliver a very satisfactory response rate (53 per cent).

The only downside to using these intermediate delivery agents was that the delivered sample, while tolerably representative of the population, could not be deemed wholly random because of the inherent convenience aspect of the sampling. Such a sampling procedure may be termed 'semi-random', in that it certainly has elements of randomness, because the respondents vary widely in their views and the characters of their businesses, constrained by the unifying linkage to the researcher's personal network.

Sample size is normally a big concern for a survey, however it should not be the only element of concern for a researcher (Bryman and Bell, 2003). Other elements such as the response rate, the reliability and validity of the data collected are also very crucial. Furthermore, some issues are also very important such as how to carefully design individual questions, have a clear layout of the questionnaire form, a lucid explanation of the purpose of the questionnaire and pilot testing (Saunders, Levis and Adrain 2003). Section 4.3 explains in detail how the researcher took these elements into account and carried out the survey.

The qualitative research was carried out by undertaking semi-structured, individual interviews. The principle of conducting such interviews is via open questions that allow the interviewee to give descriptive and explanatory answers by following the focused issues (Ritchie and Lewis, 2003). An open-ended question is also designed to encourage the interviewees to provide an extensive and developmental answer, and may be used to reveal attitudes or obtain facts. It encourages the interviewees to reply as they wish. During the process of interviewing, the other techniques such as prompting and probing should be employed too. The use of these two techniques helped the author to clarify the answers, show her appreciation and understanding of the answers, and also got the interviewees to give more examples, to extend their narrative. This interactive interviewing approach, involving both parties enabled genuine discovery to occur (Strauss and Corbin, 1998)

According to Ritchie and Lewis (2003), qualitative research is applied to either collect naturally occurring data for an understanding of a particular culture or community, especially when the researched behaviour involves some subconscious or instinctive elements; or gain generated data which can give insight into people's own perspectives on and interpretation of their beliefs and behaviours, and especially an understanding of what they really would like to address.

Obviously to implement this research, the researcher needs to gain insights into the software entrepreneur's views about technology transfer and the role of entrepreneurship.

Furthermore, they suggest that generated data can be acquired through adopting methods like: biographical methods; individual interviews; paired (or trial) interviews, and focus groups. Biographical methods use life stories, narratives and recounted biographies to explain the phenomena under study. Individual interviews are widely used comparatively in qualitative research. This is because they can give researchers an opportunity to investigate people's personal perspectives in detail and in-depth understand the personal context within which the research phenomena are located. Paired interviews are considered as a type of in-depth interviews, but carried out with two or three people. When using the focus group method, researchers usually need to bring between four and ten respondents together to discuss their research topics as a group (Ritchie and Lewis, 2003 p36-37).

As clarified in previous chapters, the research was designed to be carried out by sampling among entrepreneurs from Chinese small and medium sized IT-software firms to explore and explain the phenomena regarding whether entrepreneurship could effect technology transfer from local universities. In this respect, it would be difficult to find sufficient biographies to understand the relevant phenomena, using such an approach, especially since the Chinese software industry is still in its start-up phase, particularly the SME component of the sector. Hence, biographical methods were not considered as a suitable qualitative approach for this research.

When one considers the characteristics of the respondents (see Chapter Three, Section 3.2), especially the entrepreneurs, who are involved within this study, the researcher felt it would not be feasible to gather together those entrepreneurs to answer the questions in groups, because of the interviewees' perceived need to keep confidential material about the operation of their businesses - this relates both to genuine, commercial, confidentiality concerns and also to their psyche as Chinese (see, for example, Bond, 1991, pp.36-37). Hence, concentration on the single person interview here was considered to be most suitable and was adopted for the qualitative data collection. There was one exception, when the researcher interviewed the bankers (two bankers were interviewed together, because they were familiar with each other and willing to accept being interviewed together to provide their perspectives in a complementary way).

4.1.4 Specific Advantages and Disadvantages (of the Chosen Methods)

As elaborated previously, an obvious advantage of applying this multi-strategy approach is that, on the one hand, the outcomes from the quantitative research could help the researcher to 'paint a static picture' regarding the entrepreneurial nature of Chinese software SMEs; on the other hand, the semi-structured, in-depth interviews enabled the researcher to interpret some contents regarding their decision making, future business planning and gain some insights from officials and banker as designed.

Furthermore, since the analysis of the hard data was conducted by using an outward/forward looking approach, rather than being rooted in the positivist, "hypothesis testing approach" (Hammersley, 1996)., to create an explanatory framework, the outcomes from the quantitative research enabled and guided the researcher to develop a qualitative semi-structured interview framework and better interpreted and analysed the outcomes from the interviews (Collis and Hussey, 2003).

Nevertheless, there were some disadvantages of the methods used within the research which cannot be disregarded. One disadvantage is that the research still could not embrace and reflect all aspects of entrepreneurship in the software industry and technology transfer in China despite applying the chosen multi-method strategy. This is at least partly because of the author's necessarily subjective understanding of relevant literature which in turn must be reflected in the conceptual framework derived therefrom. Additionally, the researcher's structuring of the questions and interpretation of the outcomes from the data collected could be construed to some extent to be a phenomenological approach, and as such may be viewed as having some inherent bias, according to Saunders, Levis and Adrian (2003).

4.2 Data collection Rationale

4.2.1 Collecting the Secondary Data

In order to have an overview of the Chinese IT-software industry, first of all, guided by the conceptual framework, the researcher searched some secondary data from government publications, industry statistics and reports, organisations' records, and organisations' web sites; and some articles regarding the development of Chinese software industry and entrepreneurship.

The information has been explained in Chapter Two, which includes the software policies, legislative issues of technology transfer, the performance of local software players in Chinese market and the status of science parks and hi-tech clusters.

The relevant information was expected to assist the researcher to clarify how Chinese policy and legislative status could possibly affect and shape Chinese entrepreneurs in the software industry, and also help to understand the entrepreneurs' capabilities of adapting to the external environment in terms of their stance towards technology transfer.

The information from secondary data obtained from sources generated by highly experienced researchers in the field helped the researcher to prepare the surveys and interviews, by enabling her to identify important cities in China for the IT industry, such as Beijing and Shanghai, and also providing information that might help accordingly with the structuring of questions.

4.2.2 Collecting the Primary Data

As stated previously, the researcher adopted survey and interview methods to collect primary data. Using the aspects identified in the conceptual framework the questionnaire sought information, as discussed in greater detail in Section 4.3 below.

The outcomes from this quantitative research were used to generate reliable explanations, but in order to have a better and complete understanding of the process of entrepreneurial activities the researcher sought, through semi-structured interviews, to understand and interpret human action by finding out the meanings, reasons and intentions of the entrepreneurs. The semi-structured interviews were conducted in such a way as to enable the researcher to carry out a systematic investigation, whilst still leaving enough space for interviewees to provide spontaneous and/or other information. The researcher generated a list of questions on fairly specific topics to be covered (see Table 4.2 below in section 4.3).

Building on the information obtained about the external environment, patterns and process of IT-software entrepreneurial activities collected by secondary and primary means, the author conducted an analysis to explore whether entrepreneurship could positively affect technology transfer in Chinese IT-software industry.

However, the author also realizes that the external environment cannot be assumed to be static. This is because the policies and legislative issues tend to be adjusted according to policy makers' understanding of some entrepreneurial activities. The conceptual framework illustrates this by using a dashed line to indicate possible changes in the external environment caused by entrepreneurial activities or adjustments made by policy makers to respond to these entrepreneurial activities. To this end, the researcher interviewed two officials from MOST and two bankers from state-owned bank and investment bank to obtain their view about the relevant phenomena to get the primary data acquired necessarily for the research.

4.3 Implementation of the Multi-Method Strategy

4.3.1 Survey

4.3.1.1 Introduction

The survey was conducted by distributing questionnaires in a semi-random fashion (see Section 4.1.3) to small and medium sized IT-software firms located in Beijing and Shanghai. The reasons for choosing these two cities are as follows: Beijing with its 'Zhongguancun' district has a dominant role in the software industry in China. Shanghai, because of its exposure to foreign investors, is considered important for developing, high-tech industries (see Chapter Two, Section 2.1.2.2).

As Floyd and Fowler (2000) state, the questionnaire is one of the most widely used survey data collection techniques. Each respondent was asked to respond to the same set of questions, it provides an efficient way of collecting responses from a large sample prior to quantitative analysis.

In order to get reliable and credible data and make analysis of the data from such a survey meaningful, the questionnaires were sent to a sample of 100 with a view to receiving at least 40 responses. (In the event 53 clean responses were received). Such a sample size enables credible statistical analyses to be performed (essentially because the central-limit theorem can be deemed to apply due to the sample size, see for example, Hoel, 1962).

The sample size is not always the only element which could affect the response rate, the reliability and validity of the data collected, according to Saunders, Levis and Adrian (2003). Other important issues should be taken into account, such as, a careful design of individual questions, clear layout of the questionnaire form, lucid explanation of the purpose of the questionnaire and pilot testing. The questionnaires were designed to assure the respondents' anonymity.

4.3.1.2 Questionnaire Design for Survey

The purpose of the questionnaire survey was to extract information from Chinese IT-software incubatees and start-ups. The results of the survey were expected, on the one hand, to draw a relatively 'reliable picture' of software entrepreneurial activities within the IT-software sector and, on the other hand as already noted, to create a basis for conducting the future interviews from start-up companies within the sector.

The questions within the questionnaire were structured according to the author's understanding to the conceptual framework generated from the literature review and the context within which Chinese IT-software firms work. These are explained in detail in table 4.2 below

The questionnaire was first developed in English and then translated into Chinese (the author's mother tongue) and then tested for its clarity and meaning with five (5) entrepreneurs who had agreed to take part in the survey. The pilot was arranged in Song Jiang New High Tech Development Zone, Shanghai. The participants appeared to be able to understand all questions clearly except for very minor details, allowing the researcher to make necessary adjustments.

The author used a range of statistical analyses (Bryman, 2004) ranging from simple mean and frequency tests to correlating key data (size, turnover, number of patents etc.) taken from the selected entrepreneurial enterprises. In addition, the questionnaire data were examined for useful descriptive elements that might assist in explaining aspects related to the framework. The researcher used the SPSS package for achieving these statistical results and descriptions as the techniques used are not complex and easily processed with this particular package. A more detailed discussion of the process is discussed in section 4.4.2 below, and the outcomes of the data analysis are presented in Chapter 5.

The questions asked cover the following four sections

1. Personal details, details about your company and reasons for starting up your Business

2. Growth from Start-Up and environmental factors

3. Intellectual property and innovation

4. Competition with rivals and future planning

The questionnaire designed for the full target sample of entrepreneurs in the survey can be found in Appendix I.

4.3.2 Semi-Structured Interviews with Entrepreneurs

4.3.2.1 Introduction

The author determined to interview a reasonable number of entrepreneurs from the pool of small and medium sized Chinese IT-software companies who participated in the questionnaire process, certainly a number in excess of 10. The interviewees were selected for their willingness to take part in the interview process. (In the event 17 respondents agreed to take part providing further insights into the study.)

The reason for targeting a number of interviewees at least reaching double figures was to try to ensure that multiple views could be obtained from among the IT-software entrepreneurs.

The interviews with IT-software entrepreneurs aimed to ascertain their different entrepreneurial behaviours in the face of the competitive and policy environment in which they operate in China. The interviews crucially explored in greater depth whether and how entrepreneurship influenced technology transfer.

The ways in which the interviews were conducted and analysed are discussed in section 4.4.2 below.

4.3.2.2 Question Design

Table 4.2 below outlines how the questions used in the questionnaire drew on the themes highlighted in the conceptual framework and how the interview questions with entrepreneurs were generated from the questionnaire. The ten questions put to the entrepreneurs enabled the author to build a richer picture about the issues shown in the first column in table 4.2.

Table 4.2 Questions enquired in interviews vs in survey

Interview Themes developed from Questionnaire:		Survey Themes based on Conceptual Framework:	
Themes	Question No	Themes	Question No
a. the nature of the entrepreneurial process and the firms' growth	Question 1-4 in interviews	Entrepreneurial decision about where to locate the firms; financing; recruitment at start-up and growth stage	Questions 5-12
B how the entrepreneurs respond to the environment	Questions 5-6	How the institutional environment could affect their development	Questions 13-14
c. the effectives of R&D, and innovation	Questions 7-8	The entrepreneurs' stance towards R&D, technology transfer	Questions 15-29
d. the firms' development and the entrepreneurs possible plans for the future	Questions 9-10	The scenario of business development and how to implement the planning	Question 30

4.3.3 Interviews with the Officials and Bankers

4.3.3.1 Introduction

Policy makers and bankers play very important roles in affecting the external environment for entrepreneurship in terms of setting relevant policies, such as establishing and cutting down the science parks; providing preferential tariffs; building up projects to encourage innovation; framing the conditions for venture capital and so on (See Chapter Two, Section 2.3).

In the conceptual framework, a dashed line was drawn indicating that the policy makers and government bankers may adjust some policies in response to changes in the environment resulting from entrepreneurial activities.

Consequently, the author wished to conduct interviews with some policy makers and government bankers in relatively high positions in order to obtain their views about how and why they make and adjust relevant policies in the light of the entrepreneurial activities taking place and also to gain insights into the possible future direction of the Chinese IT-software Industry. In the event, it was possible to gain interviews with two people from each of those categories. Table 4.3 in Section 4.3.3.3 below shows how the interview questions from each category mentioned above respectively relate to the themes in the conceptual framework.

4.3.3.2 Question Guide for Interviews with the Officials

The questions directed towards the officials focused mainly on government policies relating to issues of technology transfer and matters relating to the environment for software entrepreneurs. These areas were identified in the previous chapter (See Chapter Three, Section 3.3.) and are also alluded to in the conceptual framework (see dashed line).

The interview guide for the policy-makers and officials consists, therefore, of the following:

1. Could you give me a brief introduction about the development of Chinese IT software industry especially in terms of technology issue?

2. Do you think that the software entrepreneurs or enterprises can benefit from the relevant policies and why?

3. How do you evaluate the effectiveness of science parks as KT sources for software enterprises?

4. How do you assess the state of technology transfer in China, specifically the software technology?

5. Could you introduce the situation about patent issues in China?

6. Have you kept adjusting the relevant policies to respond to software entrepreneurial activities and make sure the external environment is suitable for software entrepreneurs to develop their businesses or to better compete with foreign rivals, especially after joining WTO, if so how?

The outcomes from the answers to the above questions were expected to depict at least in outline, the Chinese institutional environment in which the IT-software entrepreneurs carry out their entrepreneurial activities. First in Chapter Six, the author processes the results to understand the implication of each question and outlines the major themes, then in Chapter Seven through contrasting these outcomes with the outcomes of how the entrepreneurs perceive and respond to governmental policies, the researcher analyses the consistency and any contradictions between the perspectives obtained from two parties.

4.3.3.3 Question Guide for Interviews with the Bankers

The researcher interviewed two bankers, one from a major representative commercial bank and one from an investment bank in China: the Chinese Construction Bank and China Jianyin Investment Securities. The interview guide focused on the stance taken by Chinese state-owned banks regarding giving loans and/or venture capital to small and medium-sized software companies.

1. How long have you worked in this field? Could you introduce your bank policies regarding loans to software enterprises?

2. Are government banks interested in providing venture capital to some software start ups, or medium sized software firms and if so why?

3. Has your bank ever provided venture capital to any software company? If yes, what are the criteria for making such loans?

4. How do you evaluate the development situation of Chinese software industry from the bank's perspective?

5. When you make policies regarding venture capital, do you refer to some overseas experiences, why and how?

6. How do you think Chinese software entrepreneurs normally finance their enterprises currently: are they able to access capital from government banks, venture capital investors or are they just self funded? How about the situation in the future?

The interviews with the above policy-makers and bankers were undertaken and analysed using the same approach as discussed above (4.3.3.2). Moreover, the author processed these results in Chapter Six first, and then compared the outcomes with what the entrepreneurs expressed about their financing status/experiences.

As stated previously, the following table summarises the connection between the themes highlighted in the conceptual framework (see Chapter Three, page 106) and the questions posed in the interviews with the officials and the bankers.

Table 4.3 Conceptual framework themes vs questions to the interviewed officials and bankers

CF Themes	Questions to the officials interviewed	CF Themes	Questions to the bankers interviewed
Officials Introduction	Could you give me a brief introduction about the development of Chinese IT software industry especially in terms of technology issues?	Bankers Introduction	How long have you worked in this field? Could you introduce your bank's policies regarding loans to software enterprises?
Possible impact given by PESTL	Do you think that the software entrepreneurs or enterprises can benefit from the 'relevant' policies and why?	The financing status of Chinese software SMEs in relation to the support from the government financial organisations	Are government banks interested in providing venture capital to some software start ups, or medium sized software firms and if so why?
Influence of clusters	How do you evaluate the effectiveness of science parks as KT sources for software enterprises?		Has your bank ever provided venture capital to any software company? If yes, what are the criteria for making such loans?
Technology Issues related with environmental elements	How do you assess the state of technology transfer in China, specifically the software technology?		How do you think Chinese software entrepreneurs normally finance their enterprises currently, are they able to access capital from government banks, venture capital investors or are they just self funded?
	Could you introduce the situation about patent issues in China?		When you make policies regarding venture capital, do you refer to some overseas experiences, why and how?

Possible adjustment and improvement to policies, since having the feedback from market players	Have you kept adjusting the relevant policies to respond to software entrepreneurial activities and make sure the external environment is suitable for software entrepreneurs to develop their businesses or to better compete with foreign rivals, especially after joining WTO, if so how?	The bankers' view regarding the development and financing scope of Chinese software SMEs	How do you evaluate the development situation of Chinese software industry from the bank;s perspective? And how about their financing situation in the future

4.4 Method of Analysis for the Data

4.4.1 Preparation for Quantitative Analysis

Quantitative data can be divided into two distinct groups: categorical and quantifiable data. Categorical data refers to data whose values can not be measured numerically but can be either classified into categories according to the characteristics in which the researcher may be interested or placed in ranked order, and they can be further subdivided into descriptive and ranked. Quantifiable data is the data whose values you actually recorded numerically as quantities on the real numbers line. In this case, quantifiable data are more precise than categorical as the data can be assigned by value to a position on a numerical scale. If it were to be divided further, it could be subdivided into continuous and discrete variables (Bryman and Bell, 2003).

The majority of questions in the questionnaire for this research, as shown in Appendix I, are designed to collect categorical data and some of them are placed in ranked order. Very few questions are designed to collect some deterministically, quantifiable data such as data regarding interviewees' ages, percentage of investment sources, turnover, growth rates and so on.

The data received back from the survey, were coded. Coding data is necessary to simplify the further research work, because it will be easier to make a large number of possible responses clear in the coding scheme (De Vaus, 1991).

SPSS was used to carry out different kinds of analysis such as frequency to demonstrate the central tendency, correlation coefficient to access the strength of relationship. Before carrying out the correlations, a reliability testing was conducted, and detail and result are set out respectively in Appendix II and Chapter Five.

4.4.2 Preparation for Qualitative Analysis

The author collected the interview data using a mixture of electronic recordings and note taking as she anticipated that not all respondents would agree to being recorded. The interviews were conducted in Chinese and the data analysed through a process of sensemaking and using language as a contextualizing resource (Watkins-Mathys, 2006; Welsh and Piekkari, 2006).

This process involved interpreting the interview data such that the interviewer is an active participant in making sense of the views expressed by the respondents. For this reason, and because the researcher was working between two languages, she chose not to use a software package, such as for example NVivo, to analyse the qualitative data. Instead, using the themes of the conceptual framework the researcher sought to draw out and interpret the views obtained from the respondents for each theme.

The themes identified and obtained from interviews with officials and bankers are displayed as separate subtitles under which the themes are elaborated.

A first overview of the data coverage was undertaken to deliver thorough familiarity with the data set, with themes and concepts being sought out (i.e. naturally emergent themes were looked for) and cross-referenced to the themes that the author hoped or expected to find relating to the conceptual framework. Other emerging implications that could possibly arise provided the inductive element of this research. The data from the interviews with entrepreneurs were managed by ordering and categorizing it into a matrix first. Each interviewee was allocated into a column, and each row denotes a separate subtopic, labelled or sorted by theme or concept. Then, in each row there was a summarizing synthesis. An abridged summary of the interview data within each table is presented in Appendix III. It contains information in detail obtained from the interviews (Chapter Six).

Chapter Seven combines the outcomes from the quantitative and qualitative analyses in Chapters Five and Six. The two sets of results were compared with each other to manifest the nature of entrepreneurship in small and medium sized Chinese software firms. Through linking it with the literature contributions about factors which affect the effectiveness of specific technology transfer, the author sought to explain and answer the major research question, which is: whether entrepreneurship in Chinese, small and medium-sized, IT-software firms could (positively) effect technology transfer from universities or not.

4.5 Summary

To conclude, the research methodology adopted for this study has been developed starting with the conceptual framework presented in Chapter Three. The various available methodological perspectives were discussed. Taking into account the focus of the research and for the reasons given, the researcher adopted a hybrid approach incorporating both quantitative and qualitative perspectives that assist in depicting the IT-software industry (survey) and then explores the situation of IT software entrepreneurs within the China context as perceived by entrepreneurs themselves, policy-makers and bankers (interviews).

As explained in section 4.1, the research was conducted using elements from both positivist and interpretivist perspectives. Consequently, rather than testing existing hypotheses, the analysis of the quantitative data is designed to begin to create an explanatory framework and to guide the qualitative data collection. In this way, the questionnaire and interviews are complementary. Therefore this section clearly outlined why a multi-method strategy was applied and its subsequent and specific advantages and disadvantages.

Sections 4.2 and 4.3 of this chapter explained in greater detail that research was undertaken by utilising a survey and semi-structured interviews, and to a certain extent, some data from secondary sources. Primary data collection was derived on the basis of gleaning information from small and medium sized IT-software entrepreneurs located in Beijing and Shanghai, two cities in China known for their IT-software concentration, and also from a small number of officials and bankers familiar with the industry and area. In this way, the data aims to provide multiple information perspectives, derived from the richness of the data responses.

Additionally, the justification of data collection processes, sample sizes, and respondent section methods were also discussed and presented within this chapter.

Finally, appropriate statistical techniques and qualitative analysis methods, including how to abstract themes and make sense of them, were outlined. The combined data from the quantitative and qualitative approaches based on, and linked to, the conceptual framework permitted the researcher to reflect on the information and outcomes with regards to the literature reviewed in Chapter Three, and hence to answer the posited research questions.

Chapter Five Quantitative Analysis

5.0 Introduction

As discussed in the Literature Review, in the West entrepreneurship has been studied from a variety of perspectives within the academic world. Through economic reform, from a centrally planned economy to a market-oriented economy, China's economy has gradually grown to become one of the biggest in the world, assisted in this growth by the Chinese government's advocacy of 'enhancing national competitive strength through science and technology'.

This favourable environment stimulates entrepreneurial activities across the country, and China has witnessed a steady increase of SMEs. These have played a very important role in the nation's economic growth and technological innovation. Chinese SMEs not only dominate the economy in China in terms of the number of firms, but also contribute to more than half of the industrial output and sales revenue. The phenomenon is steadily attracting the attention of more and more scholars. We can see that research on Chinese entrepreneurship has covered areas such as how technology transfer from universities is both driven and constrained by the government's policies (Liu and Jiang, 2001).

Further to this, more research has been carried out on Chinese entrepreneurial motivation. This has been examined with regard to several aspects of entrepreneurship, such as personality and environmental influence (Taomina and Lao, 2007). Research has also been carried out on Incentive Mechanisms, Entrepreneurial Orientation, and Technology Commercialisation in China (Li et al, 2007).

Nevertheless, despite detailed research on entrepreneurship in the Western world, the research on Chinese entrepreneurship is still fairly limited and so there are a lot of areas that should be explored. Hence this thesis is going to discuss whether entrepreneurship can affect technology transfer from universities in the Chinese software industry. In order to explore this question, data will be collected from an appropriate sample of Chinese software entrepreneurs. One of the researcher's aims is to make a contribution to Chinese research on entrepreneurship.

As demonstrated in Chapter Three the researcher has a broad literature review with regards to the basic concept of entrepreneurship from the Western academic world. There is also some relevant research regarding Chinese entrepreneurship too. In Chapter Three a conceptual framework has already been developed to help the researcher direct the work relevantly.

In order to achieve the research aims, the researcher has attempted to get firsthand information regarding the entrepreneurial activities of Chinese software SMEs' by conducting a survey. The survey was conducted by sending questionnaires to 100 software entrepreneurs. The questionnaire was designed and written in English as shown in the Methodology Chapter. In order to conduct the survey in China, the researcher then translated the questionnaire into Chinese.

Before sending the questionnaire, a pilot test was also run in PuDong Zhang Jiang STIP. The attendants were selected from the potential respondents and five entrepreneurs took part in this pilot test. Despite the need to amend certain aspects of the questionnaire to make it more idiomatic, the questions appeared to be understandable.

After the full survey was carried out, a response rate of 53% was achieved. Of the 53 respondents in the sample, ages ranged from 23 to 54 years old when starting their business, with the highest frequencies of ages being of 28, 32, 35 and 36. With regards to the level of education, 11 of the respondents had a PhD degree, 23 held a Masters degree, 12 held Bachelors degrees and only one had a college education without a degree. The other six participants chose not to answer this question. (The results from question four can be viewed in Table 7.0, Chapter 7, Section 7.1.1). As shown in the Literature Review, not all perspectives regarding entrepreneurship are covered such as the issue of gender and ethnicity which are not included. Therefore there is no specific question raised regarding gender.

After appropriately coding the close-ended and open-ended questions, the researcher carried out a quantitative analysis by comparing mean, frequency and correlation of some variables by choosing some of the finite questions (questions 8, 9, 11, 12, 13, 14). The results could be interpreted to demonstrate the major strengths of Chinese software entrepreneurs. These may include the running of a business, the importance of networks for acquiring various relevant resources, the contribution to networks, the extent to which they use a business plan to attract venture capitalists, and the correlation among some variables (such as employee numbers, turnover, growth and R&D input).

The results from some other questions (question 5, 6, 7, 10, 15 – 30) were computerised and outputs have been demonstrated mainly in bar or pie charts (see Chapter Seven). These are compared with and synthesized with the results from relevant interviews.

Questions one and two deal with the names of the entrepreneurs and their companies. In order to respect the convention of confidentiality the answers to these questions will not be published.

Due to the nature of adopting a multiple research method, the questionnaire is designed not only to provide data for quantitative analysis, in order to explore the previous issues, but also to link with in-depth interviews by providing data for qualitative analysis. Therefore the researcher will further enhance the qualitative analysis by combining some parts of feedback from the questionnaires and the results from interviews to draw a reliable picture regarding the Chinese software entrepreneurial activities.

However, under the market-driven economy, the innovation system in China is facing significant challenges in creating scientific and technological change within the constraints of the Chinese historical and cultural context. This is because in China scientific and technological knowledge is seen as based upon practice rather than academic research. Whereas in the West academic research does hold a more prominent position, although of course practical knowledge still plays a significant role.

5.1 Means and Frequency Analysis

5.1.1 Business strength

In order to understand what the major strengths for small and medium sized Chinese software companies are and how these affect the running of the sampled businesses a question listing possible strengths was included in the survey (Question Eight). The following options were offered:

a. your staff working in the business;

b. your intellectual property;

c. your brand;

d. your financial resources;

e. your physical location;

f. your networks;

g. your technological capabilities.

The respondents were required to rank on a scale of one to five (very little to very much) the extent to which these factors could affect the running of their business.

The feedback was coded and entered into the computer to carry out the mean and frequency analysis and the output generated is shown below.

Table 5.1 Mean and frequency analysis of staff importance in the business: Question 8a - your staff working in the business

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	29	54.7	54.7	54.7
3	1	1.9	1.9	56.6
4	21	39.6	39.6	96.2
5	2	3.8	3.8	100.0
Total	53	100.0	100.0	100.0

Mean: 2.38

According to the above output, 29 respondents ticked score one to show that the strength of the staff working in the business plays very little role in the running of their business. However another 21 respondents ticked score four, producing a mean of 2.83. The results perhaps indicate that a lot of software businesses are started and run largely by relying on the entrepreneurs' personal abilities. Most entrepreneurs selected here are still in the early stage of developing their businesses (still in the first two or three years) which means that they probably do not have many staff. Thus from their point of view, they themselves are the real backbone of their business. However among the sample some of the businesses have developed to a stage with an increase in staff volume. It is therefore noted that the respondents must realise the importance of their staff.

Table 5.2 Mean and frequency analysis regarding intellectual property Question 8b - your intellectual property

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	23	43.4	43.4	43.4
2	1	1.9	1.9	45.3
3	2	3.8	3.8	49.1
4	12	22.6	22.6	71.7
5	15	28.3	28.3	100.0
Total	53	100.0	100.0	100.0

Mean: 2.91

It is shown that 15 respondents thought that the strength of having intellectual properties plays an important role in the running of their business. However 23 respondents answered that this was not the case by scoring one (very little). Therefore a mean of 2.91 is achieved, which perhaps shows that at a certain level, once a company has reach a relatively large scale, the importance of intellectual property, to drive development, rises. Whereas companies that have started more recently often begin by copying the model of existing products or simply providing services, this is seen as a short-cut to quick profits. However, in the long run, the development of intellectual property is key to sustaining a strong software business.

Table 5.3 Means and frequency analysis about brand issue
Question 8c - your brand

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	51	96.2	96.2	96.2
3	1	1.9	1.9	98.1
4	1	1.9	1.9	100.0
Total	53	100.0	100.0	100.0

Mean: 1.09

The above output shows that almost all respondents (51 of the 53) did not take brand as their business running strength. This result could indicate that most of them are only small local software companies and have not built up a brand yet. Only one gave the answer as score three ('some') and another chose score four ('much'). This perhaps means that they might have larger businesses comparatively and therefore a stronger influence on the Chinese software industry.

Even though the samples were selected among a group of small start-ups or software companies, they should represent the potential developing trend in the Chinese software industry. Hence it is to be expected that they are aware of branding and have the knowledge to build up a good business reputation for further development in the future.

Table 5.4 Mean and frequency analysis on financial resources
Question 8d your financial resources

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	48	90.6	90.6	90.6
2	2	3.8	3.8	94.3
4	2	3.8	3.8	98.1
5	1	1.9	1.9	100.0
Total	53	100.0	100.0	100.0

Mean: 1.23

Of the 53 respondents, 48 ticked the lowest score, therefore producing a very low mean of 1.23. This implies that the majority of respondents do not think that they have very good financial resources to run their businesses. How to finance is always a crucial issue for start-ups or small business, and especially for software companies. This is because they have more intangible properties than tangible properties and this causes a higher level of uncertainty for investors.

Table 5.5 Mean and frequency analysis of impact of physical location
Question 8e - your physical location

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	49	92.5	92.5	92.5
3	2	3.8	3.8	96.2
4	2	3.8	3.8	100.0
Total	53	100.0	100.0	100.0

Mean: 1.19

Again, a high number of respondents (48 of the 53) ticked score one ('very little'), which shows that the majority of respondents did not think that the running of their business was affected by its physical location. They may have been able to utilise the physical location but they perhaps did not realise that this plays a vital role in benefiting their businesses. Among them only two ticked score three and another two ticked score four.

Table 5.6 Mean and frequency analysis regarding networks
Question 8f - your networks

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	34	64.2	64.2	64.2
2	1	1.9	1.9	66.0
4	8	15.1	15.1	81.1
5	10	18.9	18.9	100.0
Total	53	100.0	100.0	100.0

Mean: 2.23

We can see that there is again a large number of respondents (34) who felt that networks played very little role in the running of their business. However ten felt networks played a very important role, which may be related to the answer to 8g. For question 8g, 37 respondents thought that technological ability played a very important role in the running of their business. This could indicate that the majority of small software businesses are started and run mainly by relying on their technological abilities instead of relying on their networks. For some of them, and especially for those companies which have expanded to a certain level, being able to attract and built up networks shows a significant role within their business.

Table 5.7 Mean and frequency analysis about technological capabilities
Question 8g - your technological capabilities

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	7	13.2	13.2	13.2
2	1	1.9	1.9	15.1
3	2	3.8	3.8	18.9
4	6	11.3	11.3	30.2
5	37	69.8	69.8	100.0
Total	53	100.0	100.0	100.0

Mean: 4.23

We can see that 37 respondents ticked score five for the importance of technological capabilities accumulated, 69.8% of the 53 respondents. The mean is also very high, at 4.23, which indicates that technological capabilities are commonly considered as a very important factor or strength for the running of the respondents' businesses. However in this case technological capabilities should be understood as the capabilities such as copying and programming, instead of innovating. As displayed in question 8b, quite a lot of respondents did not consider owning intellectual property a particular strength within their business; particularly with regard to running the business. However due to the character of running a software business they must have technological ability. Furthermore they should be able to copy or provide some services.

Table 5.8 Descriptive Statistics of Various business strengths

	No.	Minimum	Maximum	Mean	Std. Deviation
8a - your staff working in the business	53	1	5	2.38	1.547
8b - your intellectual property	53	1	5	2.91	1.779
8c - your brand	53	1	4	1.09	0.491
8d - your financial resources	53	1	5	1.23	0.800
8e - your physical location	53	1	4	1.19	0.681
8f - your networks	53	1	5	2.23	1.717
8g your technological capabilities	53	1	5	4.23	1.409
Valid No. (listwise)	53				

The output presented above gives the full information regarding responses to question eight.

5.1.2 Roles played by Networks to establish business

Social networks play an important role in the entrepreneurial process. Several scholars have made vast contributions to this topic (as discussed in the Literature review, Chapter Three, Section 3.4). The widely held opinion is that entrepreneurs can easily generate initial business ideas from within an industry and due to their social networks are able to recognise new opportunities and acquire the intellectual, financial and human capital demanded for new ventures. Therefore in the questionnaire, the researcher asked to what extent they rely on their social networks

a. to establish business;

b. to get business opportunities;

c. to obtain start-up capital initially;

d. to get access to further finance/loans;

e. to find good staff and to get other resources.

Again respondents were asked to give each option a ranking between one (irrelevant) and five (very important). The feedback from the questions was coded and computed as follows.

Table 5.9 Mean and frequency analysis about extent to which social networks affect establishing business

Question 9a - establish business

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	8	15.1	15.1	15.1
2	7	13.2	13.2	28.3
3	14	26.4	26.4	54.7
4	12	22.6	22.6	77.4
5	12	22.6	22.6	100.0
Total	53	100.0	100.0	100.0

Mean: 3.25

From the output above we can see that the modal score given was three, more specifically that is to say that 26.4 % of respondents (14) chose this ranking. There is also a fairly even distribution of responses across the scale with a slight bias towards the higher scores, indicating that the majority of respondents felt that the importance of social networks in the establishment of their businesses was relatively high.

Table 5.10 Mean and frequency analysis regarding extent to which social networks affect the ability to acquire business opportunities

Question 9b - get business opportunities

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	4	7.5	7.5	7.5
2	7	13.2	13.2	20.8
3	9	17.0	17.0	37.7
4	14	26.4	26.4	64.2
5	19	35.8	35.8	100.0
Total	53	100.0	100.0	100.0

Mean: 3.70

The output shown here again displays a marked bias towards the higher scores, with the modal score this time being five. This demonstrates what we would already expect, that the majority of the respondents felt that social networks played a large role in the acquisition of new business opportunities for them. This is also reflected in the relatively high mean in this case, 3.70.

Table 5.11 Mean and frequency analysis about extent to which social networks affect ability to obtain initial start-up capital

Question 9c - obtain start-up capital initially

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	17	32.1	32.1	32.1
2	3	5.7	5.7	37.7
3	16	30.2	30.2	67.9
4	10	18.9	18.9	86.8
5	7	13.2	13.2	100.0
Total	53	100.0	100.0	100.0

Mean: 2.75

The responses for this question show an interesting split of opinion. While the modal score is one, indicating that over 30% of the respondents felt that social networks played almost no role in their acquisition of initial start-up capital, another third of the respondents chose score three, while a mere 5.7% chose score two. Despite these two spikes in opinion the responses do cover the range fairly evenly, resulting in a relatively centralised mean of 2.75. These responses suggest then that, although the respondents did not feel that they would have been able to rely solely on social networks to help them acquire start-up capital, they do recognise that networks are an important tool in the financing of their companies.

Table 5.12 Mean and frequency analysis regarding access to further finance Question 9d - get access to further finance/loans

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	15	28.3	28.3	28.3
2	10	18.9	18.9	47.2
3	13	24.5	24.5	71.7
4	10	18.9	18.9	90.6
5	5	9.4	9.4	100.0
Total	53	100.0	100.0	100.0

Mean: 2.62

Again here we see two spikes of opinion in the high number of respondents choosing scores one and three, although here the spikes are less extreme with an even distribution of responses across the rest of the scores. We again see that one is the modal score, with 15 of the 53 respondents choosing it, indicating that nearly 30% of them felt that social networks did not play a role in securing further finance and loans for their companies. This could indicate that as a new enterprise grows its past performance and the facts and figures regarding its financial stability become more important to potential investors than their personal knowledge of the founder.

Table 5.13 Mean and frequency analysis about the extent to which social networks affect abilities to find good staff

Question 9e - find good staff

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	16	30.2	30.2	30.2
2	6	11.3	11.3	41.5
3	15	28.3	28.3	69.8
4	8	15.1	15.1	84.9
5	8	15.1	15.1	100.0
Total	53	100.0	100.0	100.0

Mean: 2.74

Here we see another repetition of the spiking pattern between scores one and three, with almost 70% of the respondents choosing the lower scores in this case and just 30.2% choosing scores four and five. This perhaps indicates a personal preference in this minority group to make use of social networks in order to seek out good staff, whereas the vast majority of respondents did not feel that social networks played a significant role in the employment of good staff as they perhaps pursue more traditional recruitment routes.

Table 5.14 Mean and frequency analysis about how social networks affect abilities to obtain other relevant resources

Question 9f - other

Ranking	Frequency	Percent	Valid Percent	Cumulative Percent
1	36	67.9	67.9	67.9
3	10	18.9	18.9	86.8
4	4	7.5	7.5	94.3
5	3	5.7	5.7	100.0
Total	53	100.0	100.0	100.0

Mean: 1.83

The above output shows that the vast majority of respondents (67.9%) do not think networks are relevant to the other aspects of running of their businesses. Below is a summary of the cumulative statistics for this question.

Table 5.15 The range of Means for various aspects affecting social networks (To compare the importance of network and business plan for obtaining VC)

	No.	Minimum	Maximum	Mean	Std. Deviation
9a - establish my business	53	1	5	3.25	1.357
9b - get business opportunities	53	1	5	3.70	1.295
9c - obtain my start-up capital initially	53	1	5	2.75	1.426
9d - get access to further finance/loans	53	1	5	2.62	1.333
9e – find good staff	53	1	5	2.74	1.430
9f – other	53	1	5	1.83	1.297
Valid No.	53				

In order to gain a more balanced and in-depth view interviews were also conducted to support the data acquired from the survey.

In summary these results appear to support the prevailing opinion identified among scholars in the Literature Review that networks can play several important roles in helping entrepreneurs start and develop their businesses. For example, in obtaining venture capital. This is firstly because venture capitalists prefer to finance investments that come to them through referrals from close contacts (Fried and Hisrich, 1994), and secondly, a strong tie and consistent information across multiple independent sources might offer the investor some assurance regarding the reliability of their information and regarding the potential investment (Sorensen and Stuart, 2001).

5.1.3 The importance of different factors in acquiring financial capital

Besides networks, business plans are also treated as a tool for obtaining venture capital. This is because business plans are made and used for both internal and external purposes. Normally a business plan is required if a new or small business hopes to obtain external financing, as financiers are used to evaluating the potential of a business by going through the business plan.

So what is the reality in China, in terms of the importance of networks and business plans for obtaining venture capital? The researcher again explored this question by giving respondents five scoring options, ranging from a one for 'unimportant', to a five for 'very important'. The results were coded and from this the mean and frequency calculated. The data is represented in the following two tables.

Table 5.16 Mean analysis of the importance of networks to obtain venture capital

Question 11a - importance of networks

	Frequency	Percent	Valid Percent	Cumulative Percent
1	7	13.2	13.2	13.2
2	4	7.5	7.5	20.8
3	11	20.8	20.8	41.5
4	14	26.4	26.4	67.9
5	17	32.1	32.1	100.0
Total	53	100.0	100.0	100.0

Mean: 3.57

Table 5.17 Mean analysis of the importance of business plans to obtain venture capital

Question 11b - importance of business plans

	Frequency	Percent	Valid Percent	Cumulative Percent
1	9	17.0	17.0	17.0
2	3	5.7	5.7	22.6
3	7	13.2	13.2	35.8
4	17	32.1	32.1	67.9
5	17	32.1	32.1	100.0
Total	53	100.0	100.0	100.0

Mean: 3.57

In Table 5.16 we can see that, among the 53 respondents, there was a strong bias towards the higher scores, with 17 and 14 respondents choosing scores five and four respectively. This indicates that the majority of the entrepreneurs interviewed (58.5%) rate the importance of networks in obtaining venture capital quite highly. This is reflected by a mean of 3.57 and this suggests that the software entrepreneurs generally agree that networks are important for obtaining venture capital.

In terms of how important business plans are in affecting the ability to obtain venture capital, there are 17 people who chose very important and another 17 people who chose quite important. In this case a majority of 64.2% chose the higher scores, again indicating a widely held belief that business plans are important in the acquisition of venture capital. Coincidentally the mean is the same as the previous one, 3.57.

One could suggest that, from the respondents' perspective, both 'networks' and 'business plans' are rather important for obtaining venture capital and that they are not alternatives but complementary aids. Nevertheless, it is also notable there are 7 and 9 respondents who totally ignore the importance of 'networks' and 'business plans' respectively for obtaining venture capital. It may be that these respondents' negative perceptions are due to their poor abilities to actually access finance.

5.1.4 Technology transfer

The aim of the research is to examine whether entrepreneurship can positively affect technology transfer from universities. In the Introduction, the status of technology transfer in China is briefly presented and in the Literature Review, the relevant factors relating to technology transfer are discussed. Thus these provide a base for the researcher to construct a framework with regard to what sorts of elements can impede technology transfer from universities; the elements are listed as follows:

a. lack of entrepreneurial capability of innovation,

b. lack of internationally competitive innovation,

c. university bureaucracy,

d. lack of IPR protection,

e. inadequate venture capital,

f. lack of human resources with relevant skills,

g. government policies and

h. others

The entrepreneurs were asked to what extent each of these elements constrains technology transfer, and the range of influence is from score one ('hardly') to score five ('very strong'). The results were coded into the computer and an outcome of descriptive statistics was generated in Table 5.18. In this table the labels 14aa – 14ah represent the above elements respectively in sequence.

Table 5.18 Descriptive Statistics of the constraint influences from various elements

	No.	Minimum	Maximum	Mean	Std. Deviation
14aa	53	1	5	3.00	1.109
14ab	53	1	5	2.81	1.039
14ac	53	1	5	2.70	1.085
14ad	53	1	5	3.19	1.194
14ae	53	1	5	3.09	1.079
14af	52	1	5	2.94	1.018
14ag	53	1	5	2.60	1.182
14ah	15	1	5	2.33	1.113
Valid No.	15				

According to the outputs above, the factor rated most highly as constraining technology transfer was the lack of IPO, with a mean of 3.19. The next most highly rated elements which could constrain technology transfer are inadequate venture capital and lack of entrepreneurial capability of innovation, with means of 3.09 and 3.00 respectively. A comparatively lower percentage, but still over half of the respondents, thought that some of the other elements such as lack of human resources with relevant skills, lack of internationally competitive innovation and university bureaucracy could constrain their technology transfer, with means of 2.94, 2.81 and 2.70 respectively. The meaning of the element labelled as 'others' was to be further explored during the interviews.

The researcher also selected other factors to examine with respect to what extent they could give impetus for technology transfer. These factors were again rated from one ('hardly') to five ('very strong'). The factors are

a. entrepreneurial culture within universities;

b. availability of business advice for science park/University based start-ups;

c. university networks;

d. financial and legal advisors;

e. government policies;

f. competition;

g. human resources with relevant skills and;

h. others

The results from the survey were coded and descriptive statistics are presented in Table 5.19. Within the table the labels 14ba to 14bh again represent the factors listed above.

Table 5.19 Descriptive Statistics of the impetus influences from various factors

	No.	Minimum	Maximum	Mean	Std. Deviation
14ba	53	1	5	2.94	1.064
14bb	53	1	5	2.72	0.988
14bc	53	1	5	3.11	0.870
14bd	53	1	5	2.60	0.947
14be	53	1	5	3.19	1.020
14bf	53	1	5	3.40	1.007
14bg	52	1	5	3.50	1.094
14bh	15	1	4	2.60	0.910
Valid No.	15				

In the questionnaire, the researcher asked, in the fourteenth question, to what extent these factors (listed from ba to bh) could affect technology transfer. The output shows that averagely speaking from the respondents' view the factors of 14bc, 14be, 14bf and 14bg are quite important, and the rest of the factors are comparatively less important. It is worth noticing that 15 respondents think there are other factors which could give a little impetus to their technology transfer. The given situation will be explored in further detail. This will be conducted in the next stage of analysing the results.

5.2 Correlation

5.2.1 Correlation among employee numbers, turn over, growth rate and R&D input rate

Through journals, the Internet and government databases, the researcher collected second hand information regarding the general situation of the Chinese software industry, which is quite general and brief. This has been presented in the Introduction. In order to have accurate information regarding the running of businesses, the researcher asked respondents to fill out a table giving details of their employee numbers, turnover, growth rate and R&D input from 1997 to 2006, however not all respondents gave full information. This may be due to the fact that some of the companies started later than 1997 or some of them were reluctant to show their performance status. In order to correlate employee numbers, turnover, growth rate and R&D input overall from 1997 to 2006, the researcher will present descriptive statistics and a correlation analysis for each year, noting in which years the respondents gave more details.

It is well known that there are two different types of statistical techniques: parametric and non-parametric. The parametric methods often make assumptions about the shape of the population distributed on a general scale. Non-parametric techniques, on the other hand, do not have such stringent requirements and do not make assumptions about the underlying population distribution. Because the samples selected for the research are relatively small in comparison to the registered number of software companies in China, the non-parametric technique has been used for correlation.

The information covers aspects regarding employee numbers, turnover, growth and R&D input. In the following text the relevant factors simply represent the aspects mentioned above.

Table 5.20 Descriptive Statistics of Mean of the relevant factors from 1997 to 2006

Units: Turnover and R&D input (Thousands, Yuan), Growth (%)

		No.	Minimum	Maximum	Mean	Std. Deviation
2006	Employee number	50	1	2100	95.90	311.643
	Turnover	35	0	1400	245.57	400.582
	Growth	33	-21.0	600.0	98.887	125.9662
	R&D input	36	2	100	24.27	22.779
2005	Employee number	45	1	1900	84.71	294.836
	Turnover	31	0	790	124.30	222.320
	Growth	24	-287.4	73.1	21.925	68.8055
	R&D input	33	1.00	100.00	23.938	23.31249
2004	Employee number	36	2	1200	74.22	211.879
	Turnover	24	0	1259	121.73	276.306

	Growth	22	-66.2	100.0	52.808	41.2209
	R&D input	25	5	180	28.19	38.205
2003	Employee number	29	2	700	59.21	141.529
	Turnover	20	0	2092	149.54	473.320
	Growth	18	0	100	68.68	32.661
	R&D input	22	0	100	23.77	24.353
2002	Employee number	19	2	250	45.00	77.677
	Turnover	12	0	37	11.35	11.986
	Growth	8	0	250	101.46	81.420
	R&D input	16	0	100	26.47	27.591
2001	Employee number	12	2	175	36.25	55.903
	Turnover	7	2	28	12.32	9.714
	Growth	5	0	158	88.60	62.927
	R&D input	9	7	100	26.02	30.673
2000	Employee number	8	8	95	31.00	33.861
	Turnover	7	0	12	5.33	4.341
	Growth	4	0	250	126.50	102.080
	R&D input	7	6	50	15.37	15.392
1999	Employee number	7	8	70	23.29	24.500
	Turnover	6	1	8	4.28	3.020
	Growth	3	0	231	91.83	122.558
	R&D input	7	5	50	15.00	15.546
1998	Employee number	4	8	42	22.50	16.361
	Turnover	4	1	8	4.47	3.082
	Growth	3	0	132	87.33	75.639
	R&D input	4	4	70	23.38	31.234
1997	Employee number	4	8	35	17.75	12.816
	Turnover	4	1	8	3.78	3.377
	Growth	2	0	20	10.00	14.142
	R&D input	4	3	80	25.75	36.317

Nonparametric Correlations

The outcomes above were also accumulated from the year 1997 to 2006 by each aspect and were correlated. The results are demonstrated in Table 5.21 as follows.

Table 5.21 Correlations between the relevant factors

Correlations (Spearman's rho)

Year 1997 – 2006	Employee No.	Turn over	Growth	R&D input
Employee No.	1.000	0.496(**)	0.364(**)	0.050
Turn over		1.000	0.064	0.095
Growth			1.000	0.229(*)
R&D input				1.000

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

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

The outcomes of the non-parametric correlation tests above show that the correlation between employee number and turnover is significant and the correlation between employee number and growth rate is also significant from the year 1997 to 2006. Within this period the correlation between growth rate and R&D input is again significant, but we cannot see any correlation between employee number and R&D, or between turnover and R&D input.

Since it is difficult to collect the relevant information for such a long period (from 1997 to 2006), more statistics were collected just with the relevant data from the year 2006. The relevant information for 2006 covers more detail, which thereby provides more reliable results. The outcomes are shown in the following table.

Table 5.22 Descriptive Statistics of Mean of the relevant aspects in Year 2006

Units: Turn over and R&D input (Thousands, Yuan), Growth (%)

Year 2006	Mean	Std. Deviation	No.
Employee number	97.04	314.767	49
Turn over	233.674	400.2831	34
Growth rate	122.644	117.8365	32
R&D input	24.62	23.013	35

The above descriptive statistics show that the mean number of employees for 2006 is about 97, turn over is averagely about 233.674 thousand yuan, the growth rate is 122.644% and the R&D input rate is 24.62%. Calculations regarding correlation were also carried out. The results are demonstrated in Table 5.22. Due to the limitation of space, the labels V1, V2, V3 and V4 replace employee number, turn over, growth and R&D input respectively

Table 5.23 Correlations between the relevant factors in 2006

			V1	V2	V3	V4
Spearman's rho	V1	Correlation Coefficient	1.000	0.259	0.297	0.120
		Sig. (2-tailed)	0.0	0.140	0.098	0.498
		No.	49	34	32	34
	V2	Correlation Coefficient		1.000	0.171	0.248
		Sig. (2-tailed)		0.0	0.375	0.195
		No.		34	29	29
	V3	Correlation Coefficient			1.000	0.273
		Sig. (2-tailed)			0.0	0.178
		No.			32	26
	V4	Correlation Coefficient				1.000
		Sig. (2-tailed)				0.0
		No.				35

The results of the non-parametric tests seem to show that there is not any significant correlation between these variables. However if we compare the results of the year 2006 with the results of the10 years overall, we see that the figures for 2006, especially for employee numbers and turnover, are much higher than the mean figures we had for the 10 years. This could be indicate that the small sized software companies have developed very quickly in terms of firm size (considered by employee numbers) from 1997 to 2006.

5.2.2 The government policies versus the development of Chinese software companies

As elaborated in the Literature Review, the environment can affect entrepreneurial activities to a certain extent. Government policies are normally the main factors in creating and driving the environment. So what is the situation in China? In order to explore this, in the questionnaire, the researcher listed some policies and asked how significantly the respondents thought those policies affected their businesses; in particular when their businesses are just starting and developing. The range of importance is from score one ('not important') to score five ('very important').

The scales were selected by referring to Chapters two and three (the Introduction and the Literature Review). To carry out statistical analysis, five variables are listed:

V1 - Preferential policies for high-end talents (tax incentives, package service);

V2 - Preferential policies for Science Park (tax incentives, package;

V3 - Market entry policies for small enterprises (information security, e-government);

V4 - Government purchase policies and;

V5 - Government training policies.

The scales were selected according to the researcher's subjective understanding. In order to check if the scales were reliable enough, and further correlate two stages to understand the continued influence brought by these factors on entrepreneurial activities across those two stages, a reliability test for the scales was conducted before undertaking the relevant statistical analysis. The average mean for each stage was generated as shown in Table 5.23. A further correlation test between two stages was also undertaken and the results are presented in Table 5.24. The reliability test was processed via the computer and is presented in Appendix II.

The result of the reliability test for the start-up stage is: Alpha = 0.7745

The result of the reliability test for the development stage is: Alpha = 0.8101

The most important figure is the Alpha value. The outputs for two different stages, presented above, show that for the first stage the Cronbach's alpha coefficient is 0.7745 and for the second stage the Cronbach's alpha coefficient is 0.8101. Both values exceed 0.7, and the scales can therefore be considered reliable with this research sample.

The means for each scale are collected at different stages, and an average for each stage is demonstrated as follows:

Table 5.24 Descriptive Statistics of Means for two stages

		Mean	Std. Deviation	No.
Stage 1	start-up stage	2.792	0.8849	53
Stage 2	developing stage	2.822	0.8749	53

It is shown that all the respondents answered this question. It is noted that they think that when they just started their business the government policies were important for them but not the most important factor affecting their business when starting up. The mean is 2.792, which indicates a bias in the responses towards 'important', but not significantly. For stage two, the government policies are again ranked as important and the mean is slightly higher than for the first stage at 2.822. This could be interpreted as some preferential policies, like tax incentives, playing roles when the enterprises have generated revenue. This may be because some of them were still in the R&D stage and had not yet got business incomes when they were in their initial stages.

The correlation between the two stages was further calculated. The result is displayed in the following table.

Table 5.25 Correlation of two stages

		Stage 1 Onset	Stage 2 Developing
Stage 1 Onset	Pearson Correlation	1.0	0.973(**)
	Sig. (2-tailed)	0.0	0.000
	No.	53	53
Stage 2 Developing	Pearson Correlation	0.973(**)	1.0
	Sig. (2-tailed)	0.000	0.0
	No.	53	53

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

The output presented above shows that the correlation between the two stages is 0.973 and it is significant at 0.01. This could imply that the scales/factors listed above do not affect their businesses in an early stage, but that there is a continuously increasing influence from their starting-up stage to developing stage.

5.3 Conclusion

This Chapter has processed and analysed the data collected from the survey using SPSS. The main statistical techniques applied were used to analyse the means and frequencies, and to understand the correlation of the data collected from certain questions.

The mean and frequency analyses were useful in demonstrating the distribution of the respondents' major business strengths. This also demonstrated the role of networks in establishing business; how networks and business plans could have an impact on acquiring financial capital, and how some relevant factors could affect technology transfer from local universities.

Correlation statistics generated demonstrated the correlation among employee numbers, turnover, growth rate and R&D input rate, and revealed the correlation of influences on Chinese software SMEs by the governmental policies between two stages (the stages of business starting and business developing).

The outcomes of the analysis were expected to provide more precise evidence that can be applied and combined with the outcomes from the qualitative analysis in Chapter Seven. This precise and quantitative evidence hopefully can help the researcher generate more convincing results.

Chapter Six Qualitative Analysis

6.0 Introduction

As already stated, the statistical research enquiry will be followed with a qualitative study. This aims to explore in greater depth the issues that arise from the statistical analysis which are thought to warrant further explanation, together with soft elements not available to quantitative analysis.

Therefore, in order to capture greater insights into high-tech entrepreneurship in Chinese small and medium sized software firms', the researcher has chosen to undertake interviews with entrepreneurs selected from the respondents who took part in the survey conducted in Beijing and Shanghai.

Using the conceptual framework as a basis, and questions consistent with the questionnaire, guided interviews were conducted with a total of 17 entrepreneurs. The interviews explored the opinions and experience of the subjects in more depth, focusing on what motivated them to become software entrepreneurs, how they started and currently run their businesses, and how they perceive the environmental impacts on their businesses.

This chapter will commence with an analysis of the outcomes of the interviews based on the themes drawn from each question and a discussion of their answers will be given in detail. In order to demonstrate why and how the researcher can understand what the interviewees talked about and analyse these findings, the results from the interviews are linked with the literature reviewed in Chapter Three to a certain extent.

The researcher also includes the results of interviews undertaken with two policymakers and two bankers who provide important views on policy and environmental factors influencing software entrepreneurs.

To recap, the issues and themes that were drawn out from the quantitative data analysis are derived from the conceptual framework. This focused on: motivations for wanting to become a software entrepreneur, software venture growth, and future planning. The findings of each focus mentioned above are concluded and outlined in italics.

The subsequent sections commence, therefore, with an overview of the respondents' profiles followed by the results and conclusions on the chapter.

6.1 Respondent Profile

This section provides profiles for each of the three groups of interviewees, who are small high-tech entrepreneurs, officials and bankers. In all, nineteen in-depth semi-structured interviews were carried out. The breakdown of the interviews is indicated as follows.

Table 6.1 Interview Sample Size

Respondent Profile	Number of interviews	Interviews' Time
Small software entrepreneurs	17	June 2007
Officials	2	6th, June 2007
Bankers	2	8th, June 2007
Total Interviewees	21	

6.1.1 Profile of entrepreneurs interviewed

Those who were interviewed were selected from the entrepreneurs who filled out the questionnaires in the survey. A total of 17 interviews were conducted in June 2007 with those who were software entrepreneurs in Beijing and Shanghai.

Table 6.2 Profile of the entrepreneurs interviewed

List of Entrepreneurs	Status	Qualifications	Software Start-up since:	Size of turnover (million yuan in 2006)	No. of Employees (in 2006)
Chen	Chinese	BSc	2002	10.2	45
Chi	Chinese	MSc	2001	17.5	52
Dai	Chinese	BSc	2002	8.7	32
Gong	Overseas/ Chinese	MSc	2004	12	15
Wu	Chinese	Ph. D	2001	15	15
Li	Chinese	Ph. D	2001	(keep confidential)	36
Liu	Chinese	Ph. D	2006	0.6	8
Liu	Chinese	Ph. D	2003	6.5	40
Lu	Chinese	MBA	2001	60	90
Tan	Overseas/ Chinese	Ph. D	2005	(still in R&D stage)	20
Cao	Overseas/ Chinese	BA	1995 in USA	80	17
Wang	Chinese	BSc	1999	(keep confidential)	33
Xie	Chinese	MBA, MSc	1999	60	210
Xue	Chinese	MSc	2005	6	97
Yao	Chinese	BA	2005	3.5	1
Zhang	Chinese	BSc	2001	93	34
Zhou	Overseas/ Chinese	MSc	2004	20	22

6.1.2 Profile of officials and bankers interviewed

In order to explore the policy issues relating to the Chinese government's policy promoting high-tech entrepreneurship, the researcher interviewed two officials on 6th June, 2007. These were highly placed representatives from the Ministry of Science and Technology: Mr. Xu, Director of Software Department, and Mr. Tang, Director of Science Park Department.

The two interviewees both hold Bachelor of Science qualifications, and have considerable experience. They are also both over 45 years of age.

On the 8th June, 2007, two bankers were interviewed to give their views on the important issue of sources of finances for the high-tech entrepreneurs. They were Mr. Li, a director of Risk Management Division from China Construction Bank, qualified to MSc level and aged over 45, and Mr. Dong, who obtained his PhD overseas and was aged over 30 - a business manager from China Jianyin Investment Bank, which is one of major shareholders of China Construction Bank.

6.2 Findings from interviews with entrepreneurs

This section presents the findings of the research process on the first category of respondents who were interviewed; these were small and medium sized software entrepreneurs. The flow of this section has been aligned to the sequence of the questions raised in the questionnaires and has been synthesised into 10 questions following the themes outlined above. The results of each of these questions and how they link with the relevant theoretical contributions are further discussed in Chapter 7. The section ends with a summary of the common and different reasons given by the respondents for wanting to become software entrepreneurs; their various ways of running their respective businesses; their reactions to environmental factors; and their general approach to future planning.

6.2.1 Motivations for becoming a software entrepreneur

Within the middle circle of the conceptual framework, the researcher demonstrates contributions from the behavioural-science research, focusing more strongly on the entrepreneur as an individual. Therefore the definitions used are, in most cases, related to the personality traits of the entrepreneur, such as risk-taker (Cantillon, 1680-1734).

Beyond this, Johannisson (1992) gave further explanation about entrepreneurs and entrepreneurship. He considered that the entrepreneur is existentially motivated and that entrepreneurship involves a total commitment on the part of the individual. According to Johannisson, individuals are motivated by their commitment responsibility, creativity, and competence to create visions for new activities and eventually transform these visions into actions.

The entrepreneur has also been given a range of other different meanings, depending on the perspective of the researcher. As stated in the summary displayed in the Literature Review, much earlier than Johannisson, other scholars have given the entrepreneur the traits of problem-solver (Thunen 1850), decision-maker (Menger 1840-1921), innovator - introducing new combination of resources (Schumpeter 1934), and opportunity-seeker (Kirzner 1973).

With reference to these theoretical contributions, in the questionnaire the researcher presumed that the following factors motivated individuals to start up their software businesses:

- My individual ambition (possibly due to an individual's in-born trait of liking to take risk and seek greater job satisfaction by working for yourself rather than for somebody else);

- My being able to utilize preferential policy for university spin-off, or take advantage of returning overseas students etc;

- My ability to recognize the opportunity provided among networks;

- My good business idea;

- My product and/or service development, which I thought people wanted to buy

- My motivation to make money and create a better life for my family

(See question 5 in Questionnaire, displayed in Appendix I)

In order to further exploit the reasons, during interviews, the researcher asked about what really set the interviewees on the road to starting their software business. Some themes can be drawn from their responses and will be displayed in the order affirmed by the interviewees from larger to smaller numbers.

Table 6.3 Motivation for Starting High-Tech Business (Issues Raised)

Motivating Factors	**Total Number[+]**
Technology owned/developed by entrepreneur	11
Ambition	4
Encouraged by reforms and business environment in China	6
Own business know-how and experience	7
Own high level of education	4
Good networks	4
Own ability to spot business opportunities	6
Wanting to improve life for own family	2

[+]the numbers of interviewees who affirmed the point as a motivating factor

The additional explanation provided by the interviews revealed the following:

*** <u>Having owned/developed some available technology</u>**

Among the software entrepreneurs interviewed, there are a total of 11 interviewees who emphasised that they had owned or developed advanced technology which made them confident to start up their high-tech business. During the course of the interviews they gave three main reasons for having access to this technology. The first reason is that some of them used to work for the state-owned units in their given software field and this helped them accumulate the technologies and know-how (Mr. Chen, Mr. Chi, and Mr. Lu). The second reason is that some of them run university spin-offs which brought them advanced technology directly from universities (Mr. Gong and Mr. Liu). The third reason is that many years of gaining overseas education and working in the relevant field helped them to obtain advanced technology (Mr. Dai, Mr. Wang, Mr. Tan, and Ms. Zhou).

*** Own business know-how and experiences**

This was the second most commonly cited motivating factor, with seven of the interviewees affirming that having their own business know-how and experience was an important factor in giving them the confidence to start their software businesses. This links in with the reasons cited above because, as stated by some of them, their technological capability and know-how derived from many years of working in the software industry. For example, two interviewees summarised this as follows:

"I had worked for a state-owned research institute in the petrochemical industry before I started up, so I understood their business needs well and also had the technological accumulation. That's why I carved out a business for myself." (Interview with Mr. Chen, June, 2007)

"Since graduating from university, I had worked in a state-owned enterprise for three years and accumulated some technical abilities for developing software products, actually I'd got some products developed." (Interview with Mr. Chi June, 2007)

*** Own ability to spot the business opportunity**

Six of the interviewees mentioned their ability to identify business opportunities, this motivated them to grasp such opportunities and start their own software business.

According to Kirzner (1973), entrepreneurial opportunity is a situation in which a person can exploit (i.e. develop) a new business idea that has the potential to generate a profit. An entrepreneurial opportunity can be exploited through the creation of a new product or service, the opening of a new market, the development of a new way of organising, the use of a new material, or the introduction of a new production process.

Where do these opportunities come from? What, in short, is the basis for their occurrence? These opportunities involve several different factors and several aspects of human thought (including creativity and key aspects of intelligence). Opportunities generally arise from two major sources – the information people have that helps them to recognise a gap in the market, and changes in the external world that generate opportunities (Kirzner, 1973).

The following responses from two interviewees demonstrate how and where they spot the opportunities.

"Because the government encourages informationalization, it made it possible for us to have a start-up. The government had some projects, and we got the relationships to have one. At the same time, we had accumulated some technology and were confident about being able to carry out the project out well. And maybe you can say that my ability of identifying the opportunities from my own networks is a reason for me to have my own business." (interview with Mr. Liu June, 2007)

"…. Along with the Chinese economic reform and China's opening up to the world, I recognized that there could be some opportunities to earn more and bring a nice life-style to my family by working for myself….. I've got some strength in terms of technology, management skill and networks." (Interview with Mr. Xie June, 2007)

Two themes seem to appear in the above, representative responses regarding the motivational factors for the interviewed entrepreneurs to set up their own businesses. These are:

<u>* Reforms and business environment in China generate entrepreneurial opportunities</u>

Six interviewees described that the reforms and business environment in China encouraged them to quit their previous jobs and start their own business. The above citations encapsulate the points made by them on this topic.

*** Having a high personal level of education**

As an entrepreneur of the high-tech industry, inevitably he/she must be well-educated because of the technological/scientific expertise required. The introduction of their profiles above reveals that they are almost all graduates, with the exception being one interviewee who chose not to answer. According to Table 2, five of them have PhD degrees, five of them hold a Masters degree and the six remaining have a Bachelor's degree.

*** Good networks are a source of business opportunities**

Four interviewees stated that having good networks gave them the confidence to start their own business as it gave them access to relevant information and helped them to recognise or establish business opportunities.

A good educational background also enabled them to build up available networks, have advanced technology, and possess the ability to identify business opportunities within the given environment. One must also note that they were further reluctant to mention that they benefited from being well-educated when answering the question. Nevertheless, some of them did imply that a technical education enabled them to start their own business.

*** Being ambitious**

Some of them also demonstrated that their strong inner desire motivated them to start a business venture. As indicated in the literature review, Schumpeter (1934) stated that there are three primary things that drive the entrepreneur. They are the desire to found a private kingdom or dynasty; the will to win, to fight and to conquer; and the joy and satisfaction that comes from creation and problem solving. (Schumpeter, 1934). This also implies that an entrepreneur should be very ambitious.

Four of the interviewees stressed that because they are ambitious, they wanted to be their own bosses. Their ambitions could be positively linked with their desires to use and apply their technology, personal experiences (interview with Mr. Dai), their confidence of being well-educated (interview with Mr. Xie), and believing in the potential of the software market (interview with Mr. Li). These are the apparent factors which have pulled them into having business ventures independently.

Some negative drivers also pushed some of the interviewees to be autonomous and ambitious to start their own business. Mr. Wu from Hua Yan stated that:

"I had been thinking about having my own business when I was a university student, and at that time already joined some projects and developed some products.....I had quite outstanding work ability there but was not promoted well in comparison to other colleagues during work. I thought the company did not have a good human resources measurement system and did not appreciate and reward individuals according to their abilities properly, which made me feel that I had no future there. I decided, therefore, to quit. But the company kept my person file, so I couldn't try for other jobs without it. So, at that time, my first choice was to work for myself."

Even though he is the only one who stated the above negative factors that drove him to start his own business, it is possible that his experience is not unusual for other young people; especially during the economic transformation in China. What he talked about implies that there are some well-educated people who are very ambitious, but not satisfied with their state working environment. This means that they feel they cannot pursue opportunities working within a state-owned enterprise. They therefore seek to escape from supervision and the constraint of subservient roles by starting their own business.

* **Wanting to improve life for the family**

Although only two interviewees, Mr. Dai and Mr. Xie, expressed their strong concern for wanting to improve their family life, it perhaps represents a phenomenon starting to appear in China (See Table 6.3 above). Those who went overseas to study and work, when their parents are getting old, especially those who were the eldest or only sons in the family, then felt the need to move back to China in order to look after their aging parents. They then utilised their working experiences and accumulation of knowledge of advanced technology from overseas to start their own businesses.

For the Chinese generation aged between 35-45 years old, some experienced a very poor childhood, but were also the first generation to benefit from the educational reform. Therefore, since they were well-educated and had good networks and advanced technology, they were able to access relevant information and create wealth through entrepreneurial activity.

Until now, the relevant themes drew a clear picture regarding what really motivated them to start up their business. This can be seen to be a supplement to the results from the questionnaires, and also to be consistent with theoretical definitions of the entrepreneur.

The above themes, drawn from the qualitative data, provide a rich insight into what motivated the sample in starting their business. Many of the views were found to be consistent with the theoretical views as discussed in the literature review.

To sum up, the data confirmed that personal traits such as being able to take risks and being very ambitious actually encouraged a number of them to start their own business. Additionally, and also very importantly, to run a business in the software industry, the majority of interviewees emphasised that they needed to have very good technological capability and were able to fill this requirement due to being well-educated. Concern for the family is also a reason for a minority of interviewees. The concern to return from overseas to help develop China and look after ageing parents, or make a better life for their own families, also provided an impetus for starting a software business. Whatever motivations the interviewees had, the majority of them could see the growing trend of the Chinese software market and were able to seek the subsequent opportunities brought by the economic reform in China.

6.2.2 Software venture creation

6.2.2.1 Location Benefits

As a result of the increasing popularity of the internet, companies can source goods, capital and technology globally, and furthermore, with a more open global market, as well as possessing easy access to information and faster transportation. Therefore the role of location may not be as significant as it once was in maintaining good competition.

Society has shifted to become more technology based with the diffusion of information and it seems therefore that location does not matter quite as much. Nevertheless, the economic map of the world is still being dominated to a large extent by growing clusters of economic activity.

Clusters, according to Porter (1990), are critical masses in one place of unusual economic success in particular fields. As reviewed in the Literature, he also defined them as 'geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions in particular fields that competes but also cooperates' (Porter, 1990, p.197)

Following Porter, as reviewed in Chapter Three, other scholars like Rosenfeld (1997) and Enright (2000a) developed cluster characterisations, which are more directly relevant to policymakers. Furthermore, the cluster concept started to attract attention in regional and industrial policy-making (OECD, 1999, 2001).

Government officials and policymakers are interested in encouraging the supply of entrepreneurs, new firms and independent new and small firms. This is because they are seen as major sources of job creation in developed, as well as transitional, economic individuals; those with expertise .

As stated in the Literature Review, the cluster framework introduced by Porter in 1990 has been widely embraced by government policymakers. They use clusters as a means to develop more integrated micro policies, which enhance economic development and complement macro policies designed to create a more favourable environment to attract more entrepreneurial activities within clusters. The question of location, and notably clusters in high-tech zones, was explored through interviewing.

During interviews with the entrepreneurs, the researcher asked where and why they chose their location. Their responses can be categorised as shown in the following table and the reasons or benefits of their location were affirmed by them as well.

Table 6.4 The locations

Location	Within STIP	Near Universities	Near Clients	Other locations
Number of companies	10	5	3	5

The output above demonstrates that a clear majority (over 50% of the 17 interviewees) chose to locate within a Science and Technology Innovation Park (STIP). This bias could be caused by the researcher's personal contacts who may have selected samples mainly within STIPs for convenience, although the initial attempt was to carry out the field work by building a more random sample in Beijing and Shanghai.

However the result might also represent a trend among small and medium sized software companies to choose their location because of encouragement by the government's preferential policies; this may well be the case for enterprises located within STIPs.

If adding up the above numbers, there appear to be a total of more than 17 locations, which seems to conflict with the total number of entrepreneurs interviewed. The reason for this is that there are some overlaps among the locations, such as some universities near to and/or within STIPs. In some cases companies have chosen to register within the STIP to benefit from government preferential policies whilst also locating near to clients in order to communicate on a better level or take advantage of convenient transport (interview with Mr. Lu June, 2007).

Besides clarifying where they located the companies, the interviewees also stated why they chose the locations. Some themes have been affirmed by them as benefits under the various locations.

Table 6.5 Reasons for various locating

Reasons for Location Choice		Total Number+
Locating within STIP	Tax incentives	7
	Innovative atmosphere	3
	Low rent	3
	Agglomeration externalities	2
Locating near clients	Convenient transport	1
	Good communication	2
Locating near universities	Human resources	3
	University's facilities	2
Other locations		5

+the numbers of interviewees who affirmed the point as a reason for locating

*** Tax incentives; Innovative atmosphere; Cheap rent; Agglomeration externalities while locating within STIP**

The statements from the interviewees who chose to locate within STIPs reveal that the majority of them (seven) wanted to benefit from tax incentives by locating within the STIP. Three of them affirmed that they sought other benefits, such as being able to benefit from an environment where innovation thrives and cheap rent, due to the location. Two of them asserted that agglomeration externalities were a persuasive benefit of locating within STIPs.

"I located the company in the Science Park. Yes I can benefit from some tax incentives.... They can bring me some advantages, but they are not the main reasons for me to locate here. The main reason is that, in a long term, there is good technical atmosphere here, which could enhance our technology team's competitive ability." (interview with Mr, Chi June 2007)

"We chose to locate in the Zhangjiang Science Park in 2000 which at that time had been set up as a centre for software development in a provincial level. We were just at the start-up stage and we thought being located in a big Software Park would benefit our development, at the very least it could enhance our market awareness." (interview with Mr. Zhang June 2007)

*** Convenient transport; Good communication due to locating near to clients**

A few interviewees, such as Mr. Xie, preferred locations where they could be near their clients and have convenient transport to other locations. Hence they located outside of STIPs because the latter are normally situated in inconvenient localities.

"I located my company near to the clients, which helps us to communicate with the clients and promote our products. I think these benefits are enough for locating here, I don't need much else." (interview with Mr. Xie June 2007)

Some interviewees, like Mr. Lu, acted in a more intelligent way. They registered within the STIPs, or economic development zones, to benefit from the government's preferential policies and then chose places which could be closer to clients. This was more convenient with regards to avoiding the traffic congestion that exists in many Chinese cities.

*** Human resources; Universities facilities while locating near to universities**

Among the interviewees, some located their companies near to universities like Tongji University (Mr. Cao, Mr. Li, and Mr. Liu), or Qing Hua University (Mr. Tang). They all agreed that they could benefit from access to human resources there and could make use of university facilities.

"........The company moved to West Zhongshan Road as this was convenient for staff from the point of view of traffic and benefiting from cheap rent. From the company's point of view, human talents are the most important resource. And traffic is convenient here, so this location helps us to absorb the talents......." (interview with Mr. Cao June 2007)

"The reasons we located within the Science Park are as follows: Firstly, some of owners used to be the professors or students from Tongji University who got shares offered to them because of their technical abilities. Secondly, we could be close to the laboratory, and it was convenient for interaction." (interview with Mr. Liu June 2007)

*** Various benefits from other locations**

Five interviewees chose locations neither within STIPs, near to universities nor near to their clients. The reasons given by them for choosing these locations were as follows:

Mr. Wang, instead of renting, bought an office in the downtown area. Travel convenience might be one of his concerns, but he was motivated by the potential for the value of the office premises to increase and believed this to be an important consideration in his choice of location and premises. This would add value to the assets of his small business.

"My company was located in the eastern business district of Shanghai. Owing to the good business environment around here, the fact that we are close to our clients, made me buy the offices there. As it turned out I also avoid the inconvenience of fighting my way through heavy traffic which is a great advantage to those companies located in Zhongguancun, who are based outside town and as such I save costs as well." (interview with Mr. Wang June 2007)

Mr. Wu chose his company's location within an economic development zone in order to benefit from the government's preferential policies. When his company had developed to a certain stage, he started another company located near the downtown area in a building together with other software companies who were avoiding the traffic jams. This enabled them to create their own little 'cluster' effect.

To sum up, it has been shown that the entrepreneurs interviewed located their companies in various locations within STIPs, near universities, near clients or in downtown areas. The location benefits varied depending on their perspectives and needs. However, most of them chose to locate within STIPs due to the tax incentives available to them. This phenomenon reflects that the government's policies are working efficiently in encouraging new venture creation with the support of relevant policies for STIPs.

6.2.2.2 The different roles played by networks and business plans for financing

As reviewed in the relevant literature, social networks play an important role in the entrepreneurial process (see Chapter 3, Section 3.4). From the perspective of the entrepreneurs, their networks should help them to identify opportunities and organise development in terms of exploiting business opportunities, absorbing financial and human capital, and marketing. The interviewees' perspectives summarised below show how social networks and business plans can impact on initial and subsequent financing of businesses.

The responses from the entrepreneurs interviewed show their perceptions of and views on networks and business planning. Eight people felt business planning to be more important than networks; whilst five people considered both networks and business planning to be equally important. Two people stated that for them networks were more important, and only 1 interviewee did not consider either of them to be important. A further 2 interviewees gave unclear answers. The following table summarises the results.

Table 6.6 Comparing the importance of social networks and business planning

The comparison	Total numbers+
Both social networks and business performance equally important	5
Social networks more important	2
Business plan more important	8
Both unimportant	1
Ambiguous view	2

+the numbers of interviewees who affirmed the point as stated influence

Their answers demonstrate that most interviewees considered business plans more important than social networks to acquire financial capital, and in particular financial capital for further development of the business.

Some interviewees, like Mr. Chen and Mr. Liu, stated that it is difficult for them to have proper social networks to access loans. For a few interviewees, social networks were the only way in which they were able to acquire small amounts of capital to start their businesses. For Mr.Wu (from Hua Yan), Mr. Liu and Mr. Yao, social networks seemed more about their relationship with some very close friends or relatives, not about business relationships.

Only a very few interviewees, like Mr. Wang, omitted to mention social networks and business plans as helping him to support his business financially because he was very confident about his own financial status. He asserted that his company was funded initially by himself, and therefore both social networks and business plans were meaningless to him. This implies that he was not interested in, and did not need, the financial support possibly available through networks and business planning.

However, it seems that the relevant theories discussed above highlight different views. According to the Literature Review, social relations facilitate the acquisition of each of these three elements: tacit knowledge, financial capital and human capital. Recent studies in finance found that investors who invest locally particularly earn positive returns, presumably because their social networks bring them preferential access to data regarding the attractiveness of local opportunities (Coval and Moskowitis, 2001).

All new ventures represent fundamentally uncertain propositions, but entrepreneurs are normally likely to have a heavy incentive to overstate the attractiveness of the proposition (Akerlof, 1970) through their business plan.

When deciding how to solve the information asymmetry problem, social networks can play the role of mitigating the perceived risk associated with investing and therefore elevating the likelihood of an entrepreneur obtaining financial backing. Individuals place greater confidence in information collected from trusted parties, hence entrepreneurs find that venture capitalists prefer to finance investments that come to them through referrals from close contacts (Fried and Hisrich, 1994). A strong tie also could provide consistent information for investors regarding the reliability of their information about the potential investment (Sorensen and Audia, 2000). Therefore, regardless of how marvellous a business plan may appear to be, the sensible investor will always seek to have more precise information in terms of the entrepreneurs and the feasibilities of their business plans; social ties are therefore considered as an important bridge between the two. According to Sorenon and Stuart (2001), venture capital firms rarely invest far from their offices.

Among the interviewees, some people realised that both are very important for acquiring financial capital. For example Mr. Dai stated that having social networks could reflect the abilities of implementing business plans, and Mr. Xie believed that social networks could help entrepreneurs to earn the trust of investors.

Why did over half of the interviewees (9/17) perceive social networks to be less important than business plans in obtaining financial capital? It might be that the local venture capital system has not yet matured enough. Where there are only a few small software firms, and especially in the case where the founders do not have any overseas background or contacts, venture capital may not be a readily available resource and thus having had no experience of financial support from a venture capitalist the founders of these firms may assume that a well-structured business plan is the only route to obtaining venture capital. Additionally these firms may not yet have developed to a stage that is attractive to venture capitalists, therefore they can only guess at the requirements they would need to meet to attract venture capital. This would also imply to them that the local small software companies may face financial problems.

6.2.3 Software venture growth

6.2.3.1 Entrepreneurs' perspectives on the relevant government policies

Environmental factors have been considered to affect venture creation and growth, as demonstrated in the Literature Review and the Conceptual Framework. The work done by Keeble and Walker (1984) revealed a relationship between environmental conditions and new venture creation, and Cooper (1993) pointed out that business growth can be influenced by internal and external environmental factors. According to Birley and Westhead (1993), government policies are one of the most important external environmental factors contributing to the characteristics of the local environment, and may also influence the ability of a firm to acquire resources and develop further.

One of the reasons why government policies are considered important in shaping the external environment is that new and small firms are seen as a major source of job creation. Consequently, policymakers are interested in encouraging the growth of entrepreneurs and new firms. Furthermore in China, as elaborated by Liu and Jiang (2001), environmental issues are inter-related with the affairs of the government.

In the initial discussion of the software industry (see Chapter 2) it was also explained that the Chinese government recognised how important a role IT could play in modern society and identified software as a critical industry. The government has therefore made great efforts to assist the development of this industry in many ways. These include preferential policies regarding talents and tax incentives, national projects, purchasing policies, and establishing science and technology industry parks and industrial development zones facilitated with first-rate infrastructure including roads and office buildings.

In order to explore how the software entrepreneurs perceive and experience the external business environment supported by the government, the researcher listed some factors and enquired about how and why the companies studied could benefit from the relevant policies, either in their initial stages or at a later stage of development. These factors included: preferential policies for high-end talents (tax incentives, package service); preferential policies for STIP (tax incentives, package service); government purchasing policies; and government training policies.

The following themes are drawn from the responses regarding the perspectives of the interviewees on the relevant government policies.

Table 6.7 The various reactions to the different government policies for business development

Various Perspectives		Total Numbers+
Government policies bring no benefit at all, because:	Business development not relying on Government policies	2
	Technology more important	1
	Policymakers not familiar with relevant field	2
No benefit from training programmes		7
No benefit from purchasing policy		6
Benefit from some Government funds	Funds for national projects	1
	Funds for small and medium sized companies	3
Benefit from tax incentives		6
Benefit from locating within STIP		3

+the number of interviewees who affirmed this point as an influence on their business development

*** Government policies bringing no benefit at all**

There are five entrepreneurs altogether who did not think that the government policies could bring them any benefits. Mr. Chen and Mr. Xue thought that their business development did not rely on the government policies, Mr. Tan stated that technology should be the priority for software business development, and Mr. Lu and Mr. Yao felt that the policymakers were not familiar enough with the relevant fields to create pertinent and helpful policies.

"I don't feel the policies are very helpful and our development mainly relies on our own operation. And it certainly would be easier to start up if there were good social networks. Without them, some enterprises would have little possibility to succeed even if they had good starting-up mode and an excellent team." (interview with Mr. Cheng June 2007)

"I don't think the policies can help us much. For the government officials who constitute and implement the policies are also the persons, who normally don't investigate and research the enterprises' real needs carefully in advance. That's why I don't think the relevant policies can play any role. In terms of training, I think there are few experts in the government, so they can't provide useful training." (interview with Mr .Lu June 2007)

<u>* Benefit from tax incentives; locating within STIP; some government funds</u>

Nevertheless, eleven of the interviewees stated that they could have benefited from the government's preferential policies. Similarly to the previous responses, the beneficial policy felt most widely is tax incentives (as stated by six interviewees). Three of the interviewees said that they could have benefited by locating within the STIP and that this might indicate some preferential policies for high-end talents within the STIP. Four of them elaborated that they could have benefited from some government funds, such as funds for national projects and the fund for small and medium sized companies.

"..... I feel we cannot benefit from other policies that much, except some tax incentives." (interview with Mr. Cao June 2007)

"I think the preferential policies for the high-end talents and companies located within Science Parks are quite important and useful, because they benefit us directly and obviously." (interview with Mr. Li June 2007)

"The policies are helpful to some extent. For example, some of our initial capitals came from the special fund supplied by the Bureau of Science and Technology of Pudong by competitive bidding. Even though it was not a big amount of money, it did help us at the early stage." (interview with Mr. Gong June 2007)

"When we just set up, we were very confused about how to benefit from the relevant government policies. But in 2004, we found some national projects and funds online, and got the innovation funds." (interview with Mr. Liu June 2007)

*** No benefit from training programmes, purchasing policy**

Even though some of them stated that they could have benefited from government policies, they still declared that some of the government policies actually could not work efficiently. Seven of them clearly pointed out that the training programmes organised by the government were not practical, and six of them also stressed that the purchasing policy did not seem open to most small sized enterprises.

It seems that most interviewees benefited from the preferential policy regarding tax incentives in both stages and whether they were located within an STIP or not, they had achieved some turnover. If located within an STIP, they were able to enjoy some relevant preferential policies. For example, Mr. Liu mentioned that his company would benefit from the preferential policy for high-end talents, Mr. Zhang and Ms. Zhou also explained that they benefited from being able to bid on some projects and get funds. It appeared that those interviewees whose companies were either financially supported by their largest shareholder or were located outside STIPs were less interested in the government policies. Mr. Lu doubted if the policymakers were informed or qualified sufficiently to make relevant policies to support the industry as the software industry keeps changing quickly and the policymakers are either lacking relevant knowledge or reluctant to carry out market research. As a result, therefore, the policies put forward are often not practical. His view was also supported by the majority of interviewees, who criticised government training policies as being irrelevant to software businesses. Most of the interviewees also stated that they found it difficult to benefit from the government purchasing policy because of the limitations put on the company size or because of their company's focus.

According to some theorists (see Chapter 3, Section 3.4) the government policies, as an aspect of the environmental conditions, play a role in the development of entrepreneurship and help build up an "entrepreneurial environment" (Gnyawali and Fogel 1994). Porter's cluster theory (1990) also indicted that the clusters, like

STIPs, are able to increase the productivity of companies based in the area due to better access to the required resources. He emphasised that not all industries can benefit from clusters, but those which are knowledge-intensive industries should be able to particularly enjoy the proximity benefits due to being clustered. However, the responses from the interviewees regarding relevant questions do not appear to provide much evidence to support these theories within the context of China.

6.2.3.2 Competitive advantages delivered by business strengths

In modern strategic management studies, entrepreneurial strategies are mainly divided into deliberate and emergent approaches. Some scholars tend to advocate the emergent approach (see Chapter 3 Section 3.2.2) more than the deliberate, which is regarded as a traditional approach and related to resource based theory.

However in order to develop the business and control the development process, the entrepreneur must be aware of their business strengths and what sorts of resources they own in order to deliver them more effectively so that they can compete with their rivals and develop their businesses. This suggests then that the deliberate approach can be more beneficial than the emergent. The responses of the interviewees regarding the business advantages of their companies can be summarised into a few themes, as shown below.

Table 6.8 Summary of strengths delivering competitive advantage

Various Strengths	Total Numbers+
Advanced technology for niche market	3
High-tech products	6
Hard working employees	4
Financial support available	1
Good networks with clients	7
Good team	1
Excellent R&D capabilities	6

+the numbers of interviewees who affirmed the point as a strength delivering competitive advantage

*** High-tech products; good networks with clients and excellent R&D capabilities**

Among the interviewees, six affirmed that having high-tech products was a strength which gave them a competitive advantage. Seven thought that good networks with their clients were an important factor, and six again confirmed that excellent R&D capabilities gave them an advantage.

"Yes. I think the development of a software company depends on human resource essentially. We have some expertise in our team, each of them used to be the technological backbone in their former companies. And they quit the job and worked together for their business. Because they gained good training from the previous jobs, when they communicate with clients to compete for some projects, the clients can realize that they are quite professional and have precise understanding about the projects and have, therefore, great confidence in our company. So I think these sort of advantages are able to give us some competitive advantages for the development." (interview with Mr. Liu June 2007)

"Yes. Our staff work very hard and we have independent R&D capability, which makes us able to supply good products and services to the clients. So we have advantages when we compete with our rivals." (interview with Mr. Li June 2007)

It seems that the majority of interviewees realised how important having technological capabilities was for a software firm. Hence they all emphasised that they had strong technical capabilities, except Mr. Xie and Mr. Zhang who did not specifically mention this here. However, if we refer back to their reasons for starting a software company there is some evidence to show that they personally had technological advantages due to being well-educated. Nevertheless, what Mr Xie and Mr Zhang have asserted about the importance of their own education seems less persuasive as the nature of software companies requires that all employees should have technological abilities in order to run the business successfully.

The variation in responses perhaps reflects the different levels of technological capability, but this research has not been specially concerned with identifying the differentiation in these abilities and there is therefore little evidence presented to distinguish the firms in question. Only Mr. Xue claimed excellent technological capabilities, with 30 IPs, and according to Mr. Cao there were only two local rivals having similar products to compete with theirs in China.

With regard to networks, Mr. Dai mentioned that his unique strength came from combining technological abilities with being very familiar with his target clients. Mr. Wang is also confident that having built up 'trust' with his clients will result in further business opportunities, and Mr. Xie and Mr. Tan were both very close their clients. In particular Mr. Tan, whose major rivals were foreign companies, considered that his proximity to and relationship with his clients gave him a strong advantage over his rivals. Mr. Xue felt that his company would be much more likely to get contracts due to a well-established relationship with the government. Mr. Liu considered that networks incorporating universities could also help the company to absorb technical talents which would strengthen R&D. Further to this, Mr. Zhang and Ms Zhou stated that they were not confident about their companies' competitive abilities due to their lack of local networks. This also provides evidence to support how important networks are from other perspectives.

*** Advanced technology for niche market; hard working employees**

Fewer interviewees mentioned these two advantages particularly, but there were some interviewees who elaborated that they started their businesses within a special area or niche market, and that this gave them confidence about having some advanced technology in certain areas.

For example, Mr. Chen stated that his business focused on providing products and services to the petrochemical industry, Mr. Lu emphasised game software for the telecommunications industry, and Mr. Liu said that his products were the first and the best in their particular area of the Chinese software market.

"Regarding our advantages, we have our own core technology, Tongji Dawn Software, which is the first and the best in China for its specific market. And another advantage is the personnel resource in Tongji University." (interview with Mr. Liu June 2007)

Mr. Wang and Mr. Xie both emphasised that they had made strong efforts to motivate their staff, and Mr. Wu from Hua Yan and Mr. Li both thought that their employees worked really hard which was very important if they wanted to be competitive.

"Sure. For example, we try to identify the employees' potential, establish the targets for the staff, take care of them, inspire them and make them work hard for the company, which are the reasons why the company can be developed and strengthened well." (interview with Mr. Xie June 2007)

*** Available financial support**

There was only one interviewee, Mr. Wu, who mentioned that his company was confident about having adequate financial support.

Besides the other advantages mentioned above, the researcher also raised several possible choices such as physical location, brand and intellectual property. However the interviewees rarely credited these strengths. Only a few of them talked about their technological capabilities and their ability to absorb talents and to utilise facilities due to their physical location. It is also interesting to note that none of them considered that their brand gave them an advantage.

6.2.3.3 The status and impact of IPR protection

In order to understand the IPR status and any impact brought by IPR, relevant questions were raised. The entrepreneurs' views were then categorised as shown below.

Table 6.9 The status of IPR protection in China and any influence to the business development

IPR Protection Status	Not well protected	Ambiguous view		Well protected
+Total No.	5	4		1
Various influence	Negative influence	Little negative influence		Positive influence
		Providing service mainly & not copied easily	Products well designed & rarely copied	Help to enhance the level of companies' awareness
+Total No.	3	2	5	1

+ the numbers of interviewees who affirmed by the point as the relevant status and influence

<u>* Not well protected</u>

The above results indicate that all the interviewees view IPR protection as a very important issue. In particular, five explicitly stated that in China IPR is currently not well protected, and of those five, three felt that this had a negative impact on the development of their business.

The software industry is a technology intensive industry, and because of the nature of their business these enterprises normally run by providing some intangible and non-excludable goods. It is therefore difficult to protect their patents, or copyrights, even though the government has made a lot of effort to protect IPR. It must be noted however, that these efforts to protect IPR are not always wholly successful.

*** Negative influence**

Three of the interviewees strongly emphasised the negative influence they suffer from the lack of IPR protection. Mr. Xie mentioned that his company was affected very negatively to the extent that one employee actually stole their product. Furthermore the process of bringing people to court is very time consuming and a successful outcome is not guaranteed. Therefore some companies, like Mr. Cao's, apply for the patents in America to guarantee that litigation is effective. Ms Zhou also suggested the importance of the social system, as she mentioned that a social credit system or individual track record could be helpful in reducing piracy.

"I think the protection of the IPR is just so so in China. Some policies are not perfect and easily misused by some guys. Of course the situation is relevant with the characteristics of the software product itself, 'cos sometimes it is hard to figure out and define if a product comes from copy or not after some improvement and changes have been made on the original one." (interview with Mr. Chi June 2007)

"I feel the protection of IPR in China not very good. That's why we apply for patents in America. In our opinion, if we apply for patents in China, it's very difficult to deal with litigation, especially implementation when our IPR is pirated." (interview with Mr. Cao June 2007)

*** Little negative influence**

Some of them, including Mr. Lu, emphasised that IPR protection should not just rest with the government, and that the companies should pay more attention to enhancing technological abilities and developing products which are not easily copied by others.

According to Mr. Chen and Mr. Dai, they mainly provide services that are tailor-made for their clients and this limits copying.

"The protection of the IPR is not good enough, but it affects me little, because we mainly sell our service" (interview with Mr. Cheng June 2007)

To sum up, some of the companies avoided piracy by providing services or portfolios rather than products. It seems for them that products are fixed, however services are more flexible and adapted to the client's needs and are therefore not so easily imitated.

Mr. Lu, Mr. Xue, Mr. Liu, Mr. Chi and Mr. Gong also asserted that their products have been designed well and are rarely copied.

*** Positive influence**

Some interesting views were shown here and quite a few interviewees did not appear to think that their businesses were seriously affected by the lack of IPR protection.

Some of them stated that, in China, piracy could use geography to advantage, finding more space to survive. As a consequence pirate products are sold far away from the inventors' territories and thus have less impact on the creators' business. A few of them even considered that piracy could actually be helpful in diffusing their companies' names, which is an unintended side effect of selling pirated goods. There was even one interviewee, who considered the potential effects of piracy as a positive.

Given the ambiguous attitudes about the IPR protection issue, most interviewees did not seem to be very worried about the situation and appeared to be flexible about IPR protection. Consequently they carried on running their businesses in China. Perhaps this in fact demonstrates the entrepreneurs' ability to adapt and survive within the given IPR context.

6.2.3.4 Constraint and impetus factors for technology transfer from universities

As demonstrated in the Literature Review (Chapter 3, Section 3.5) the elusive nature of technology and the multi-faceted character of technology transfer are illustrated in various ways (Hawkins and Prasad, 1981). It is also apparent that technology can be transferred through many different channels.

However this research seeks to explore whether entrepreneurship could make a positive impact on technology transfer from universities for small Chinese software firms. The issue focused on, therefore, is technology transfer from universities. The role of the university has been receiving growing attention with regards to generating economic growth through technology transfer and interaction with industries. This is believed to lead to the new production of knowledge based collaborative relations between knowledge generation and knowledge application (Gibbons et al., 1994). The definition of technology transfer is here taken as "the quantum of knowledge by which such inputs as patent rights, scientific principles and R&D are translated into production and marketable industrial materials, components, and end-products" (see Chapter 3, Section 3.5).

An adequate infrastructure is required in order to transfer technology effectively. According to Behraman and Wallander (1976), adequate infrastructure should include scientific institutions, R&D facilities, vocational, technical and management training institutes, and skilled personnel.

When referring to these theoretical views in the questionnaire the researcher listed some relevant factors that impacted negatively on university technology transfer. These included: lack of entrepreneurial capability and innovation; lack of internationally competitive innovation; university bureaucracy; lack of IPR protection; inadequate venture capital; lack of human resources with relevant skills and government policies. On the other hand some relevant factors that helped to promote university technology transfer were also identified by the researcher, including: entrepreneurial culture within universities; availability of business advice for science park/university based start-ups; university networks; financial and legal advice; government policies; competition and human resources with relevant skills to provide entrepreneurial impetus.

More details were explored during the interviews and the responses demonstrate a distinct contrast with the theoretical contributions regarding the importance of the role played by scientific institutions like universities.

Table 6.10 Factors affecting technology transfer from universities and their influence

Factor	Influence of Factor	Total No.+
University's bureaucracy	Constraint	3
	Avoidable	1
	Not bureaucratic	1
The Government's policies	Little influence	2
	Impetus	7
Lack of IPR protection	Constraint	2
Available human resources	Impetus	9
Lack of venture capital	Constraint	5
Innovative capabilities	Impetus	5
Entrepreneurial environment within universities	Impetus	2
Academic bias within universities	Constraint	4
Networks on campus	Impetus	2
Services provided by counselling firms	Impetus	2
	Helpless	5
No co-operation		7

+the number of interviewees who affirmed the point as a factor influencing technology transfer from universities

*** No cooperation**

Quite a few of the interviewees (seven) were reluctant to cooperate with universities in China to facilitate technology transfer. Some of them, like Mr. Chen and Mr. Xue, even asserted that they have never cooperated with universities in this way.

Although these interviewees were less enthusiastic about cooperating with universities for technology transfer, some of them still presented views regarding how they could see relevant factors that might affect technology transfer.

For those who really had relevant experience of transferring technology from universities in China, it was possible to state their standpoints regarding the constraints and impetus of the process.

"We don't cooperate with universities, so we have few experiences of it" (interview with Mr. Cheng June 2007)

"We haven't had, nor will we have plans to transfer technology from the universities." (interview with Mr. Xue June 2007)

*** The universities' bureaucratic character**

Five of the interviewees talked about the universities' bureaucratic character. Among them, three agreed that the bureaucracy brought constraints, while one (Mr. Lu) commented that it could be avoided using a short-cut by assigning projects directly to a professor or to students. Mr. Xie held the opposite view: he did not think that there was any university bureaucracy.

"The universities' bureaucratic systems also constrain the technology transfer to a certain extent, for example with regards to technology transfer procedures, application and ownership of an intellectual property- universities tend to be more concerned about how to hang onto the technologies." (interview with Mr. Chi June 2007)

"As far as cooperation with the university is concerned, we often do so by contacting students or teachers directly instead of following the formal procedures in the university – in this way, I think, we can avoid the university's bureaucracy." (interview with Mr. Lu June 2007)

"I don't think the universities' management systems would hold up the technology transfer. However, if the universities were to teach a basic management module it would help us transfer technologies from the universities and spin it out into enterprises." (interview with Mr. Xie June 2007)

*** Less relevance with the government policies**

Nine of the interviewees mentioned government policies. Although seven felt that the government had made great efforts in encouraging university technology transfer, most of the interviewees thought that on the whole the policies were not relevant in effecting technology transfer between universities and companies. This they believed to be a matter between the university and the company. Mr. Zhang did, however, point out how the government had supported the commercialisation of university technology: he gave the example of his company obtaining government funds to undertake a national project that involved transferring technology from universities.

However Mr. Lu considered that technology transfer should rely on the company's competitive capabilities rather than on the government, given that he considered the government to be ineffective in facilitating technology transfer.

"But the technology transfer from the university to the enterprises is a deal between these two entities and does not involve the government, so I think the government does not play an important role in this." (interview with Mr. Chi June 2007)

"......the government also encourages technology transfer from universities in various ways. For example, it organizes some scientific forums and invites the relevant companies to attend, and the companies will find out what kind of core competence it should enhance during the communication with other companies in this industry." (interview with Mr. Wang June 2007)

<u>* Lack of IPR protection; Lack of VC support; Academic bias in universities</u>

These three factors are all considered as constraints on technology transfer from universities according to the responses.

From the perspectives of all of the interviewees, IPR protection is very important for encouraging and guaranteeing technology transfer. However only two of them explicitly talked about the constraints brought on by the lack of IPR protection.

Five of them stated that support from venture capitalists is actually very important for technology transfer from universities. However the reality is that venture capitalists are only really interested in larger companies, or looking for projects with higher market returns guaranteed. They tend not to be patient with a long term R&D process and the interviewees generally found it hard, therefore, to get support from venture capitalists.

As already discussed, some of them were reluctant to co-operate with universities for technology transfer. The main reason for this was the feeling that Chinese universities tend to be more concerned with academic matters, and normally the products transferred by them are not practical and hence cannot be applied directly in the real commercial world.

"The lack of protection of the intellectual property rights surely hinders greatly the technology transfer process. Obviously, technology transfer without the protection of intellectual property rights means that it is imitated and copied easily." (interview with Mr. Liu June 2007)

"I can give you an example about financing: the banks are only interested in giving me a loan when my business is doing well, but in the early stages, or if I am having difficulties and require capital for developing my business further, they don't really want to know." (interview with Mr. Lu June 2007)

"Research in the university is very different to running a business. We realize that the products from the laboratory cannot be put onto the market directly, otherwise we would face many problems." (interview with Mr. Liu June 2007)

*** Available human resources; Innovative capabilities; Entrepreneurial environment within universities; Networks on campus**

The above four factors are considered quite useful for technology transfer from universities. In particular, nine of the interviewees agreed that having good human resources was an important impetus in technology transfer. Innovative capabilities were also considered to be extremely important by five of them.

The available networks and entrepreneurial environment within universities are advocated and appreciated because entrepreneurs realise that the networks could help their companies to absorb available talents and enhance the companies' profiles by diffusing their information within the campus. Some of them claimed that universities hold relatively advanced technology and are often at the forefront within specialised fields because there are many talented students and professors in universities, despite the fact that the applications of this technology can be too academic and not practical enough. According to Mr. Lu, the entrepreneurial environment within universities could encourage students to approach enterprises because they have seen the success achieved by other graduates.

"But among these factors, the factor of human resources should be the most important one. If a company has good human resource, it will be very helpful for technology transfer, because, whilst technology is the root, people have to make it happen. " (interview with Mr. Wang June 2007)

"When I cooperated with some universities, such as Beijing University of Posts and Telecommunications, BUAA, Tsinghua, I experienced that. The students normally would like to keep close contacts with enterprises, if in their universities there are some graduates who have succeeded in the real business world and brought feedback to the universities which may create a sort of entrepreneurial culture and atmosphere." (interview with Mr. Lu June 2007)

"The University's network is quite useful, because the students can diffuse our information like free advertising for us after they graduate and work for other enterprises (of course, this has not really anything to do with technology transfer directly). Both the government's policies and competition have little impact on effecting technology transfer." (interview with Mr. Liu June 2007)

*** Expectation for services provided by counselling firms**

Even though few of them had really benefited from relevant services provided by professional enterprise support organisations (five interviewees had), two entrepreneurs expressed explicitly that they would like to receive advisory and counselling services.

"I think we need some advice from professional law and finance organisations."(interview with Mr. Wang June 2007)

In conclusion, the responses here demonstrate a distinct contrast with the theoretical contributions regarding the importance of the role played by scientific institutions, such as universities (see Chapter 3, Section 3.5.2). The universities have not been considered by small software firms to be the main factor effecting technology transfer as various constraints impede them. Indeed, instead of cooperating with universities, some of them explained that they would normally cooperate with other enterprises, especially foreign ones, as a means of developing new products rather than with universities (Ms. Zhou).

6.2.4 Future planning

6.2.4.1 The target rivals and how to compete at the moment and in the future

The interviewees' responses to the relevant questions put forward showed that small firms realised that companies should be innovative to compete with various rivals. However it is worth noting that not every interviewee could or would clearly identify their competition.

Generally speaking, the interviewees expressed that they competed separately with three types of firms (excluding those which they did not care to mention) which are small and medium sized firms, large SOEs and foreign companies. More details are demonstrated in the following two tables.

Table 6.11a The target rivals and now how to compete with them

Rivals and how to compete with them		Total No.+
Small and medium sized firms	Good service and staff	3
	Close relation with clients	1
	Advanced technology	1
SOEs	Higher flexibility	1
	Harder working staff	2
	Proximity to clients	1
MNCs	Better prices	3
	Closer to clients and possessing shared culture	2
Rivals not clarified	Advanced technology	4
	Value added service	2
	Choosing a purely new market	1
	Good networks	2

+the numbers of interviewees who affirmed by the point as a rival/competitive way

Table 6.11b Future plans to compete better with rivals

Future Plans	Total No.+
None	2
Diversifying products	2
Widening the range of value-added services	1
Improving management & better internal resource allocation	4
Cooperation with universities to absorb talents and reduce R&D costs	2
Cooperation with other firms	2
Other	1

+ the numbers of interviewees who affirmed the point as a planning

*** Competing with small & medium sized firms, with good services and staff, close relation with clients and advanced technology**

For those entrepreneurs who competed with other small and medium sized firms, like Mr. Cheng, Mr. Wu and Mr. Li, the common strengths listed were good networks, close proximity to clients, and an ability to provide more flexible services and maintain the regular clients due to having excellent staff (Mr. Wu). Others thought that being located close to universities and having good learning capabilities was a competitive advantage (Mr. Li).

Regarding the issue of how to compete better with target rivals in the future, Mr. Chen declared that the company did not have a particular future plan, because it was a small company and faced an uncertain future. However Mr. Wu and Mr. Li thought they still needed to strengthen their personnel training. In particular Mr. Li expected to build up a network with some international counterparts through university channels and contacts.

"Our competitors are some small Chinese software companies. We have some excellent employees who are in charge of developing software. We are also able to provide good service to satisfy our customers, and have got good feedback and reputation as well. Of course in comparison to some companies our services may have not met a higher benchmark, and we still need to undertake more personnel training to improve our service for our long term development." (interview with Mr.

Wu June 2007)

"Our competitors are other small-or-medium sized software companies. I think our advantages are our learning capability and being close to the talent pool, Tongji University.... Learning capability is necessary for a company to survive. Therefore our resources include the tangible and intangible ones..... To compete successfully, we of course need to enhance innovation. I think what we have to do is to figure out the market trend and develop products accordingly by learning; and this is the priority for us at the moment..... We also have some interaction with some international competitors by utilizing the Tongji University as a platform for doing so." (Interview with Mr. Li June 2007)

*** Competing with SOEs by being more flexible, staff working harder and being closer to clients**

Some interviewees competed with SOEs, such as Mr. Gong and Mr. Xie. According to them they were more aggressive, more flexible and closer to clients because their staff worked harder, the companies were less bureaucratic and their employees were better motivated than those in SOEs.

In terms of future plans, Mr. Gong thought that the company should be innovative and also research further the market's needs so as to be able to provide products that would be/are in demand. Mr. Xie also wanted to be able to maintain a much closer relationship with his clients in order to understand them better and provide more products accordingly.

"Our competitors are mainly SOEs. Their advantages are that they've got well known brands and are well known in the industry already, but they don't update the technologies quickly enough because they developed the technologies very early, at the same time, they just maintain the existing market because of the limitation of the system. However we have more advanced technology and would like to do something innovative with it in the market. For example, we would like to solve some technological problems which they haven't solved. We will achieve this through market research and introducing technology innovation in this industry." (interview with Mr. Gong June 2007)

*** Competing with MNCs by having better prices, being closer to clients, and having the same cultural background**

Mr. Tan, Mr. Wang and Ms. Zhou's companies all compete with foreign firms. However, Ms. Zhou also competes with some SOEs. As shown in the sample, the companies run by entrepreneurs with previous overseas experience (through completing a PhD and/or work experience) often choose to compete with foreign rivals, especially those whose founders have worked for a long period of time in large multi-national companies abroad. This is because these individuals have had the opportunity to learn from their rivals about advanced technology and premier management skills. This type of experience would help to improve aspects of the technology and management practices for the Chinese market. These companies compete, for example, by offering lower prices through cutting costs in areas such as human resources; their founders were able to acquire networks more quickly and reduce management costs. Their local market knowledge and understanding of their local clients and local business environment was shown to be better than that of their foreign counterparts. Hence the combination of local knowledge and international training has provided these companies with an extremely valuable advantage.

In terms of future plans, Mr. Wang and Ms. Zhou both considered their brands less well known in comparison to large foreign firms. Therefore the question of how to enhance their brand awareness and marketing was crucial for them. Mr. Wang was going to improve this through cooperating with universities with a high reputation. It seems however that Ms. Zhou expected more help from the government.

"Our competitors are some foreign MNCs who have invested in China....As discussed just now, MNCs often pay more attention to getting profit in the shortest possible time and may have less consideration from their clients' perspective. However we are able to understand the local customers more than they do, therefore we compete with them by a way of providing our clients tailor-made products in terms of technology and services......MNCs normally pay more attention to public relationships when they expand the business in China, while we understand the Chinese characteristics better than they do, and so it could be easier for us to weave a suitable network. I always think the technology is the core for developing software companies, so we will further cooperate with some universities to outsource them some R&D projects." (interview with Mr. Wang June 2007)

Even though the above information cannot cover all opinions from each interviewee, it is possible to make a general conclusion from the information given. The main point arising is that their strength was being able to compete effectively in the market because of local knowledge and networks. This certainly gave them a competitive edge over foreign rivals. The sample respondents were also clear that they would focus on strengthening their capabilities in the future (technological and business). All agreed that technological innovation is important. However Mr. Lu seemed to be an exception in comparison with the majority of interviewees. He stated that his company mainly did business with large SOEs, such as large telecom companies, and was able to compete effectively by means of advanced technologies and good networks. With regards to the future he emphasised the need to diversify his product range. As his example shows, software enterprises supply large firms in the market, so in order to survive high-tech software enterprises need to focus on enhancing their innovative capabilities as Mr. Lu did.

6.2.4.2 How businesses benefit from owning technology and planning to enhance their innovative capabilities

Most of the interviewees did not directly indicate where their technologies were from. However, from what they described and explained, some relevant information could be generated as follows.

Table 6.12a The technological factors benefiting business development and future plans to enhance innovation capabilities

Technological Factors		Total No.+
Products with advanced technology	Self-invented	3
	Transferred from top universities	1
	No source	2
Products available for markets	Reintegrating from overseas	1
	Imitating and improving existing products	1
	No source	5
Good and suitable services	Good and suitable	4
	Having ability to adjust	1
Strong tech team		2

+the numbers of interviewees who affirmed the point as an technological

advantage to business development and the sources of their technological advantages

<u>* Having products with advanced technology (transferred from top universities, self-invented, source not clarified)</u>

As demonstrated in the previous question, some of the interviewees appreciated that universities helped with advancing technologies, even though most of companies were reluctant to cooperate with them. Nonetheless, there are still entrepreneurs like Mr. Li who, as a spin-off from university, set up the company with technology developed within the institution.

There are some interviewees who represented companies that had invented their own technologies. Mr. Gong and Mr. Chi explained that their clients could trust the technology that they had invented themselves. Mr. Zhang was confident in his own company's advanced technology and did not think that it could be easily copied, but did not seem to have a long-term plan. According to him, it was meaningless to plan ahead because of the fast-changing nature of the industry. Mr. Liu stated that his company was able to compete on the basis of product innovation, and also because of the company's R&D and regular updating on the market for their products. Mr. Cao explained that his company owned products which had unique and outstanding technology, with only two other companies possessing similar technology.

"It is not easy to imitate our technology, and it takes time. Now only two enterprises in China own this technology, so it is meaningless to talk about selling out technology.. We may not sell it even if some enterprises would like to offer a very high price for it. Of course we will innovate further, because we are a technological enterprise, and for us, no innovation means no development. Now we rely on the R&D team in Chongqing to develop the products, because the personnel cost is low there, we rarely lose employees from the business based there and the team is comparatively stable." (interview with Mr. Cao June 2007)

"We have brought out several innovative products ourselves and have applied for the patents, so we are confident when we face the clients and can get the clients' trust easily, which benefits our development. We aim to enhance our innovative ability by expanding our investment in R&D and taking on new talents and opinions into the company which we believe will help us to meet market demands." (interview with Mr. Chi June 2007)

*** Products available for markets (source not clarified, reintegrating from overseas imitating & improving existing ones)**

Mr. Wang and Mr. Xie represent companies which own products that have imitated and enhanced the ideas/technologies of other companies. According to Mr. Wang his company's strategy was to adapt foreign products to meet Chinese requirements. His company was going to focus on researching local market demands and adapting the product to meet that demand.

Mr. Xie claimed that it could save costs and shorten the R&D process by imitating others' product ideas. He also stated that his company was going to hire more talents to engage in more innovation or cooperation with foreign companies rather than universities. In this way, the company could benefit from acquiring more updated product information.

Besides the above mentioned means of accessing innovation, others like Mr. Lu had many years of work experience in the relevant field before starting their own companies. Consequently, they had accumulated technology, human capital and clients from their many years of experience. Mr. Lu is convinced that his company is competitive due to enormous efforts put into R&D and IPR protection.

Mr. Chen's company tried to utilise its internal resources in order to generate products that require less R&D input. This was because the company's innovation was limited due to resources.

A couple of respondents, such as Mr. Wu from Hua Yan, did not clearly state where the company got its technology from, but they admitted that their technology was less advanced, therefore it could be copied more easily and was less competitive. Similarly, Mr. Xue did not mention where his technology was from. Neither did Mr. Liu, but in fact asserted that they provided products following the local market trends and demands.

Among the interviewees, Ms Zhou did not elaborate much on this topic, but demonstrated her confidence in her technology by stating that the company owned technology through cooperating with foreign or local companies, and also partly by developing its own due to an accumulation of technology from abroad.

<u>* Providing good and suitable services due to being close to clients and having abilities to adjust</u>

Besides doing business with software products, some of the companies studied also provided services. As described by Mr. Dai, Mr. Gong, Mr. Yao and Mr. Zhang, they kept close relationships with their clients and therefore by understanding the needs of their clients provided better services accordingly. Mr. Wang emphasised that his company had excellent adjustable capabilities to meet his customers' requirements.

"We develop professional software products, and the clients we target are regular enterprises. We can supply high-quality products and good services, which are what they want. Of course, we also need to enhance our innovative capabilities, and concentrate our resources (capital and human resource) to ensure that we outperform our rivals. At the same time, we have to try to get familiar with more advanced technologies in this field." (interview with Mr.Gong June 2007)

"The advantage of my operation mode is that I can integrate various resources and control my costs to a low level. So my price is low and my clients are satisfied. And I am close to the clients and understand them, which can avoid some trouble. I can explain to them how to do things and what to do directly, which makes the clients feel they get value for money. So, I can be easily trusted by my clients and this increases my standing with them." (interview with Mr. Yao June 2007)

<u>* Possessing a strong technical team</u>

Even though Mr. Tan was still at the R&D stage of launching his enterprise, he was very confident about his technical team because his company relied mainly on its own in-house R&D team to develop products.

The outcomes above seem very consistent with the attitudes previously expressed by the interviewees towards cooperation with universities. In other words, the respondents tended to rely more on their in-house capabilities than on sources of technology obtained from universities. Furthermore, many of them were keen to have access to the human resources from universities to hire technical staff and/or carry out projects for them.

As mentioned in the Literature Review (Chapter 3, Section 3.6.1), Schumpeter (1942) had two assumptions about innovation with regards to firm size. One is that large corporations generate most of the innovative activity in a society. The other is that the situation mentioned above could exist in industries where competition is limited and high entry barriers can be expected.

Acs and Audretsch (1987) made efforts to test Schumpeter's two assumptions. They came to the conclusion that firm size was not relevant but rather a firm's capability to be innovative and, in particular, pose the question "under what conditions have small and large companies an innovative advantage"? They conclude that within the manufacturing industry, large companies appear to have some innovative advantages in sectors where competition is limited, which supports Schumpeter's second assumption. They also thought that small companies enjoy similar advantages in sectors more exposed to competition. In another article (1988) they further tried to explain a phenomenon which shows that industries with a high share of large companies exhibit more innovative activity despite the fact that it is mainly the small businesses which are responsible for this activity. They generated a possible explanation that shows that when an industry is dominated by large companies, the small companies have to be innovative in order to survive.

Even though the theory suggests that innovative capability is very important, especially for small high-tech firms, not all the entrepreneurs interviewed seemed to have plans to enhance their innovative capabilities or rather they did not outline what they would do to improve innovation. Given the limited information available, some themes regarding how some of the interviewees were planning to enhance their innovative capabilities can be identified as follows.

Table 6.12b The future plans for enhancing innovative capabilities

Future plans to enhance innovative capabilities	Total No.+
Acquiring more talents	4
Acquiring more financial capital	1
Cooperating with other firms	1
Cooperating with universities	1
Better allocation of internal resources & absorption of more technology	3
More market research	1
Investing more/Strengthening R&D	3

+the number of interviewees who affirmed the factor as a future plan to enhance innovative capabilities

*** Acquiring more talents**

Four of the interviewees emphasised the importance of human capital. Being a university spin-off, Mr. Li still wanted to absorb more human capital to further strengthen his R&D team and diversify products. Mr. Wang and Mr. Xie also expressed a desire to take on more talents to work on further innovation.

*** Acquiring more financial capital**

Besides taking on more human capital, Mr. Li also claimed that financial capital would be very important for further strengthening R&D in his company.

*** Cooperating with other firms**

Mr. Xie strongly intended to cooperate with foreign companies, even though his company had already experienced cooperation with universities. According to him, the universities could not design industrialised products and were only able to undertake some theoretical designs.

*** Cooperating with universities**

Even though the majority of interviewees were reluctant to cooperate with universities, one interviewee, Mr. Liu was keen to cooperate with universities as a means of gaining access to high technology.

*** <u>Better allocation of internal resources & absorption of more technology</u>**

Instead of acquiring various types of capital externally, some of the interviewees realised that it was also very important to utilise their internal resources. This could be consistent with the resource-based theory that focuses on how to develop a firm's capabilities and core competence in order to achieve a competitive edge (Hamel and Prahalad, 1996).

According to Mr. Gong, his company would concentrate on finding more financial resources and human resources as well as improving their research on technology as it was weaker than that of their rivals. Furthermore, he would try to develop or acquire more advanced technologies in the relevant fields.

Mr. Wu from Hua Yan stated that his company would further strengthen employees through training. He would also establish standards for measuring technological and management levels in order to encourage innovation.

*** <u>More market research</u>**

Undertaking more market research was considered to be a crucial factor for Mr. Wang. According to him, it was necessary to conduct good initial market research in order to identify more clearly what talents were available and which products could be developed further.

*** <u>Investing more/Strengthening R&D</u>**

As mentioned previously (Chapter Three, Section 3.5.1), according to Acs and Audretsch (1988) the total number of innovations in an industry is inversely proportional to industry concentration but proportional to the intensity of R&D. The responses from some interviewees, like Mr. Cao, Mr. Wang and Mr. Chi, showed that they realised the importance of R&D for their future planning and intended to invest more in order to strengthen their R&D. This was considered necessary if they wanted to further develop their business and reach a more advanced stage of growth.

6.2.4.3 Business scenario for the next five years and how to achieve it

The Literature Review concluded that there were two main strategic approaches to entrepreneurship. The deliberate strategic approach is based on Venkataraman's view (see Section 3.3.1). While the emergent approach is advocated by Jenkins (see Section 3.3.2). According to the latter, it seems that many entrepreneurs respond flexibly to new opportunities as they arise rather than planning for a particular future.

During the process of organising entrepreneurial activities, entrepreneurs inevitably come across problems that result from uncertainty and information asymmetry. Planning therefore provides a means of organising a way out of such problems. Planning also clarifies goals and sets specific objectives, which facilitate the achievement of those goals (Locke and Latham, 1990).

Planning tests the accuracy of the entrepreneur's conjectures about opportunities. Efforts to exploit new opportunities generally begin as unsubstantiated claims based on the entrepreneur's interpretation of the information that they possess. Furthermore, planning tries to establish demand, production and governance and forces the entrepreneur to articulate assumptions and formulate hypotheses that can be tested for internal consistency, plausibility and accuracy, especially as information at the beginning may be incomplete (Harper, 1996).

In the field work, the researcher enquired about planning, asking respondents how they would like to enhance their innovative capabilities. When considering their company's possible developments some possibilities regarding their future planning were itemised and these included: growing sufficiently large to get listed; selling the business and using the profit to start another business, or retire; and going into partnership with another company to gain new technology and/or a new market. During the interviews, these issues were further explained and what the interviewees elaborated on can be categorised as follows.

Table 6.13 Directions for future development within 5 years and how

Further development intention		**Total No.[+]**
Expanding through business	Cooperating with other firms to acquire advanced technology or better marketing	5
	Acquiring useful capital/resources	3
	Expanding market share locally/globally	2
	Further developing independently	2
Becoming listed by:	Improving performance	5
	Acquiring more human capital	1
	Acquiring more financial capital	2
	Developing better products and improving marketing	3
Maintaining clients to be more profitable		1
Selling the business		1
No plan		1

[+]the numbers of interviewees who affirmed the point as a development intention

*** Expanding the business through:**

a. Cooperating with other firms to acquire advanced technology or better marketing

b. Acquiring useful capital/resources

c. Expanding market share locally/globally

d. Further developing independently

Some respondents said that they would seek to cooperate with other larger enterprises to acquire more resources (human, technological and financial) for developing the business further. This would be in order to gain a greater market share locally, or even to further penetrate international markets. For some of them cooperating was a means of acquiring resources for enabling them to become listed or for expanding their business, as Mr. Gong, Mr. Chi and Mr. Wu all stated. Mr. Wang and Ms. Zhou cited cooperation as a means to acquire more advanced technologies or increase market shares. Also, as Mr. Cheng said, some companies found it necessary to seek cooperation with a partner in order to develop the business as it would be difficult to do as a solo venture.

In contrast, Mr. Liu seemed to have a totally different view to Mr. Cheng. He was confident that his company would develop and expand independently, believing that he would not find a partner very easily, nor would his company become listed at the present time.

"So for future development we mainly consider to cooperate with some enterprises whose technology is on the frontier line of this industry, especially in the field of safety software, we are also looking for some larger enterprises to cooperate with them in marketing in order to increase our market share." (interview with Ms. Zhou June 2007)

"We will cooperate with other companies if there are some opportunities. It may be very difficult to survive if we just rely on ourselves. I think if we partner with another company that has some complementary strength, then we could grow and become stronger." (interview with Mr. Chen June 2007)

"Our future plan is to develop and expand the business by ourselves. Firstly, it's difficult to find a suitable company to cooperate with. Secondly, we are far away from being able to get listed. Thirdly, we want to carry on developing our own products, so we won't sell the business. We're currently looking for some sort of technical cooperation. In five years time, I think our turnover may increase by 4-6 times. And then the company will be a medium sized one." (interview with Mr. Liu June 2007)

*** Factors perceived necessary for listing**

a. Improving performance

b. Acquiring more human capital

c. Acquiring more financial capital

d. Developing better products and marketing properly to increase market share

To sum up, most interviewees aspired to get their company listed one day, because they perceived being listed as the ideal direction to go in, especially for a software company. They saw this as offering them the best opportunity for maximising returns easily and quickly, as being listed would raise their reputation in industry.

However, they realised that it would take them a long time to reach this goal because they would need to achieve a reasonably good performance before acquiring listed status (Mr. Chi, Mr. Gong, Mr. Wu, Mr. Xie and Mr. Lu). They acknowledged the need to plan by acquiring more human capital (Mr. Liu), more financial capital (Mr. Dai, Mr. Liu), developing better products and marketing these more effectively in order to increase their respective market shares (Mr. Tan, Mr. Cao and Mr. Xie).

"In the future, we want to develop the company step by step and finally get listed. Listing would have the highest return for our company. It can help us balance risk and returns. At present, we are focused on developing the technology well and designing the products. When we have the products developed, we will get onto doing the marketing well. If we can overcome some difficulties and have gained enough market shares in the future, then we could be on the way to achieving our aim of becoming listed." (interview with Mr. Tan June 2007)

***   Maintaining the clients to be more profitable**

Mr. Yao emphasised strongly that he had a more ambitious future in business planning in order to maintain clients and gain more profit.

***   Selling a business**

Among the interviewees, Mr. Xue is the only entrepreneur who seemed quite tired of running the business and would like to retire in the foreseeable future.

***   No plan**

Mr. Zhang is a small shareholder in his company. The largest shareholder is a state owned company which means that the state has more influence on deciding the future planning of the company.

Overall, even though the interviewees demonstrated their optimism for future developments, they did not demonstrate a specific and clear long term plan to further expand and develop their business. When discussing planning they focused on becoming listed or cooperating with other enterprises to acquire necessary resources as the main means of making a speedy return on their investment. Indeed, to be profitable, or to get a return on their investment, was seen to be the main priority of most of the entrepreneurs in the sample.

The above provides the entrepreneurs' views on venture creation, growth, and future planning. The subsequent section provides views from two officials and two bankers interviewed on:

- the effectiveness of relevant government policies,
- the issues around technology transfer and IPO protection,
- the situation of small and medium sized software firms with regards to

financial support.

These aspects are discussed in the following paragraphs, and the outcomes of their responses will be compared with the results obtained from entrepreneurs interviewed in the next chapter.

6.3 The views regarding software development from officials

As noted in the previous section regarding interviewees' profiles, on 6^{th} June 2007, the researcher interviewed two officials from MOST, Mr. Xu director of Software Department and Mr. Tang director of Science Park Department. A total of six questions were asked and the two officials answered the relevant questions separately.

In general, the questions focused on:

- the development of the Chinese IT software industry, particularly the technological aspects

- whether and how software enterprises benefit from the governmental policies

- the status of technology transfer in China, specifically software technology

- the effectiveness of the patent registration regime

- any adjustments the government is planning to make to provide a suitable environment for the development of software enterprises

- how software entrepreneurs could compete with foreign rivals, especially after China's entry into WTO.

The responses from the officials have been included in the following two sub-sections.

6.3.1 Relevant government policies and how they benefit the Chinese Software Industry, including future policy adjustments

*** Various efforts made by government to promote the development of high-tech industry effectively, including continuous policy adjustments**

Mr. Tang, Director of the office at the Ministry of Science and Technology in Beijing, outlined preferential policies brought out under the Chinese government's TORCH project. These support the development of specific fields such as systemic software, database management software, middleware software and embedded software. These policies encourage the establishment of special software science parks to promote high technology industrialisation and enable Chinese software companies to meet international standards and effect technology transfer.

The policy achievements and the speed of industrial development are evident at macro level. Since 2000, China has developed and marketed some distinguishing software products (see Chapter 2, Section 2.4).

Mr. Tang was convinced that the government's high-tech policies supported the development of software enterprises. According to him, the reason for many software enterprises locating and gathering in STIPs was because they wanted to benefit from preferential policies such as training offered on-site, taking advantage of tax incentives, investment and financing policies as well as the supply of public services available through the administrators of STIPs, who are responsible for implementing the government's preferential policies.

Mr. Tang's view did not wholly resonate with those expressed by the entrepreneurs. There was some scepticism expressed by the entrepreneurs towards the effectiveness of the policymakers' efforts. Mr. Tang was very optimistic about the benefits to be gained by software entrepreneurs from the policies. He said that the Government carried out examinations regarding the efficiency of the implementation of their policies, and the result showed that 85% were considered to be implemented effectively. However, Mr. Tang did mention that sometimes policymakers lagged behind the fast-changing software industry. Moreover geographic differences and local governments' respective understandings of how to implement national policies raised some challenges.

In terms of future policy adjustments, he highlighted several actions and decisions made by the Government. These consisted mainly of adjusting policies to meet international requirements and standards; encouraging software entrepreneurs to bid for outsourcing services, thereby following a global trend in the software industry; and establishing new measures to identify high and new technology enterprises. The Chinese government expected, from these efforts, the revenue of the software industry to increase from 480 billion yuan in 2006 to 1000 billion yuan in 2010. The Government also expected exports to rise, especially as a consequence of promoting IT outsourcing. In summary, Director Tang was confident that the Government's policy efforts would improve the performance of the IT industry.

6.3.2 Effectiveness of technology transfer and IPR protection

*** Technology transfer constrained by certain factors & suggestions regarding how to protect IPR well**

Director Xu from the IT software division of MOST answered questions regarding technology transfer and the protection of IPR.

Mr. Xu asserted that if enterprises rather than universities were to take a principal stake in a technology transfer project, then this was likely to be more successful than projects in which universities were the main stakeholders. He further gave the following reasons for this assumption: Owing to their own limited access to funds, universities were only able to support R&D in the laboratories. They are not able to pump further funds into supporting product testing after the initial product launch. The other reason is that, due to the gap between academi

c institutes and industries, the types of projects mainly carried out by universities tend not to be practical enough.

In terms of the issue of IPR protection, according to Mr. Xu, the government has made enormous efforts to protect IPR and encourage innovation by issuing relevant policies. Policies such as income tax incentives were made especially for the software industry, and tax incentives were also implemented for enterprises undertaking R&D. Nevertheless, due to the nature of software, it is difficult to define and contain piracy. However he tried to give some recommendations about how to make sure that implementation of IPR protection was efficient. He suggested that IPR protection should be carried out at different levels. The judiciary authority should be able to enforce IPR effectively, but companies need to take measures to protect their intellectual property rights by improving their contracts with their own employees.

Responses from entrepreneurs affirmed some of the views put forward by policymakers. For example, wanting to take advantage of government preferential policies, such as tax incentives and sharing public facilities. This was for many of the entrepreneurs the initial reason for locating within STIPs. However, most did not consider the training programmes helpful as they were arranged by officials who did not have expertise in software. They also lacked understanding of the software entrepreneurs' needs. Furthermore, the small start-up software firms felt unable to compete for funding in order to take part in national projects because in order to compete for such projects they would usually require reasonable levels of resources that the small firms simply did not have. Very few of them, only two or three, mentioned that they had benefited financially from getting national projects to advance their R&D.

In terms of future policy adjustments, notably in outsourcing, one interviewee pointed out that for most small software firms it was not possible to provide outsourcing services. This was because their business was not geared to providing outsourcing services and would therefore need to reconfigure their resources and business structure to compete in this field.

Government officials and software entrepreneurs seemed to agree on technology transfer issues. In particular they agreed on a lack of financial support from Chinese universities to successfully affect technology transfer.

Mr. Xu's response on IPR Protection remained fairly generalised, however not completely different to that given by the software entrepreneurs: great efforts have been made by the Chinese government to protect IPR, but whilst the judiciary has a role to play, enterprises need to ensure that they have measures in place to minimise piracy from their own employees and within their own businesses.

6.4 Finding from interviews with two state-owned bankers

In order to collect views on government policies relating to finance for small businesses, the researcher interviewed two bankers: Mr. Li, Director of the Division of Risk Management, China Construction Bank and Mr. Dong, Business Manager, China Jianyin Investment Bank, which is also a shareholder of the China Construction Bank. The two bankers were interviewed jointly by the researcher on 8th June 2007.

The interview focused on two main areas: the loan policies, and risk management of the state-owned bank, with regard to software firms. The bankers were asked how they evaluated the way in which the Chinese software industry has developed, and how they thought Chinese software entrepreneurs financed their enterprises.

The purpose of the discussed topics was for the researcher to understand bankers' attitudes towards financing small software firms, especially as many entrepreneurs, in their interviews, had previously revealed that they did not believe that small firms could obtain finance easily from banks and other similar institutions.

During the interview, they tried to supplement each other's opinions, and the outcomes are summarised as a whole below.

6.4.1 The lending principle, risk management specifically to software firms and criteria setting for loans

*** <u>Cautious loan principle especially towards high-tech firms with fewer tangible assets</u>**

The bankers began by outlining who they normally finance. They had some criteria for minimising risk, but this is not necessarily in line with approaches found outside China. According to Mr. Li the bank establishes relevant standards which support and comply with local Chinese industrial and loan policies.

Consequently, they provide loans to enterprises: with tangible assets; who have a promising future; from which high returns are expected; and also who do not require large amounts of money. The bankers gave examples of successful, and quite famous, Chinese software companies such as Founder, Jade bird and Huawei, to whom they have given loans. However, in terms of small-sized enterprises, they expressed concerns about the high level of risk and as a consequence there was little support for them.

Mr. Li worked in the relevant field for about 20 years and is now in charge of project appraisals. According to him the bank does not stipulate on what basis that they will grant loans to software companies. He did confirm, however, that the bank has some general requirements such as the company being able to demonstrate good financial management, having a good product which is able to compete in the market and having a product that meets industrial standards. The company's ability to repay the loan on time was also one of the bank's requirements. If the enterprises are privately owned, the company is expected to guarantee the loan through its tangible assets and cannot offset it against its IPR. He explained that there are, as yet, insufficient measures in China for IPR.

To sum up, besides giving loans to successful high-tech companies such as Founder, Jade Bird, Lenovo, Huawei and China Teclecom, very few, if any loans, are granted to small high-tech start-ups. In order to qualify for loans these companies have to meet the same criteria as any other more established company and also meet the necessary industrial standards.

6.4.2 The development status of the software industry from the bankers' perspectives

*** Falling short of international standards**

The bankers seemed quite cautious about giving their opinions on the development status of China's software industry as they said they could only give their impression gained in dealing with companies that had borrowed from the bank. They agreed that the key asset for the industry was its technology development capability. According to them it seemed that there was still a great gap between China's software industry and software companies internationally. Local software firms should focus more on how to commercialise their knowledge and develop their ability in order to further their application capabilities. The bankers also referred to the Japanese and how they managed to maximise their limited capital resources and speed up the technology transfer process, which enabled capital flows to be more efficient.

6.4.3 Their view about how the Chinese software entrepreneurs finance their businesses

*** Size of firm plays an important role in banks being willing to offer finance**

According to the bankers, large software enterprises can get loans from government banks if they have substantial assets and a liability ratio, which normally should be over 65%. Although state-owned banks tend to be quite conservative, they are gradually becoming more interested in providing loans to some big IT companies as the Chinese government supports the development of high technology. The government also wants to promote innovation and considers that the high-tech industry has considerable potential for the future.

In terms of how small and medium sized firms within the industry could finance their enterprises, it was thought that venture capitalists might be interested, especially when such companies were at the start-up stage.

Theoretically speaking (see Chapter 3, Section 3.6.3), there are four basic factors that determine how a company is financed. The first consideration is the economic value potential. A small business with potential for high growth and large profits has more possible sources to finance them than a firm that does not offer attractive returns. Small businesses that can provide rates of return that exceed the investor's required rate create value for the investor. The life-cycle position, or maturity, of the company is the second factor. Lenders look for companies with established track records that can demonstrate, based on past performance, the ability to repay a loan. This factor encompasses the small business' and owner's assets, as these tangible assets are solid sources of collateral. The final factor is the owner's preference for debt versus equity and whether the owner is comfortable exchanging any amount of control in return for funding (Longnecker, Moore and Petty, 2003).

However as the bankers stated, the Chinese state-owned banks normally make the rules without referring to international standards, they just take the local industrial policies into consideration. The response to the last question supports this view that the relevant policies tend to consider large firms from the high-tech industries more. Furthermore, large firms are always in a position to benefit more from the government's preferential policies and this in turn secures loans from the bank.

According to Mr. Li, Chinese state-owned banks have not built up any rules regarding how to lend capital to small and medium sized companies. They also show no intention of supporting small and medium sized software firms to develop financially. Their explanation was that the small and medium sized firms do not produce competitive products or have as good a financial management level as large firms. In addition to this, the state-owned banks will not accept IPRs as a deposit for enterprises to apply for loans. The major reason is that state-owned banks try to avoid this difficult situation of how to measure the risks they would take if lending to small and medium sized software firms.

Actually some professional knowledge and expertise are required if a bank intends to lend capital to small business, as the bank should evaluate if the business would have a potential for high growth and large profits or not. The two interviewees' attitude of totally ignoring the small and medium sized companies may imply either they are too large to be interested in small business or that the large banks have not got sufficient, available human resources to properly appraise the issue. This view perhaps stems subconsciously from some large, famous, Chinese high-tech firms providing broad ranges of software and hardware products and services, such as Founder.

The views given above, mainly by Mr. Li from CCB, confirm those given by the entrepreneurs, i.e. that it remains very difficult for the small and medium sized software companies to obtain financial support from large banks or investment institutions within China.

6.5 Summary

This chapter has revealed and discussed extensively the information collected from several interviews with entrepreneurs, government officials and bankers.

Following the structure of the conceptual framework shown in the literature review, results from the interviews with entrepreneurs have been analysed by the factors that really motivated them to be software entrepreneurs. (Entrepreneurship in the individual). This included how they started and expanded their business, any impact given by the environmental factors and, particularly, any impact on technology transfer. (Entrepreneurship as a process). Lastly, their future planning and how they aimed to achieve their goals. (Entrepreneurship as a function).

In brief, the entrepreneurs indicated that there are various reasons motivating them to become entrepreneurs, but on the whole show that the key reasons were because they were well educated, confident with technological capabilities, had previous work experience and were ambitious in wanting to take risks (see Section 6.2.1). They described what criteria helped them to choose the location for their business, and from their perspectives, how networks and business plans could be used to gain sources of finance for their companies. Their responses suggest that the majority of them located within STIPs in order to benefit from government preferential policies, especially tax incentives. Most of them considered that business planning was more important than networks to attract financial capital (see Sections 6.2.2.1 & 6.2.2.2) and that government policies could influence their businesses to a certain extent (see Section 6.2.3.1). The entrepreneurs also presented their views about the factors affecting technology transfer (see Sections 6.2.3.4). In terms of future planning, most of them would like to expand their business further, either on their own, or by cooperating with other firms to increase their market shares. Others discussed the option of getting their company listed as a means of acquiring more capital which would enable them to grow. Innovative capabilities are also recognised as a vital factor for the development of high-tech firms (see Sections 6.2.4.1-3).

The interview with government officials was designed to collect insights on government policies; the development status of Chinese software industry and the issues regarding technology transfer and IPR protection from the officials' perspectives. Their responses confirmed their confidence in government preferential policies and that these were efficient in promoting high-tech development. Regarding the issue of technology transfer, their views were similar to some opinions expressed by the entrepreneurs interviewed. However, they gave few opinions about how IPR has been protected (see Sections 6.3.1 & 6.3.2). The interviews with the two bankers revealed that the large state-owned banks in China are very cautious and conservative when giving loans to firms with fewer tangible assets, and that they hardly ever lend capital to small sized software firms. Their responses affirmed the difficult situation facing most Chinese small and medium sized software firms seeking sources of finance for their businesses (see Sections 6.4.1 & 6.4.2).

Chapter Seven Discussion of Findings

7.0 Introduction

Chapters Five and Six presented the major results obtained from the questionnaire survey carried out among 53 high-tech entrepreneurs, as well as the qualitative data from interviews undertaken with 17 of those 53 entrepreneurs, two policymakers and two bankers.

As explained in the introduction of Chapter Four, the results from the questionnaires (questions 3-7, 10, 15-30) were put into a computer and the outcomes presented in tables in this chapter. This was done in order to present the data in a more visually accessible way and to allow for the outcomes to be compared and contrasted more easily. This chapter aims, therefore, to compare and contrast the two sets of data and to discuss these in relation to the theory and notably the conceptual framework developed for this research in Chapter Three.

The chapter is structured as follows. The first section examines questions 3-5 from the survey and question one in the interviews, which focuses on the entrepreneurs' motivations to become software entrepreneurs in China. The second section compares the two sets of data drawn from questions 6-13 in the survey and questions 2-5 in the interviews, exploring the entrepreneurial process experienced within the Chinese context. This section includes discussions on location and environmental factors, including views of the policymakers, sources of human capital and sources of finance. This will also explore the attitudes of the policymakers and bankers towards China's policies on loans, venture capital and finance for private enterprise in China. Further to this, a discussion will be carried out on the role of social networks, vis-à-vis business planning with regards to entrepreneurs being able to access sources of finance and other resources, such as human and knowledge. The third section analyses questions 14-30 from the survey and questions 6-10 in the interviews from the quantitative and qualitative perspectives, highlighting the entrepreneurial capabilities required to bring their innovation to market. Within this section the results will be discussed in relation to the entrepreneurs' perception of what they consider to be their business's competitive advantage; what they perceive to be the factors affecting or facilitating technology transfer; their approach to future plans; and finally, issues surrounding their innovative capabilities.

Following the comparison of the quantitative and qualitative sets of data, the fourth section will discuss the outcomes of the empirical findings in relation to the researcher's conceptual framework (see Chapter Three), and this will be applied to the data collection. On the basis of the findings and discussions presented in this chapter, a revised conceptual framework is then presented and the way in which the findings here contribute to the theoretical development in this field is discussed.

7.1 Motivation to Become a Software Entrepreneur

7.1.1 The major reasons

(The outcome from the survey against the interviews)

The results from the Question Four of the survey first provide information regarding the educational background of the respondents.

Table 7.1 **Qualification held when business started**

	Frequency	Percent	Valid Percent	Cumulative Percent
Unknown	6	11.3	11.3	11.3
B.A	4	7.5	7.5	18.9
BSc	8	15.1	15.1	34.0
Journal College	1	1.9	1.9	35.8
M.A.	4	7.5	7.5	43.4
MSc	19	35.8	35.8	79.2
Ph.D	11	20.8	20.8	100.0
Total	**53**	**100.0**	**100.0**	**100.0**

The data in this table suggests that the open policies and comeback of national examination have encouraged more and more people to attend universities, both within their own countries and globally. Generally speaking the respondents had quite high level qualifications, with 20.8% of them holding a PhD and a further 43.3% holding either an MA or MSc. Altogether nearly two thirds (64.1%) of the 53 respondents held some type of postgraduate degree at the time that they started their businesses. This perhaps indicates that a relatively high level of personal education is quite an important motivating factor in the decision to become an entrepreneur.

These well-educated people absorb tremendous amounts of new knowledge and new concepts in relation to work-style and lifestyle. Cognitively they are people who are more likely to grasp opportunities, access available opportunities and utilise opportunities. The bar chart below shows data regarding what motivated the respondents of the survey to become software entrepreneurs.

In Question Five of the questionnaires, by drawing on the theoretical definitions in the literature, the following assumed motivations for the respondents to start a software enterprise are listed:

a. individual ambition (possibly due to your in-born desire to take risk and have greater job satisfaction by working for yourself than for somebody else)

b. ability to utilise preferential policy for university spin-off, or overseas student etc

c. my ability to recognize the opportunity among networks

d. having a good business idea

e. having developed a product and/or service which I thought people wanted to buy

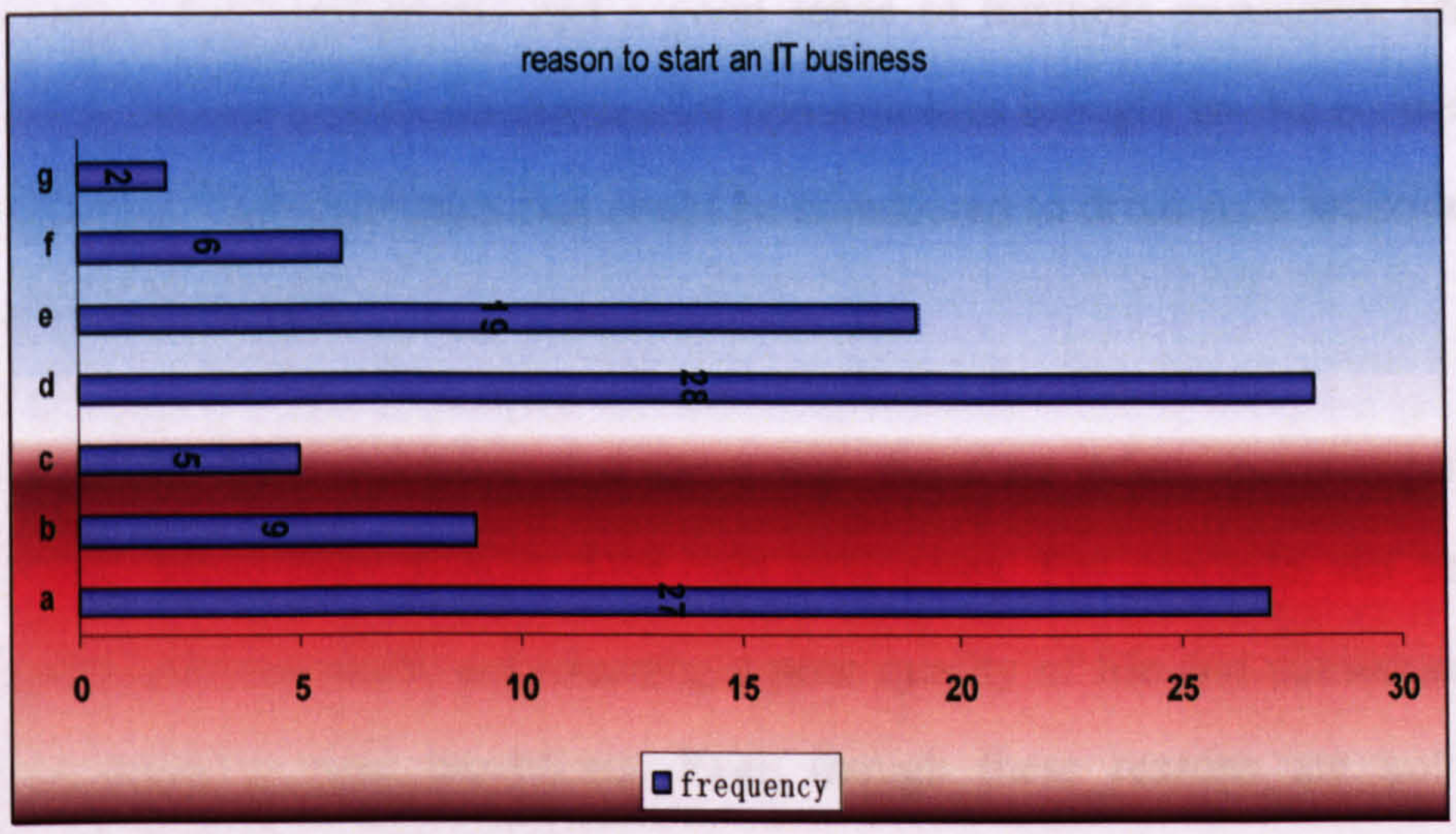
f. wanting to make money and create a better life for my family

g. Other reasons

The entrepreneurs were asked to tick one or more available answers.

The results are displayed in Chart 7.1:

Chart 7.1 Reason to start an IT Business



This shows that the three most common reasons for the respondents to become entrepreneurs are:

-having a good business idea;

-individual ambition;

-having developed a product and/or service they thought people would buy.

In order to explore further what the other reasons could be, the researcher conducted 17 interviews among the respondents. A qualitative analysis of the responses from these interviews was undertaken in Chapter Six to clarify the motivations for becoming an entrepreneur.

The qualitative analysis drew a much clearer picture with more details on this issue. According to the interviewees, to start and run a business in the software industry, it is necessary to be well-educated and have good technological capabilities, as these traits will be needed to help them develop good business ideas and products, as shown in the survey.

Similarly to entrepreneurs in other industries, personal traits (such as being able to take risks and being very ambitious) are also required to carry through these business ideas. The respondents had a good sense of business awareness which made them conscious of the entrepreneurial opportunities brought by the economic reform in China. These are traits that could be considered to drive such individuals to become entrepreneurs.

The outcomes of the interviews also show that there are other, more negative, factors which drove them to start their own businesses. For example, not being satisfied with previous work, experiencing a poor quality of life and consequently wanting to improve these conditions. Even though these reasons are not the principal drivers, they could still offer some explanation as to why these individuals have become entrepreneurs.

The motivating factors listed by the respondents in both the questionnaire and the interviews are summarised in the following table.

Table 7.2 The motivating factors to become software entrepreneurs from the survey against those factors identified from the interviews

Motivating factors from the survey	Frequency	Motivating factors from the interviews	Frequency
having a good business idea	28	technology owned/developed by entrepreneur	11
individual ambition	27	own business know-how and experience	7
having developed a product and/or service which I thought people wanted to buy	19	encouraged by reforms and business environment in China	6
ability to utilize preferential policy for university spin-off, or overseas student etc	9	own ability to spot the business opportunity	6
Wanting to make money and create a better life for my family	6	own high level of education	4
my ability to recognize the opportunities among networks	5	Ambitions	4
other reasons	2	good networks	4
		wanting to improve life for own family	2

7.1.2 Comparison and Analysis with the guide of theoretical contributions

*** Entrepreneurial cognition differs from the mind-set of normal people**

Most people, including many entrepreneurs, believe that they are different from other people in many ways. Growing evidence suggests that all of the factors (motives, skills, abilities, experience) are important, but perhaps the most impressive research concerning entrepreneurs to date has focused on entrepreneurial cognition – how entrepreneurs think, make decisions, and perform, and are driven positively or negatively.

Relevant contributions to this theory can be found in some psychological scholars' theories, for example some of the traits often displayed by entrepreneurs are: a strong drive for achievement, as stated by McCelland (1961); the possession of a dream and the will to found a private kingdom; the will to conquer and the joy of creating (Schumpeter, 1934). In addition to this, Schumpeter also paints the entrepreneur as an innovator. (See Table 3.1 for a full summary).

If we look into the minds of the respondents, we can find that as entrepreneurs they may indeed differ from other people with respect to many aspects of cognition, as stated in the relevant theoretical contributions. For instance, we can see in the above bar chart that the most significant reason for respondents to start a software business were having good business ideas and an individual ambition, such as a personal need for achievement. There was also a belief in the effect of personal effort on outcomes and the greater satisfaction of working for themselves rather than for somebody else. The fact that they had developed good products and/or services and thought people would like to buy these was also quite a common reason for them to start their businesses, but comparatively a less frequently mentioned reason, as demonstrated in the bar chart.

This is possibly because new products or services provided on a new market are usually easy to duplicate, and unless they are protected in some way (patents, trademarks, and other factors) they don't stay 'new' or 'unique' for very long. In contrast, business ideas involving new methods of production often provide better prospects for entrepreneurs because they can be kept secret and are therefore more difficult to copy. Owing to the fact that entrepreneurs sell their new products to customers, all of the attributes of their new products are available for others to see. Competitors can buy a new product, take it apart, and see how it works. Then the competitor can often copy the product. In contrast, an entrepreneur does not have to show anyone else the production process that he or she uses. Therefore, it takes much longer, is much more difficult, and costs much more for competitors to imitate business ideas that are developed through new production processes than ones that are developed through products and services.

*** A positive attitude to facing the risk**

The respondents answers also tally with the theories given by some classical scholars, like Cantillon (1680-1734) who thought that an entrepreneur should be a risk-taker.

The evidence shows that successful entrepreneurs may perceive risk differently (perhaps as more tolerable or less tolerable), may be more subject to some cognitive errors (e.g., a tendency to be overly optimistic) and may be more capable of recognising connections or patterns in seemingly unrelated events or trends (and hence, better at recognising opportunities). They are more likely to think long and hard about unexpected or surprising events or outcomes.

*** Having a strong awareness of the opportunities**

According to Chart 7.1, in the survey there were nine respondents who mentioned that they were able to utilise preferential policies for university spin-offs, or overseas students, and five respondents who thought that they had the ability to recognise opportunities among networks.

As explained in the Literature Review (see Chapter 3, Section 3.4), the empirical research confirms one of the important factors that social networks fulfil. This is opportunity identification, due to the fact that opportunities generally arise from two major sources – the information people have that helps them to recognise new business opportunities, and changes in the external world that generate opportunities (Kirzner, 1973). Given the situation described in Chapters One and Two, we can surmise that such opportunities exist in China due to social and demographic change, political and regulatory change, and technological change, especially for the high-tech industries.

Generally speaking, the evidence from the survey and the interviews confirms that the respondents are a group of people who conform to the theoretical conceptions of 'the entrepreneur'. They are ambitious, willing to take risks, and are able to identify opportunities within networks or government policies.

However there is less evidence to support the notion that the above capabilities are necessarily in-born traits. The evidence obtained here tends to show that the respondents interviewed benefited from the Chinese open and reform policies, and thereby became well-educated locally or overseas. A good education gave them access to technological capabilities and helped them to generate good business ideas, and subsequently helped them to recognise entrepreneurial opportunities arising from the transition economy and the business environment encouraged by the Government's policies.

Due to the huge structural change that occurred in China, economic uncertainty and disequilibrium were created which resulted in the existence a breeding ground for generating entrepreneurs. In high-tech industries entrepreneurs are the people who are well-educated and ambitious, willing to take risks and able to seek opportunities in making profits.

7.2 The entrepreneurial process in the Chinese context

Having discovered such opportunities, an entrepreneur needs to establish an organisation or market mechanism that he/she will use to acquire resources and make the available opportunities profitable, via effective commercialisation of their motivation.

This process is called organising (Venkataraman, 1997). It involves creating routines and structures, and gathering resources that support the goal. Therefore research of this process could provide some insight into the entrepreneurs' decision making processes regarding where to locate and why, how to finance, how to attract talent, and how to react to and have an impact on the environment. High-tech firms need to know how to allocate their resources in order to conduct

R&D at an appropriate level and work out what their scenario will be.

The organising process is uncertain though, as future efforts to exploit opportunities are not always going to be one hundred percent successful. Entrepreneurs cannot identify all possible actions and all expected outcomes of these actions, they must base their decisions on conjectures (Arrow, 1962). The organising process is therefore fundamentally uncertain (Harper, 1996).

The organizing process is also strongly influenced by the context in which an entrepreneur runs a business. Theoretically speaking, one important dimension of the context is the institutional environment. The institutional environment consists of the economic, political and cultural context, which has been discussed earlier for the Chinese software industry.

The data collected from the survey and interviews covers information regarding the decision making process for such issues as: how to initially locate companies, how to finance companies, how to acquire human resources and how to manage technological issues under certain Chinese contexts. This section focuses more on analysing the process of how to locate, to hunt talent and to finance the firms by linking the entrepreneurs' decision making with the environmental issues.

7.2.1 Location and Environmental issues

Today, with the Internet and the click of a mouse button, companies can source goods, capital and technology on a global scale. Technology has set new frontiers of conventional wisdom about how companies and nations compete. With a more open global market, easy access to information and faster transportation, we can say that the role of location in competition has become less important.

As society has shifted to a more new technology based society, with information diffused and accessed more easily, it seems that location does not matter that much, although the economic map of the world is still being dominated by growing clusters of economic activity.

In Chapter Three, much of the literature regarding the issue of clusters was reviewed (Section 3.3.2), and the relevant literature covered the concept of the cluster along with its various interpretations by different scholars (Feser and Bergmanm 2000, p1-21; Porter, 1998b, p199; Czamanski and Ablas, 1979). The reasons that the cluster approach has been embraced by policymakers to different extents were also covered (Lagendijk and Cornford, 2000, p214; Martin and Sunley, 2001, p30; Raines, 2001), as were the suggestions of how to implement this approach (Enright, 2000a; Lundequist and Power, 2002).

By referring to these theoretical contributions, in both survey and interview the researcher set up questions to ask entrepreneurs where to locate and why to locate. Meanwhile an official from the science park department of MOST was asked about his views with regard to the relevant government policies. These answers are now discussed.

7.2.1.1 Location choice: Comparison of survey and interview responses

* **Mainly tending to locate within STIPs in order to enjoy tax incentives**

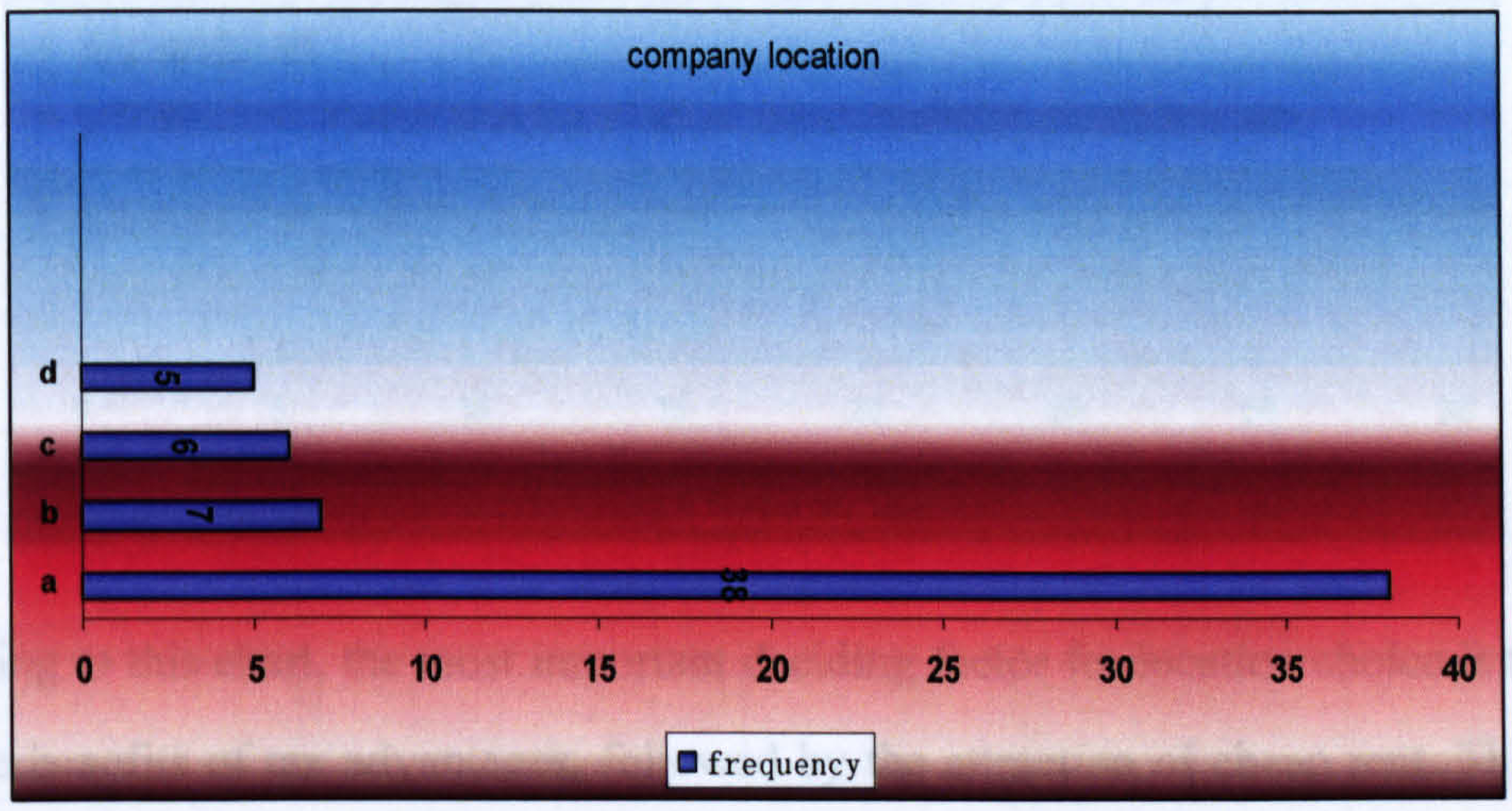
In Question Six of the questionnaire, the researcher assumed that respondents might prefer to locate within STIPs based on the theoretical contributions reviewed, such as the theories regarding 'clusters' and 'agglomeration'.

The four options in terms of where respondents located their companies are listed as follows:

a. in science park   b. near universities   c. near customers   d. other location

The results are displayed in Chart 7.2. It shows that the majority of respondents (38 of the 53) have located their businesses within science parks, while only seven located near universities and six located near customers.

Chart 7.2 Company location



These choices of location may reflect two things. First, that the cluster is advantageous and thus attracts the respondents to gather within science parks. Second, that due to personal contacts the majority of the questionnaires distributed for the research were issued in science parks. Furthermore, Question Seven was also asked in order to find out why the respondents had chosen their particular locations. The reasons given are listed below, and the responses are displayed in Chart 7.3.

a. because of the low rent

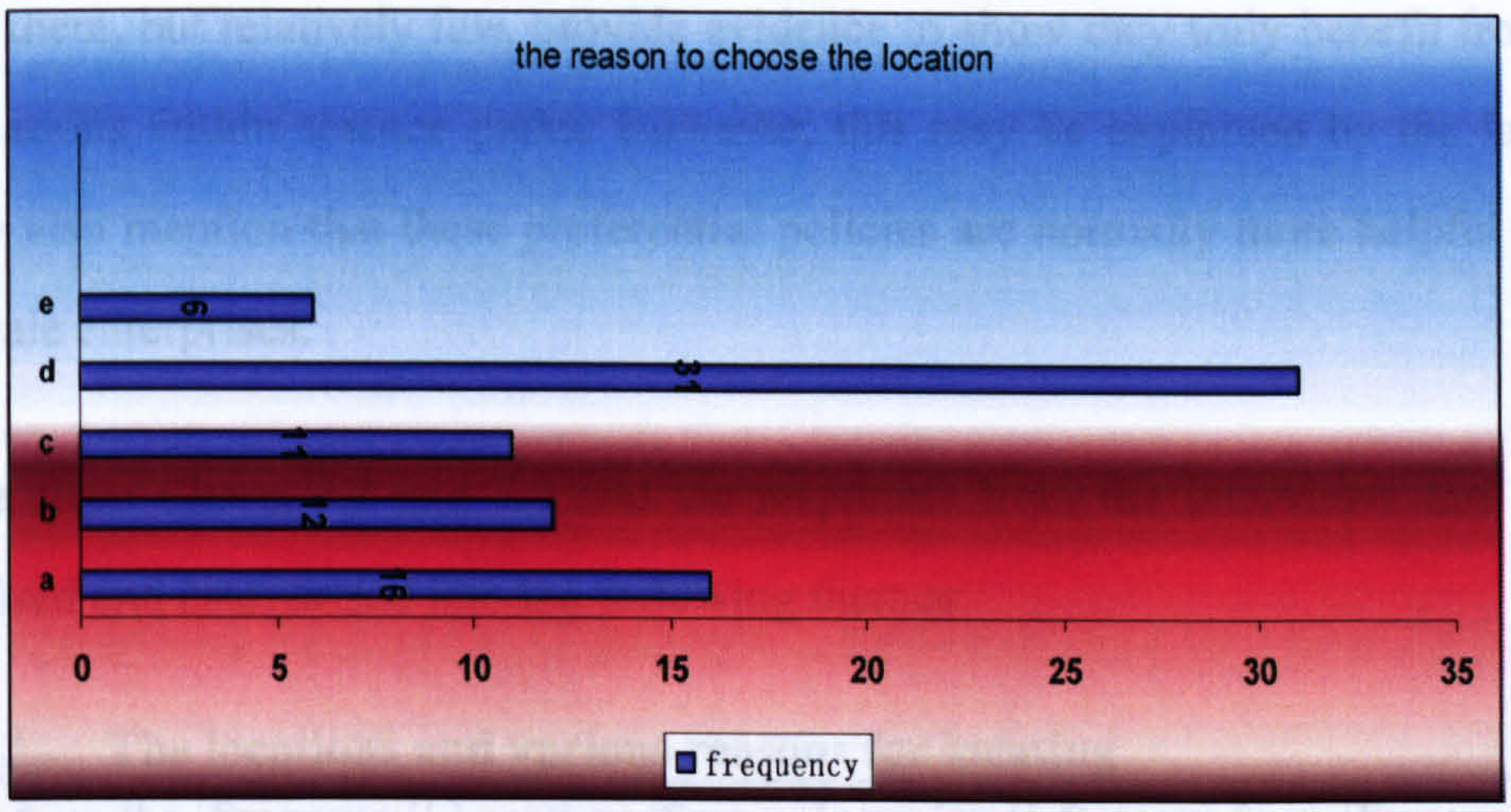
b. because of its proximity to software programmers based at the university

c. because it is near to my customers

d. because of tax advantages

e. other reasons

Chart 7.3 The reason to choose the location



According to this chart, the most important deciding factor for location choice is to reap the benefits of tax advantages, followed by the attraction of cheap rent. This shows that the respondents are very financial aware, possibly because their businesses are still largely in the early stages.

Referring to the discussions about technology transfer in the previous chapter, we can see that most respondents asserted that they rarely cooperated with universities. This is reflected in the fact that only 12 of the 53 respondents cited proximity to software programmers at universities as a deciding factor in their choice of location.

The results from the in-depth interviews presented in the previous chapter also show that another fairly important reason for the majority of them to locate within science parks was to utilise the Government's preferential policies. As explained previously, science parks have been built up as a vehicle to implement relevant preferential policies. Hence the start-ups located there are able to benefit from well-facilitated infrastructure, preferential tax policies, and cheap rent, etc. As small, new companies, they also think that locating within science parks may enhance their image (agglomeration externality). For some overseas returnees, the belief held is that science parks will provide a useful base from which they can build up networks. Regarding the preferential policies of funding and purchasing, some of them, but relatively few, provide evidence to show they truly benefit from their locations within science parks. However, this may be explained by the fact that they also mention that these preferential policies are normally more helpful to larger scale enterprises.

The data from Charts 7.2 and 7.3 and the responses from the interviews can be summarised and categorised into the following themes:

Table 7.3 The locations and various reasons for locating

Reasons from the survey	Frequency	Locations	Survey	Interviews	Reasons from the interviews	Frequency
Because of tax advantages	31	In STIPs	38	10	Tax incentives	7
Because of the low rent	16				Innovation atmosphere	3
Because of its proximity to software programmers based at the university	12				Low rent	3
					Agglomeration externalities	2
Because it is near to my customers	11	Near universities	7	5	Human resources	3
					Universities facilities	2
		Near clients	6	3	Good communication	2
					Convenient transport	1
other reasons	6	Others	5	5		

The outputs above demonstrate that actually the results from the interviews and survey are very consistent. They show that most of the respondents preferred to locate within STIPs, with the most commonly cited reason being to take advantage of tax incentives, which is one of the preferential policies offered by the Government within STIPs. It was evident from the responses of the officials interviewed that they also had confidence in the attraction of the other preferential policies delivered within STIPs and their effective implementation.

7.2.1.2 The officials' views regarding the effectiveness of relevant policies

<u>* Being confident with the relevant policies</u>

According to the officials interviewed, the Chinese government has made great efforts to promote software industry development by issuing preferential policies, including launching the TORCH programme and establishing STIPs to deliver the policies. They felt that there were some obvious achievements generated afterwards, such as the industrial development speed (which has increased) and the development of some large, distinguished software products. They were quite optimistic about the effectiveness of the government policies, because there has been a steady increase in the number of software enterprise locating within STIPs to benefit from the preferential policies. These policies include talent training, tax incentives, and investment and financing policies.

In terms of further improvement of the relevant policies, officials confirmed that the government made efforts to keep adjusting some policies to meet the international requirements, and recently the emphasis has turned to encouraging the outsourcing of services.

7.2.1.3 Comparison and Analysis

The various theoretical views regarding the functions of a cluster were summarised by Porter (1998b). He listed up the ways in which clusters broadly affect competition and create competitive advantage as follows:

- By increasing the productivity of companies based in the cluster;

- By driving the direction and pace of innovation, which underpins future productivity growth; and

- By stimulating the formation of new businesses, which expands and strengthens the cluster, forming a virtuous circle or positive feedback.

These theoretic contributions will be referred to in order to discuss the realities and views regarding the effectiveness of the cluster approach (when applied as STIPs) from entrepreneurs and officials as follows.

*** Similarities and differences**

Both the entrepreneurs and the officials emphasised the importance and attractiveness of STIPs for software enterprises. As the data collected shows, the majority of the interviewees and survey respondents chose locations within STIPs.

The perspectives of the officials interviewed appeared slightly different to those of the entrepreneurs regarding what benefits could be derived from their locations. For the entrepreneurs, even though most of them preferred to locate within STIPs, it was not generally felt that they could really benefit from many of the government policies applied within STIPs, except tax incentives. This was either because the policies were not practical, like the training policies, or because the size of their business was not sufficient to qualify for some policies.

Given the importance of the benefits derived from clusters (as previously explained), the cluster concept has inevitably started to attract attention from regional and industrial policymakers (OECD, 1999, 2001). Indeed, Langendijk and Cornford (2000) consider that it is through the 'successive translations' in industrial and regional policy that the concept has become a mobilising force.

As described in Chapter Two, and also stated by the officials during their interviews, since the Chinese government realised the important function of science and technology in this fast growing new economy, it has launched several programmes to rejuvenate the development of high technology. These included an approval of the establishment of several science parks at different levels (i.e.

provincial and city levels).

According to the official definition, a science park is managed by specialists whose primary goal is to increase the wealth of its community by promoting a culture of innovation, as well as enhancing the competitiveness of its companies and institutions based upon the knowledge associated with them or established by them.

This definition is consistent with the theoretical description regarding what the functions of a cluster are supposed to be. In order to accomplish these objectives, the Government expects that a science park must: stimulate and facilitate the transfer of knowledge and technology amongst universities, R&D institutions, companies and markets; make it easier to create, and foster the growth of, companies focused upon innovation by means of company incubators and spin-offs; and encourage the provision of other value-added services, including first-class spaces and facilities. That is why the relevant policies have been issued as explained by the officials. They also appeared quite confident about the effective implementation of those policies.

However, as previously stated, evidence collected from the survey and the interviews with the entrepreneurs demonstrated that generally their decision to locate within STIPs was based on attractions of tax incentives and cheaper rent. Some of them, especially those who came back from overseas, have expected to benefit from the agglomeration externalities which clusters or STIPs are supposed to have, but in practice they have found that this was not the case and consequently they appeared disappointed. Most of them elaborated that some government policies, like the policies regarding training and purchasing, were in fact not beneficial.

Consequently it can be concluded that STIPs in China, as one type of cluster, could stimulate the formation of new businesses. This shows the similarity between the theoretical and practical cases. As asserted by Porter (1998b), this stimulation could expand and strengthen the cluster, forming a virtuous circle or positive feedback.

However Porter also states (see Section 3.4.2.2) that a cluster is supposed to have two other functions: to increase the productivity of companies based in the cluster; and to drive the direction and pace of innovation, which underpins future productivity growth. Looking at the data collected, there is little evidence to support the existence of these two functions within Chinese STIPs. This shows the difference between the theoretical and practical cases. Discussions about technology transfer and innovation will provide more evidence to examine the practical reality of this issue.

7.2.2 The sources of human capital

<u>* Expansion of human resource availability</u>

As discussed in Chapter Two, human resources are a key asset for sustaining any economic and social development, especially skilled personnel for high-tech industries. As a result of efforts in education and training for many years, adult literacy in China had increased to 93.28% by 2000.

Research organisations and universities have increasingly become the human resources sourcing ground for software industries within China. The information from CSIA (2003) shows that around 71% of employees were from universities or research organisations, 17% came from various vocational training institutes or part time training programs, and the remaining 12% were students who had returned from overseas. In 2004 the statistics from CSIA also displayed the status of student enrolments with software subjects, and the relevant subjects from diploma students to PhD students, covering a total of around 1.86 million people. This large IT student body generates huge numbers of graduates each year.

* Source from the research organization and universities

In the questionnaire and interviews there was no question specifically designed to enquire where and how skilled staff are recruited, but some relevant information can be drawn from their responses to the questions regarding what specific benefits they expect to get from their location, what benefits they expect to have from cooperating with universities, and to what extent they can rely on their social networks to provide resources such as good staff.

Chart 7.3 (reasons for location choice) shows that the proximity to software programmers based at universities is the third most important reason for locating. The reason its frequency is not as high as others, such as the tax advantages, is because all STIPs provide the policy of tax incentives, but not all STIPs are near to or have universities within them. Therefore although most of the companies studied did choose to locate inside STIPs, not all of them are located near a university. Nevertheless the proximity to software programmers based at universities was still considered a comparatively important reason.

The following two pie charts give more precise information about the intentions of the interviewed entrepreneurs of continuing to work with universities and their reasons for this.

Chart 7.4 The intention of continuing work with universities or not

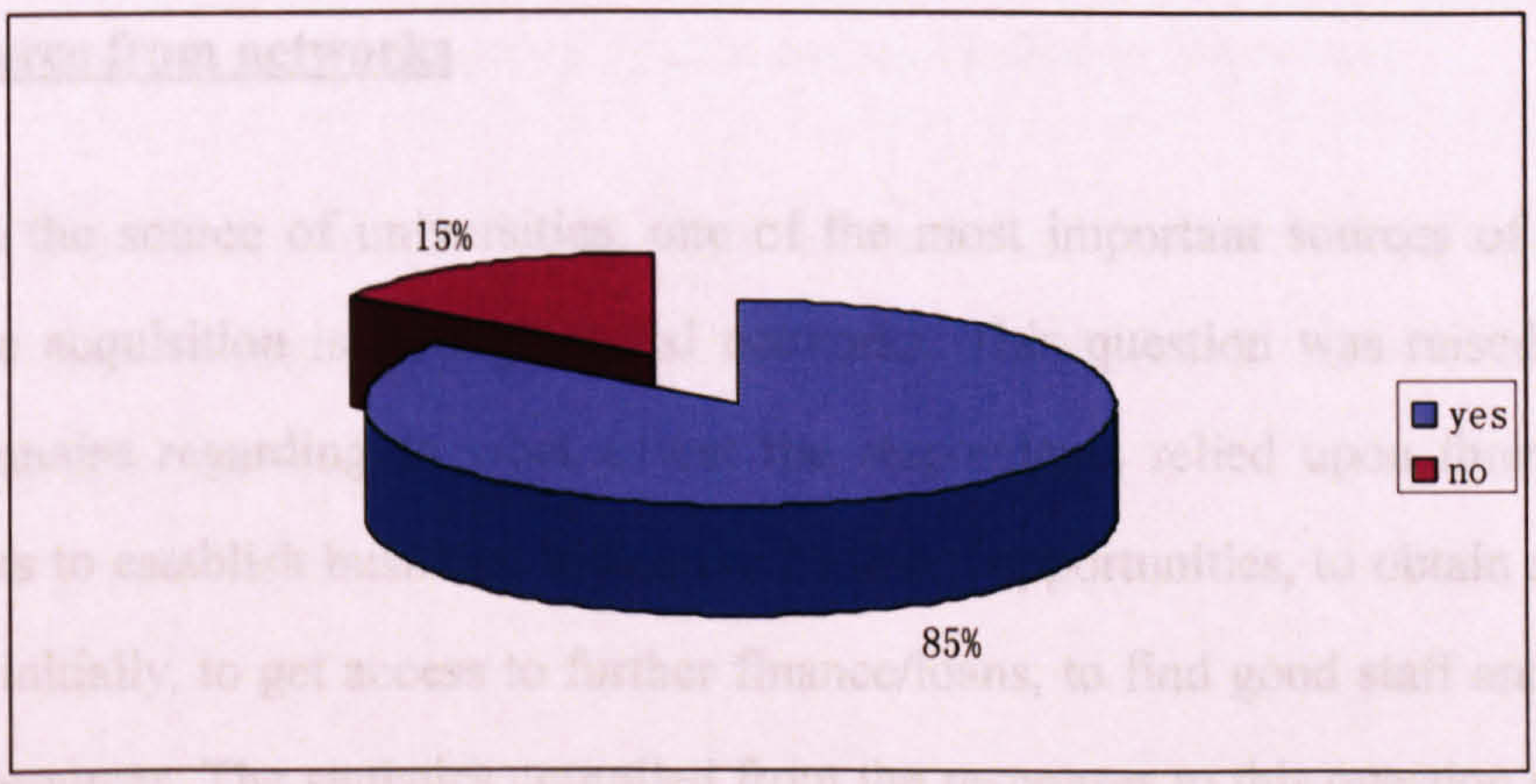
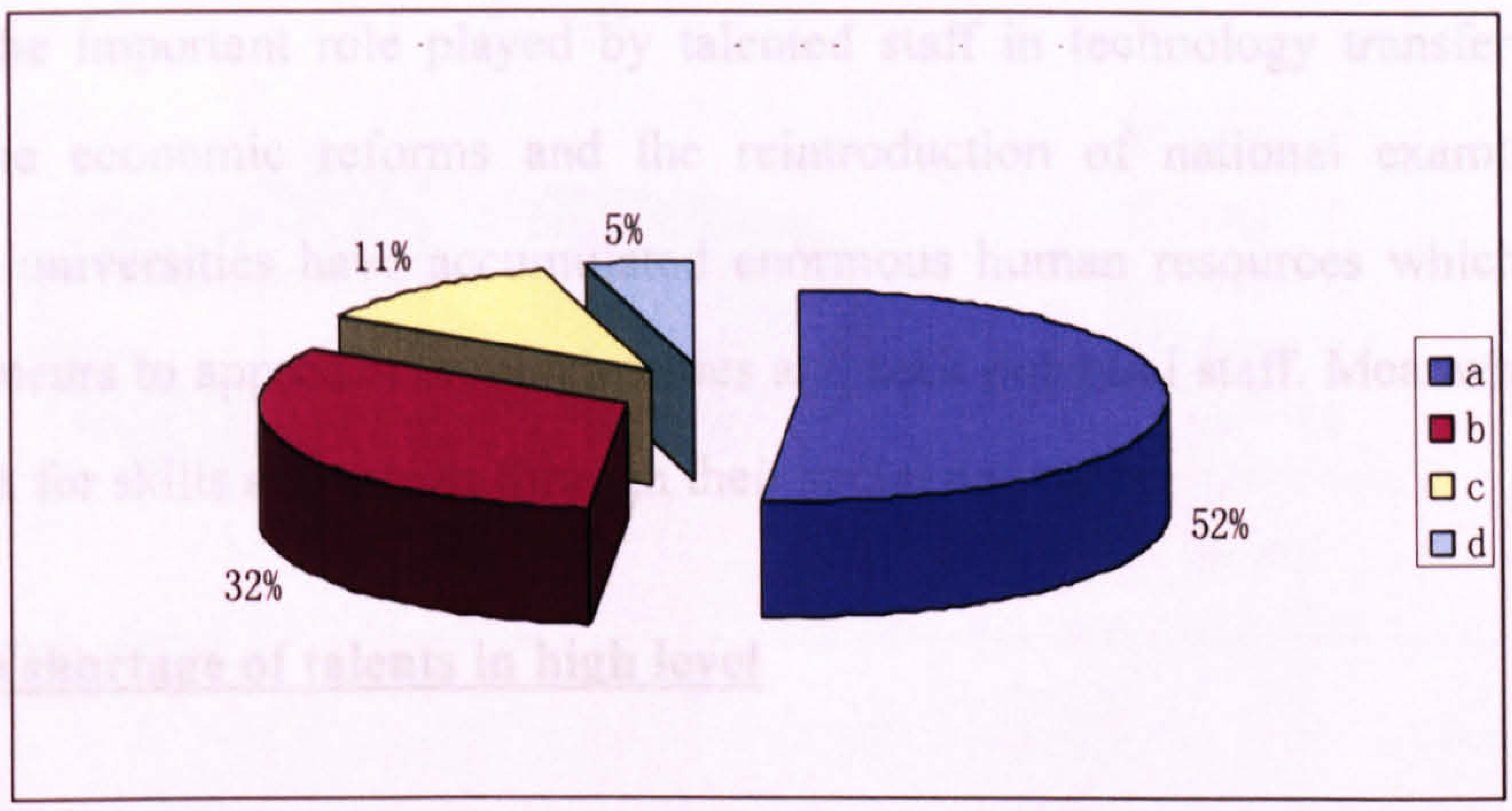


Chart 7.5 Reasons to work with a university



a. to have access to scientists/students as potential employees

b. to have them carry out R&D for the company (outsourcing)

c. to purchase their innovation

d. other reasons

Charts 7.4 and 7.5 demonstrate that 85% of the entrepreneurs interviewed would like to continue working with universities and that the main reason for this is their desire to have access to scientists and students as potential employees.

*** Source from networks**

Besides the source of universities, one of the most important sources of human resource acquisition is through social networks. This question was raised in the questionnaire regarding to what extent the respondents relied upon their social networks to establish business, to acquire business opportunities, to obtain start-up capital initially, to get access to further finance/loans, to find good staff and to get other resources. The statistics compiled from the responses to this question showed that social networks were only averagely rated in terms of importance for the acquisition of good staff, with a mean of just 2.74 in the 1-5 scoring system.

Generally speaking as software entrepreneurs, they are all fairly well-educated and realise the important role played by talented staff in technology transfer issues. Since the economic reforms and the reintroduction of national examinations, Chinese universities have accumulated enormous human resources which attract entrepreneurs to approach the universities and seek potential staff. Meanwhile they also look for skills and talents through their social networks.

*** The shortage of talents in high level**

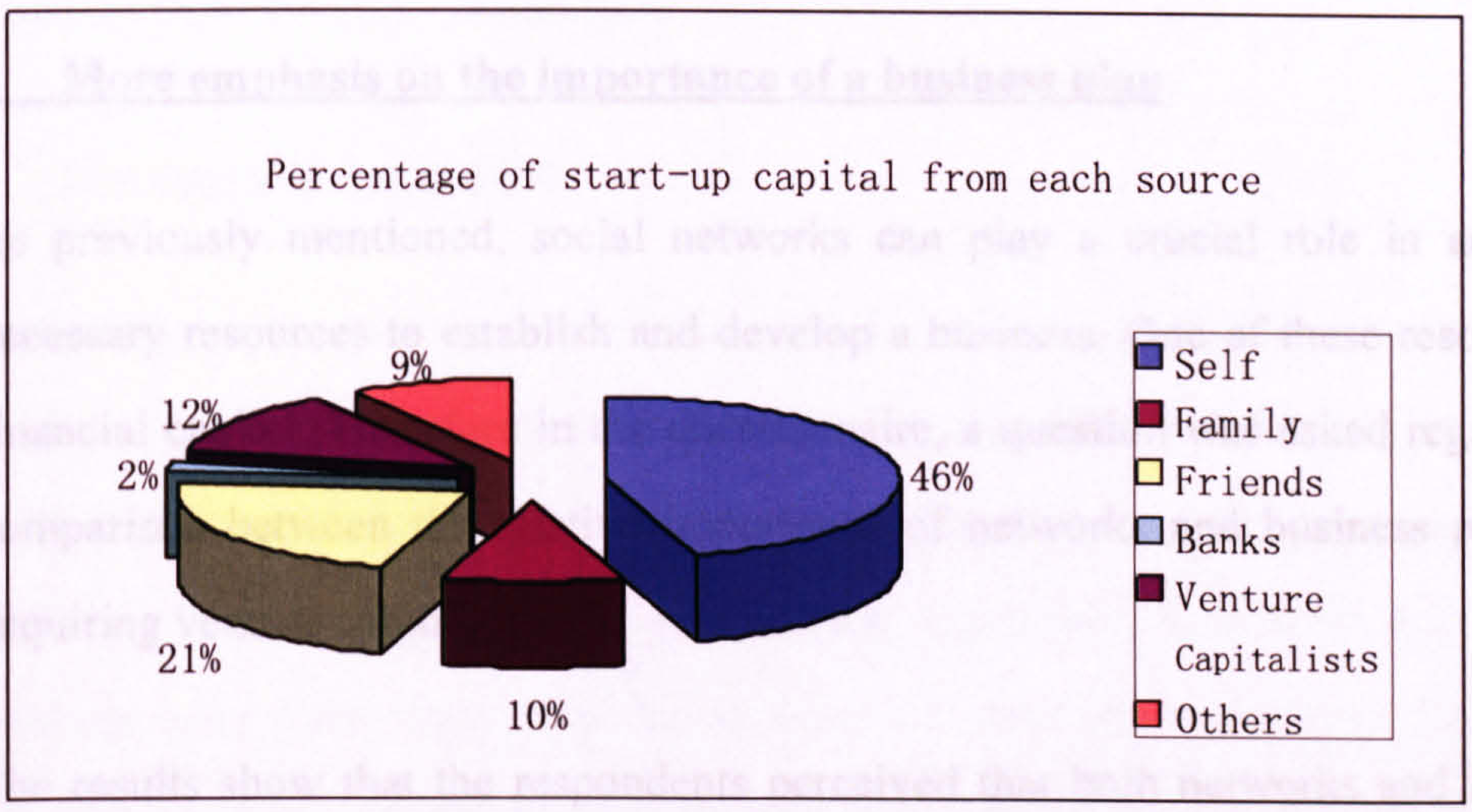
Nevertheless, as discussed in the Introduction to the Chinese software industry, a big concern for most software entrepreneurs is the shortage of highly skilled software professionals. This is because software programmes and departments in Chinese universities still place emphasis on traditional engineering fields rather then computer science. It brings a real shortage of high-level system architects, designers and project managers, which also limits the presence of Chinese firms in the international software outsourcing business. The Government has also identified this as a weakness and therefore made efforts to promote the outsourcing, as explained by the officials.

7.2.3 Issues regarding financing

7.2.3.1 The sources from survey against sources stated in interviews

Question Ten of the questionnaire enquired about the sources of start-up capital used by each entrepreneur. Chart 7.6 shows the different sources and their percentage contributions.

Chart 7.6 The breakdown of initial capital on average



*** Self financing as a main source**

From the above pie chart, we can see that only 2% of the initial capital used by the entrepreneurs who participated in the study came from banks. By contrast, their own investments into their projects amounted to 46% of the total. This can be accounted for by looking at the results of the interviews. Due to the nature of a high-tech company, generally the initial start-up does not require huge amounts of money. The founder can largely rely on the presence of advanced technologies, which can be transacted in lieu of shares under certain conditions. Additionally, since Chinese software companies were started in late 1990s and early 2000s, some of these individuals have financially benefited from the economic changes in China before starting software companies. Some of them, as overseas returnees, were able to accumulate financial resources as well as technology capabilities. Therefore with reasonable financial assets, they could take risks and finance their own companies.

7.2.3.2 The differences between networks and business plans for financing

<u>* More emphasis on the importance of a business plan</u>

As previously mentioned, social networks can play a crucial role in acquiring necessary resources to establish and develop a business. One of these resources is financial capital. Therefore in the questionnaire, a question was asked regarding a comparison between the relative importance of networks and business plans for acquiring venture capital.

The results show that the respondents perceived that both networks and business plans are quite important in obtaining venture capital, and are therefore not alternatives to each other but rather complementary aids. However a somewhat different answer appears when we look at the responses from the interviews for a similar question. Most of the interviewees presented idealistic attitudes to the importance of business plans in acquiring venture capital. This was emphasized even if they had not been supported by venture capitalists, with only very few of them recognising the importance of social networks. These are of course helpful in building up the 'trust' relationship with venture capitalists and solving the information asymmetry problem possibly brought by overstating the attractiveness of the proposition in the business plans.

Some explanation of this attitude was given in the qualitative analysis. It is possibly due to the fact that local venture capitalists have not yet matured enough, and few small software firms, except those with some overseas background, have had experience of getting financial support from venture capitalists. These companies may also not yet have developed to a stage where they would become attractive to venture capitalists, especially from overseas. Therefore they can only conjecture as to the successful means to acquire venture capital. The above pie chart also lends weight to this assumption as it shows that among the respondents' companies only 12% of the initial capital was acquired through venture capitalists.

7.2.3.3 Link with the policies regarding how to issue loans described by the bankers from the state owned bank

<u>* Having coherent results</u>

In the interviews with the two bankers, one from a state-owned bank and the other from a state-owned investment bank, several questions were asked regarding their loan policies and loan objectives, in particular for software enterprises. The analysis of the outcomes reveals that normally the state-owned banks operate their business very cautiously. In order to keep the risks at a low level they prefer providing loans to enterprises that are relatively large in size and having the ability to repay on tangible assets.

They stated that it was not common for them to issue loans to small or medium sized firms, and in particular software firms, due to the higher risks involved. The larger high-tech firms with promising futures tend to be treated more favourably though. This attitude reflects a popular phenomenon among state-owned banks for handling loan issues, especially when they are faced with firms from high-tech industries. The results of the interviews and survey coincide on this issue then, as shown in Chart 7.6 by the fact that only 2% of the initial capital was acquired from banks. This data is further compared in Table 7.4:

Table 7.4 The status of software firms' financing

Sources	Percentage	Importance of networks & business plans	Frequency	Description from banker (loan policies)
Self	46%	both social networks and business performance equally important	5	cautious loan principle especially to high-tech firms with fewer tangible assets
Friends	21%	social networks more important	2	the development of Chinese small software firms having gap with the international level
Venture capital	12%	business plan more important	8	
Family	10%	both not important	1	
Bank	2%	ambiguous view	2	due to small size they are less attractive to state-owned banks
Other	9%			

*** Facing the challenge of how to absorb financial capital properly**

The initial amount of funding that a small business has will have a significant impact on its success; small businesses that fail often cite inadequate capital as the reason for their failure (Van Auken and Carter, 1989). Small business success is also affected by the composition of this initial funding.

The primary sources of equity financing are personal savings, friends and family, private investors in the community, large corporations, venture capitalists and the sale of stock in public equity markets. For a small business owner, his/her primary business funding sources are the principal owner, trade creditors and commercial banks (Berger and Udell, 1998). These sources present a life cycle for small business funding that begins with all funding from the principal owner and then shifts toward funding from trade credit and bank loans as the firm grows and ages. The majority of loan programmes are offered in conjunction with a bank.

As stated in the Literature Review, MacMillan, Siegel and Subbanarasimha (1985a) suggested that venture capital should also be an important source of capital especially for technology-based firms. He categorised venture capitalists into different groups. For him the major one, about 40%, was that of the 'purposeful risk managers', so called because they try to ensure that various risks are well managed. While considering the nature and development status of small software firms, it seems they are hardly attractive to a majority of venture capitalists due to a poor management of their risks. This supposition is supported by the results of the survey and interviews.

Therefore all the evidence indicates that small sized software firms are generally financed their founders or their founders' friends. There is less support for companies on this scale and at this stage of development from venture capitalists and especially from banks. The evidence also implies that these small software entrepreneurs are seriously puzzled as to how to further finance their companies.

7.3 The entrepreneurial capabilities

7.3.1 Various business strengths against how to cope with the influences from the Government's policies

7.3.1.1 Various business strengths

In order to understand what the major strengths are for small and medium sized Chinese software companies, one must review the literature. In the survey the researcher listed the following strengths: staff working in the business; intellectual property; your brand; your financial resources; physical location; your networks; your technological capabilities. The responses were coded and entered into the computer and the quantitative analysis was carried out. Table 7.5 shows the relevant statistics.

Table 7.5 Descriptive Statistics

	No.	Minimum	Maximum	Mean	Std. Deviation
8a - your staff working in the business	53	1	5	2.38	1.547
8b - your intellectual property	53	1	5	2.91	1.779
8c - your brand	53	1	4	1.09	0.491
8d - your financial resources	53	1	5	1.23	0.800
8e - your physical location	53	1	4	1.19	0.681
8f - your networks	53	1	5	2.23	1.717
8g - your technological capabilities	53	1	5	4.23	1.409
Valid No. (listwise)	53				

As demonstrated in the quantitative analysis, owning intellectual property was considered quite an important strength in the running of a software business, reflected here in a mean of 2.91. For those who did not tick the very important score for this, as presumed previously, it is thought that they may have just started their companies hence they might start their software business by copying products or just providing services or in order to get quicker profit. This is perhaps thought of as a cut, so owning intellectual properties is not their business strength. During the interviews with the entrepreneurs, some of them actually proved this assumption.

Almost none of the respondents considered their brand identity as a business strength. This result could be interpreted as indicating that most of them are only small local software companies and have therefore not yet built up their brand. Only two respondents of the 53 chose scores of three and four, perhaps indicating that they may have larger businesses and therefore a stronger brand within the Chinese software industry. However, even though the samples were selected among a group of recent start-ups and small software companies, they should represent the potential developing trend in the Chinese software industry. They should be expected to be aware of branding and to have consciously built up a good business reputation for further development even when they were very small.

In terms of physical location the majority of respondents did not think that this supported their business much. Reasons for location choice compiled from previous evidence suggests that these companies are more concerned with cutting costs, benefitting from agglomeration externalities, having access to convenient transport and using human resources in universities, rather than working with universities for R&D or innovation.

Referring to the quantitative analysis of Question Eight of the questionnaire, we can see that 34 respondents (nearly 75%) thought that networks play very little role in the running of their business. However, by contrast to this, ten felt that networks played a very important role in the running of their businesses. Technological abilities were also rated very highly by the majority of respondents (37 of the 53). The majority of small software businesses start and are run by relying on their technological abilities instead of their networks, and for some of them, or especially for those companies whose businesses have developed to a certain level, it is important to attract and built up networks.

However as shown in the literature review, networks play a very important role in the identification of opportunities and organising businesses. As noted, 37 respondents ticked score five for the strength of technological capabilities, and the mean is consequently very high at 4.23. This represents the idea that technological capability is commonly considered as a very important factor or strength in running their businesses. In this context technological capabilities should be understood as copying and programming instead of innovating. This is because, as displayed in question 8b, quite a lot of respondents did not think owning intellectual property was an asset in running their businesses.

The relevant results from both survey and interviews with entrepreneurs are also listed in the following table.

Table 7.6 Various business strengths

Various strengths from survey	Mean	Various Strengths from interviews	Frequency
staff working in the business	2.38	hard working employees	4
intellectual property	2.91	high-tech products	6
Brand	1/09	advanced technology for niche market	3
financial resources	1.23	available financial support	1
Networks	1.19	good networks with clients	7
physical location	2.23	good team	1
technological capabilities	4.23	excellent R&D capabilities	6

Overall entrepreneurs normally have to rely greatly on their technological capabilities to run their business, because the running of software businesses means selling products involved with technology or providing some kind of technical service. Eventually intellectual property and staff working in the business appear as comparatively important strengths for the running of their businesses.

In contrast, it seems that they cannot rely heavily on some other factors like networks, financial resources and physical location to run their business. However, as reviewed in the literature, some scholars emphasised the importance of networks. This is because social networks facilitate the acquisition of each of these three elements: tacit knowledge, financial capital and human capital. Although they started with a certain level of technology and some skilled workers, the founders of firms still need to get technology updated and human resources well trained in order to compete and expand their business. Available social networks could bring the knowledge, financial capital and human resources required in order to update their technology. This process can be aided through the decision to locate within certain clusters, like STIPs, which are expected to help the enterprises find new and better means to compete due to better business links, knowledge spill-overs and innovation (Porter, 1990). However, most of the sampled entrepreneurs did not seem to be confident in their social networks and the extent to which they benefited from locating within STIPs in terms of technological capabilities and innovation.

7.3.1.2 How to cope with the influences from the relevant government policies

Today across the world, as well as in China, society is constantly changing. China's policymakers initiated market-oriented economic reforms in the 1980s in order to address the shortcomings of the nation's science and technology system. These shortcomings combined weak R&D, poor technical skills, a lack of efficiency, and an outdated focus on defence and other heavy technologies.

The software industry was identified by the government as a critical or "pillar" industry that was essential to economic progress and national security, hence deserving of government promotion, along with more established industries such as computer manufacturing, telecommunications, lasers, and aerospace engineering. This targeting reflects recognition that software remains a small and underdeveloped sector. It is an extremely fragmented industry that consists of thousands of small, undercapitalised firms with few competitive advantages relative to the foreign corporations that dominate the market.

Looking at Section 2.2 and the outcomes of the interviews with the two officials, we can categorise the new policy initiatives that were developed to enhance China's technological capabilities in this period as follows:

1) Exploiting the international environment by acquiring foreign technology, attracting foreign investment, and sending students abroad for training.

2) Promoting university-based research, which was barely existent in the pre-reform era, and encouraging closer ties between research and production through horizontal, market-mediated ties linking research institutes, universities, and enterprises. This included providing greater managerial autonomy to new high-tech enterprises without changing ownership.

3) Funding schemes and institutional innovations to improve the focus and coherence of R&D and technology diffusion efforts, including most famously the

"863" Plan, which allocated approximately five billion yuan between 1986 and 2000 to projects designed to monitor the world's high technology frontier, train a new generation of researchers, and advance Chinese capabilities in fields such as biotechnology, information technology, energy, robotics, new materials, space exploration, and lasers.

STIPs have also been established since 1995 across the country as main carriers to implement the Government's policies, promote high technology industrialisation and meet with international standards.

As reviewed previously (see Section 3.3.1), several scholars (Birley and Westhead, 1993; Gnyawali and Fogel, 1994) proposed that environmental factors could affect entrepreneurial activities in various ways. Smallbone and Welter (2001) used institutional theory and focused on the subjective perceptions of some SME owners to explore the inter-related effect of different types of business barriers. These are identified separately in previous studies that affect business operation, such as the tax issue, the general regulatory environment and so on.

Hence, in order to enhance China's technological capabilities and develop the software industry, a fertile environment has been deliberately nurtured by the Government by establishing some preferential policies. However do the preferential policies work effectively in the enterprises' initial stage and/or early growth stages? Under the theoretic guide, and with reference to the contents of the policies, several relevant factors were listed for rating in the questionnaire and further interviews were conducted to explore answers from the sampled software entrepreneurs.

The listed factors are: the preferential policies for high-end talents like tax incentives, as a package service; preferential policies for Science Parks, like tax incentives, package service as well; market entry policies for small enterprises like information security, e-government; government purchase policies and government training policies. In Chapter Five, the relevant results from the survey were analysed statistically (see Tables 5.23 & 5.24).

The relevant descriptive statistics show that all respondents answered the question regarding the influence of the government polices at both the initial and the developmental stages of software firms. As explained in the quantitative analysis the results obtained may indicate that for both stages the relevant government policies play similar roles, except certain policies like tax incentives which only play a role when companies have real sales. Hence the mean importance score is slightly lower for the initial stage than for the growth stage. The correlation between the two stages was 0.973 and it was significant at the 0.01 level. It can also be observed that during the interviews with the entrepreneurs, they emphasised that the government's policies play similar roles in both stages for them.

In order to explore the question in depth, the same question was raised during the interviews with the entrepreneurs. The outcomes were analysed qualitatively, which actually explains to what extent each policy affected each of the interviewees.

Table 7.7 Various benefits from the Government's preferential policies for business development

Views from officials	Views from entrepreneurs in interviews	Frequency
great efforts made by government to promote the software industry development through establishing STIPs as major vehicles to deliver preferential policies	government policy brings no benefit at all	
	business development not reliant on government policies	2
	technology more important	1
	policymakers not familiar with the relevant field	2
	benefit from tax incentives	6
the obvious achievement generated because of the effectiveness of the policies such as:	benefit from locating within STIP	3
	benefit from some government funds	
talent training	funds for national projects	1
tax incentives	fund for small & medium sized companies	3
investment and financing policies	no benefit from training programmes fund for small & medium sized companies	7
	no benefit from purchasing policy	6

Generally the entrepreneurs interviewed seemed to have quite similar views to the respondents in the survey. Although it is worth noting that very few entrepreneurs explicitly stated that governmental policies did not play a role at all. Above all it seems that technology is most important for a software company.

As analysed previously, six of them (which represents a relatively large proportion of the interviewees) could surely benefit from the relevant policies like tax incentives and incentives for high-end talents within STIPs. However, most criticised the policies like training programmes and purchasing, as mentioned in the previous section. Very few touched on the topic of industrial entry and the only entrepreneur who did mention this policy held a negative attitude towards it.

It seems that there is more evidence to suggest that the entrepreneurs' views did not support the officials' views towards the efficiency of the relevant government preferential policies.

One of the entrepreneurs interviewed, Mr. Lu, suggested that the problem with the Government's policies may be that the relevant policymakers do not have the ability to make practical policies because they are either lacking relevant knowledge or are reluctant to carry out market research to catch up with the fast changing nature of the software industry.

To sum up: the government policies, especially within STIPs, can help the development of small software firms to some extent by being receptive to new ventures, reducing the costs and therefore possibly fostering a better competitive edge for new companies by helping them to lower their prices. However there seems no real help on enhancing their innovative capabilities and having a better financial situation for more R&D input through getting the government contracts due to the relevant policies, like training, being impractical and purchasing biasing more towards large sized companies. Thus the evidence collected does not suggest a vast advantage offered by STIPs in China. STIPs in fact act as a kind of cluster and thus fulfil some of the functions previously categorized by Porter (1998b):

- Increasing the productivity of companies based in the cluster;

- Driving the direction and pace of innovation which underpins future productivity growth.

7.3.1.3 The various target rivals and how to compete with them

In the survey (Questions 20 & 21), the researcher enquired as to what sorts of competition the studied firms faced and how they approached this rivalry. This topic was also covered in the interviews and the results are compared below in Table 7.8.

Table 7.8 The target rivals and how to compete with them

Various rivals (results from the survey)	Percentage of rivals this size
Small & medium sized firms	52%
Chinese SOEs	32%
MNCs	11%
Other	5%

Method of Competition (results from the survey)	Ratio of Competition Tactics Used
Technology	26%
Service	28%
Price	17%
Variety of products	13%
Value added	8%
Guanxi	4%
Other strategies	4%

Various rivals and how to compete (results from the interviews)	Frequency
Small & medium sized firms	
Good service & staff	3
Close relation with clients	1
Advanced technology	1
Chinese SOEs	
More flexible	1
Staff work harder	2
Closer to clients	1
MNCs	
Better price	3
Closer with to clients with same culture	2
Rivals not clarified by interviewees	
Advanced technology	4
Value-added service	2
Choosing a purely new market	1
Good networks	2

The outputs above show that entrepreneurs from the survey and interviews explicitly clarified that they mainly competed with other small and medium sized software firms, Chinese SOEs and MNCs. 52% of the entrepreneurs from the survey competed with other small and medium sized software firms, which is a relatively large proportion. However there is no obvious bias regarding what type of companies the interviewees competed with. This is possibly because entrepreneurs selected from the survey for interviews were developed only to a certain stage and the respondents in the survey included more small sized firms. However, in terms of how to compete with rivals, the entrepreneurs from both the survey and interviews admitted that generally speaking they were confident with their service, technology and price. Further the results from interviews explained that normally when they competed with small and medium sized firms, they were good at providing better services; when they competed with SOEs, they had staff working harder and by implication a better service. In addition being able to provide better prices made them confident to compete with MNCs.

7.3.2 Issues relevant to technology transfer

7.3.2.1 The status of technology transfer

The previous sections summarised decision making about location and relocation, recruiting talent, business strengths and the possible influence of government policies. Besides these topics, the data from the survey and the interviews with the entrepreneurs also covered how some factors could affect their actual innovative activities such as transferring technology from universities. As stated in the Literature Review some scholars consider that the effective transfer of technology is directly related to some of these factors (see Section 3.6.1). Therefore the relevant question was constructed accordingly and asked in the survey and interviews with entrepreneurs. The views of the officials were also taken into account. The outcomes are shown in Table 7.9.

Table 7.9 The different impact given by various factors on technology transfer from Chinese universities

Views from respondents in the survey	Mean	Views from entrepreneurs interviewed	Frequency	Views from officials
Constraining factors		The universities' bureaucracy		If the enterprises take the principal parts of a project, the successful ratio is comparatively higher.
Lack of entrepreneurial capability of innovation	3.00	Constrain	3	
		Avoided	1	
Lack of internationally competitive innovation	2.81	Not bureaucratic	1	
University	2.70	The Government's		

bureaucracy		policies		
Lack of IPR protection	3.19	Little influence	2	The academic bias of national science institutional mechanism constraint the technology transfer in certain extent.
Inadequate venture capital	3.09	Impetus	7	
Lack of human resources with relevant skills	2.94	Lack of IPR protection (constraint)	2	
		Available human resources (impetus)	9	
Government policies	2.60	Lack of VC (constraint)	5	
Others	2.33	Innovative capabilities (impetus)	5	
Impetus factors		Entrepreneurial environment within university (impetus)	2	
Entrepreneurial culture within universities	2.94			
Availability of business advice for science park/University based start-ups	2.72	Academic bias in university (constraint)	4	
		Networks in campus (impetus)	2	The limitation of funds only supports in the lab and can not cover the further expenditure.
University networks	3.11	Services provided by counseling firms		
inancial and legal advisor	2.60	Impetus	2	
Government policies	3.19	Helpless	5	
Competition	3.40	No cooperation	7	
Human resources with relevant skills	3.50			
Others	2.60			

1) Views regarding impact on technology transfer, from entrepreneurs' perspectives

The results from the survey regarding the relevant factors bringing impetus or constraint were analysed in a descriptive way (see Section 5.1.4), and the outputs explained the exact extent to which each factor could affect their technology transfer. The data in Table 7.9 shows that generally speaking the most common constraint factors noted by the respondents from the survey were lack of IPR protection, lack of adequate venture capital and lack of entrepreneurial capabilities for innovation. The key impetus factors for technology transfer mentioned were staff with relevant skills, competition and governmental policies. The in-depth interviews gave further explanation of how these factors have an impact on technology transfer from universities and these results appear fairly consistent with those of the survey.

The data collected shows that the results from the survey, and from some entrepreneurs from the interviews, that some factors were considered very important for technology transfer, such as available human resources (nine of the 17 mentioned this in interviews). Five of the interviewees considered that a lack of adequate venture capital placed a serious constraint on their technology transfer and also that further innovative capabilities would provide a great impetus for them.

Many entrepreneurs from the interviews appreciated efforts made by the Government to encourage technology transfer (seven of them), nevertheless, according to two of them, technology transfer for each company happened at micro level while efforts from the Government are usually focused at macro level. This implies that the Government's policies would not be particularly useful to them on this issue.

To sum up, the results from the survey show that lack of IPR protection had the highest mean as a constraint factor. However there were only two entrepreneurs during the interviewing that shared this view. This might be because the majority of entrepreneurs interviewed regarded it as a sensitive topic and avoided discussing face to face on this topic. This is also reflected in the officials' ambiguous attitude towards IPR protection.

In terms of other factors like entrepreneurial environment, networks in universities, academic bias and the universities' bureaucracy, some entrepreneurs stated their views as shown in the table above, but relatively speaking there were fewer entrepreneurs who mentioned such factors.

There was a conflict of views regarding the universities' bureaucracy. Three of the interviewees stated that technology transfer could be affected negatively by the universities' bureaucracy, one suggested that it was possible to avoid the bureaucracy by dealing directly with scientists/students and one entrepreneur did not think there was any bureaucracy at all.

These views are perhaps held because cooperating with universities for technology transfer has not been that successful for some of the interviewees, and they therefore seemed less enthusiastic to transfer technology directly from universities. On the other hand, however, there were some interviewees who owned products successfully transferred from universities and based on this started their software businesses, such as Gong Hai, Liu Xuezeng. As demonstrated in Chart 7.5, the most significant reason for the respondents to cooperate with universities is to seek skilled workers as potential employees and to be able to outsource for staff. However, there was a relatively high number of entrepreneurs from interviews (seven) explicitly showing no cooperation with local universities for transferring technology. Ultimately the current situation of technology transfer for small and medium sized software firms can be concluded as follows:

<u>* Less enthusiasm for cooperating with local universities for technology transfer</u>

2) Views regarding the technology transfer issue from officials

As said before, Mr. Xu, one of the officials, who is from the software department of MOST, was one of the interviewees who gave a response on this issue. According to him, there is a tendency to academic bias within the national science institutional mechanism, and financial constraints as well. Therefore, the rate of success for technology transfer from universities has tended to be quite low, especially when universities have taken the principal roles in the projects. Therefore his views towards the status of technology transfer in China could be summarised as:

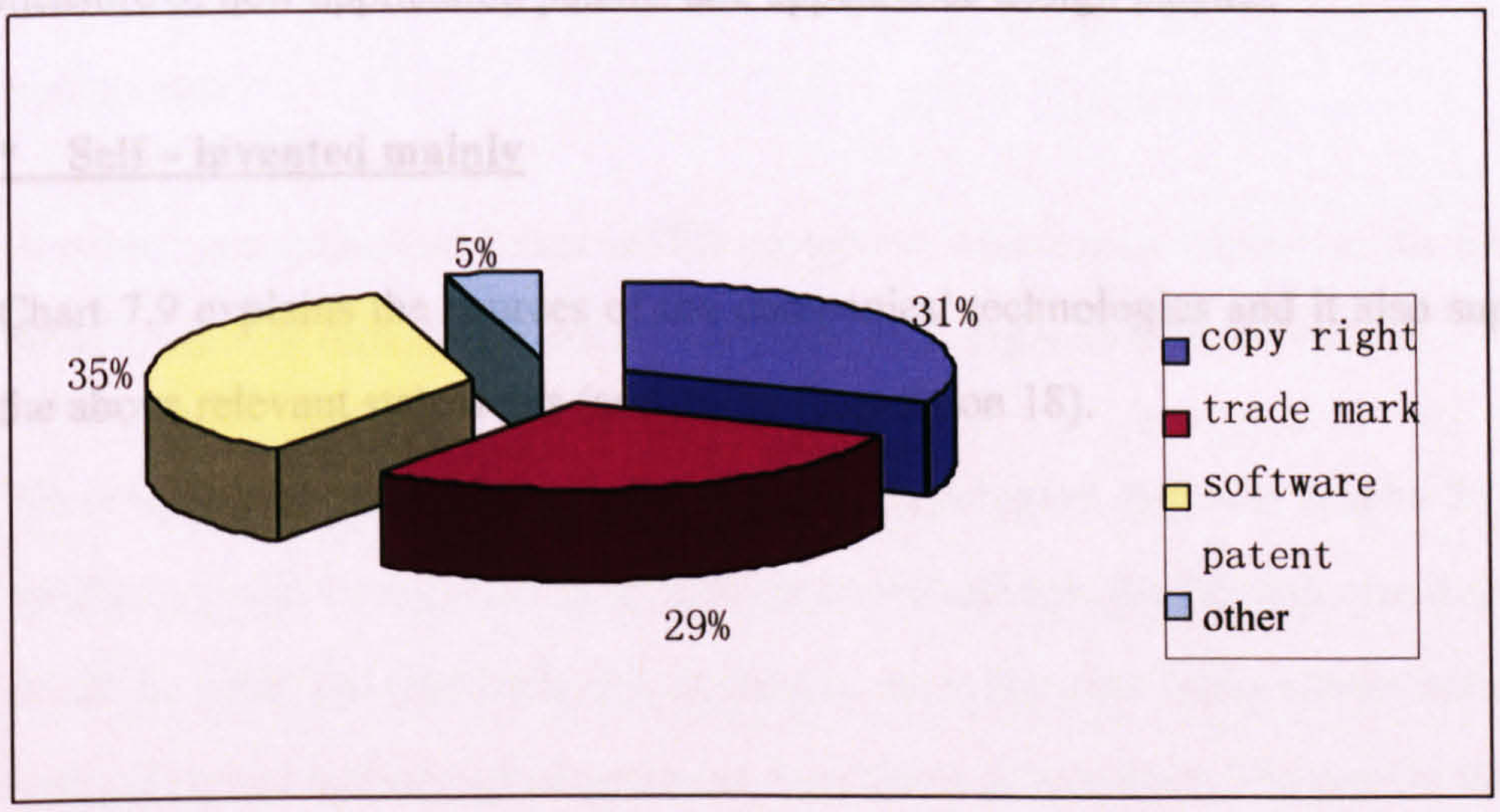
*** Rate of success is dependent on who takes the principle part**

7.3.2.2 The technologies and resources owned by the firms (results from survey)

Chart 7.7, below, displays what sorts of intellectual property the companies own as average percentages based on data collected from Question 15 of the survey.

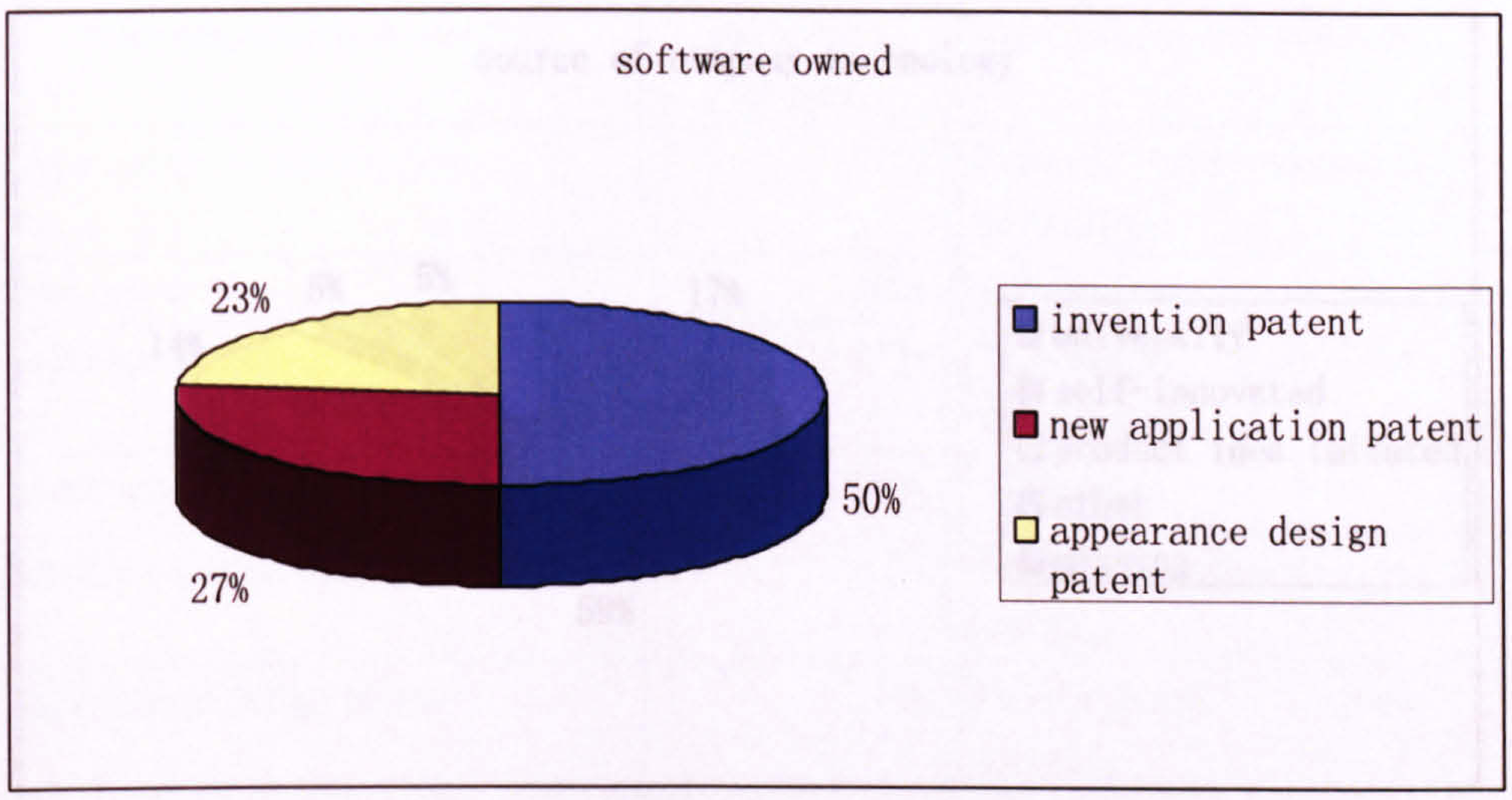
*** Patents occupy relatively larger percentage**

Chart 7.7 Intellectual property owned by the companies



The above output demonstrates that the type of IPR most commonly owned among the respondents is software patents (35% of all IPR owned). This category is further divided into invention patents, new application patents and appearance design patents. The specific breakdown of these categories is shown in Chart 7.8.

Chart 7.8 Various software patents

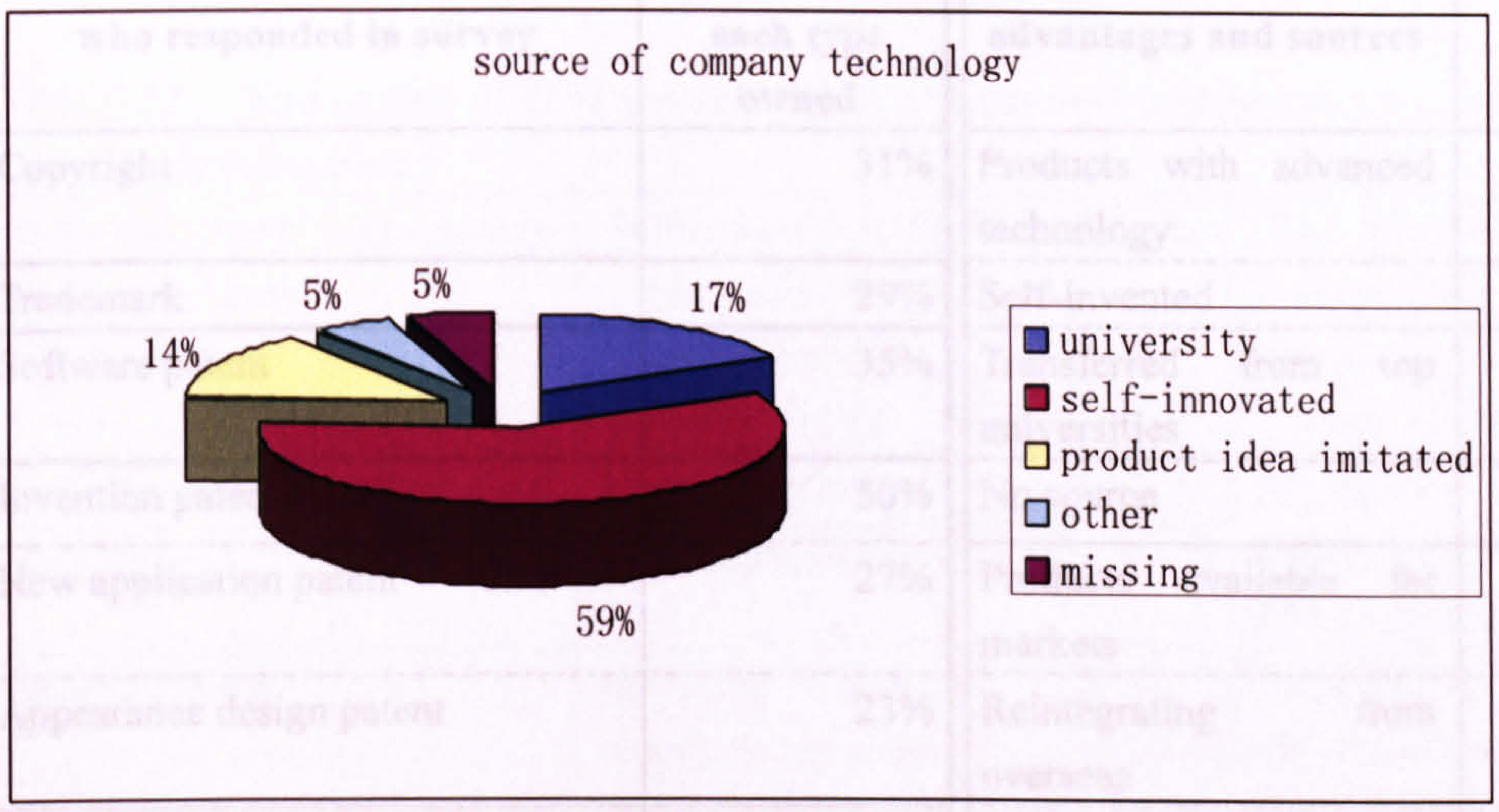


The pie chart above shows that, among the software patents owned by respondents, half of them are invention patents. The other half are made up, in roughly equal measure of new application patents and appearance design patents.

*** <u>Self – invented mainly</u>**

Chart 7.9 explains the sources of the companies' technologies and it also supports the above relevant statements (according to question 18).

Chart 7.9 Source of company technology



The data shown in Chart 7.9 seems to support the view that there is a low efficiency in technology transfer from universities. The vast majority (59%) of technology is self-innovated by the companies with only 17% coming from universities.

Another very important factor is IPR protection which may impact on the business development of technology-based firms and their capacity for innovation.

The results shown in Chart 7.9 can also be compared with the results from the interviews with entrepreneurs in relation to technological advantages and sources. It can be observed that both sets of results show that few interviewees stated that their advanced technological products were from universities. The results from the survey and interviews are compared below:

Table 7.10 The technological factors benefiting business development and their sources

IPR owned by the entrepreneurs who responded in survey	Percentage of each type owned	The technological advantages and sources	Frequency
Copyright	31%	Products with advanced technology	
Trademark	29%	Self-invented	3
Software patent	35%	Transferred from top universities	2
Invention patent	50%	No source	2
New application patent	27%	Products available for markets	
Appearance design patent	23%	Reintegrating from overseas	5
Other	5%	Imitating & improving existing ones	1
Source of technology from survey	**Percentage**	No source	1
Self – innovated	59%	Good and suitable services	
University	17%	Good and suitable services	4
Product ideas imitated	14%	Having abilities to adjust	1
Other	5%	Strong tech. team	2
Missing	5%		

In the interviews only one entrepreneur mentioned that his advanced technology was transferred from a university. Therefore combining this fact with the data already examined in Chart 7.9 we can see that <u>the evidence supports the view that the entrepreneurs were less enthusiastic to transfer technology from local universities.</u>

7.3.2.3 The issues relating to IPR protection

This topic was probed in the interviews and the researcher enquired what the interviewees thought about the intellectual property protection measures currently in place in China. The researcher also put forward the question as to whether their business development and expansion would be affected by these measures or not. The responses from both entrepreneurs and officials are displayed in Table 7.11.

Table 7.11 The status of IPR protection in China and any impact on their business development

Status described by entrepreneurs interviewed	Frequency	Influence from the perspectives of entrepreneurs interviewed	Frequency	The relevant issues regarding IPR protection from the view of officials
Not well protected	5	Negative influence	3	Ambiguous view about the status of IPR protection
		Little negative influence		
Ambiguous view	4	providing service mainly & not copied easily	2	Emphasising the efforts made by the Government to protect IPR
		Products well designed & rarely copied	5	
Well protected	1	Positive influence		The importance of implementing IPR protection by judicature authority and each firm
		Help to enhance the level of companies' awareness	1	

* Little confidence in IPR protection but issue avoided by entrepreneurs

The results confirm that efforts made by the Chinese government to protect intellectual properties have improved. Further the importance of IPR protection, especially for a technology-based company, was also recognised.

Most of the businesses studied were started with a certain volume of IPR which was used to facilitate ongoing innovation by granting inventors a temporary monopoly in return for disclosure of technical know-how. However some ambiguous attitudes were also observed regarding whether business development could be affected negatively by the lack of IPR protection in China. As stated in the qualitative analysis, quite a few interviewees did not think their businesses were seriously affected by the lack of IPR protection, despite the current poor status of IPR protection in China.

The explanation for this could be that they avoid piracy by adjusting their business to be more service-oriented rather than product-oriented. A service-oriented business is seen to be more relevant with the staff's working attitudes, flexible capabilities and further products would not be easily imitated.

More interesting views could be drawn from the vast nature of Chinese geography which would mean that the pirates need not be situated close to their businesses. Some interviewees even considered that pirates could alternatively help inventor companies by diffusing their names and thereby promoting the company's status.

<u>* Very ambiguous views from officials</u>

A similarly ambiguous view was displayed by Director Xu regarding IPR protection. He stated that the Government have made a great effort in the protection of IPR, and emphasised that the protection of IPR really should be implemented at different levels, such as the judicature authority and the protective conscious of each firm.

7.3.3 The entrepreneurs' various future planning

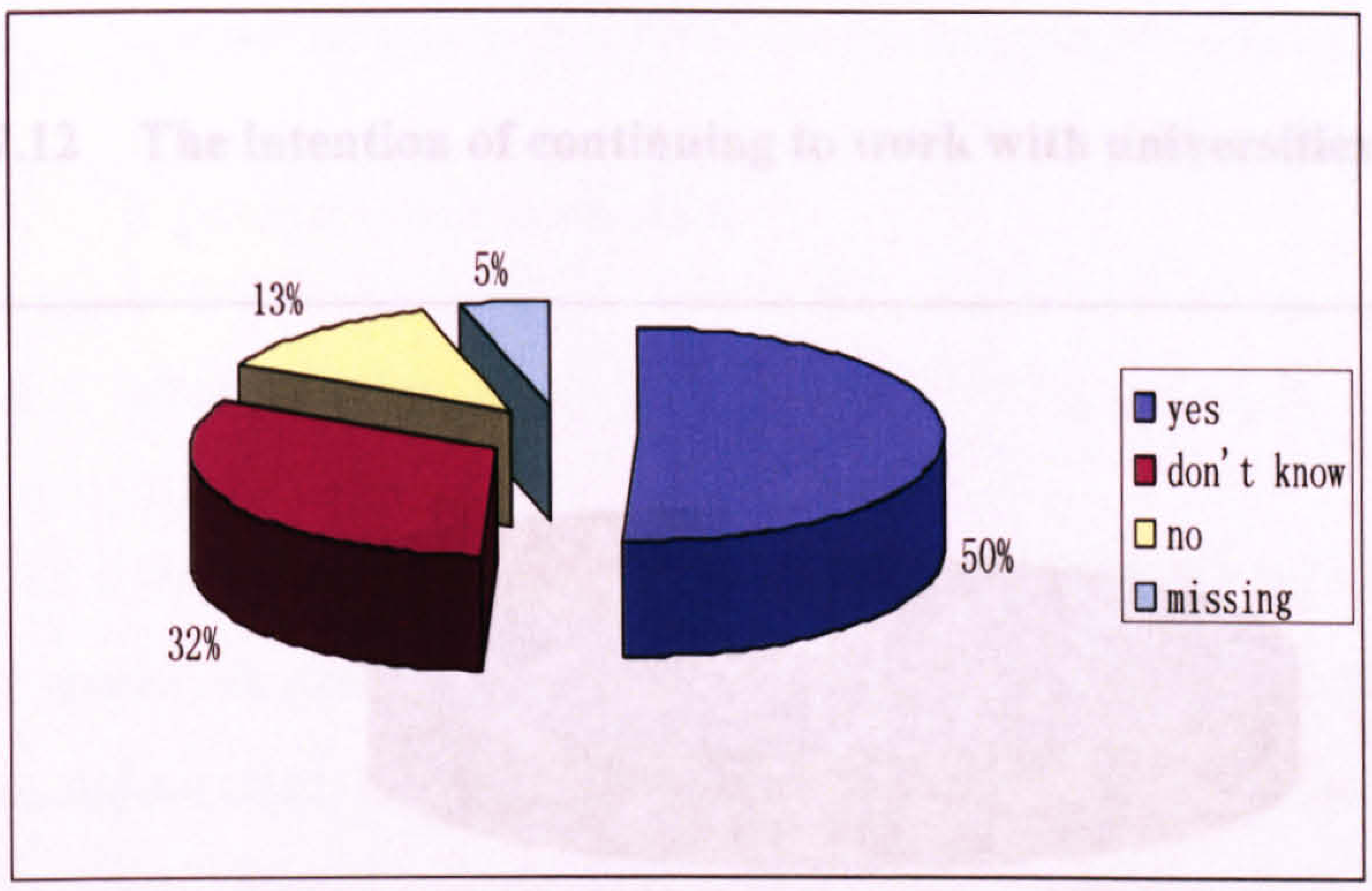
7.3.3.1 How to better compete with rivals or strengthen their firms in various aspects

As stated previously many scholars have made a large number of contributions to entrepreneurship research from the discipline of management study. They have generated two basic approaches to describe how entrepreneurs manage their entrepreneurial process, which are the deliberate and the emergent approaches (see Chapter 3, Section 3.3). Many scholars tend to advocate that entrepreneurs have more of a bias to the emergent approach. However the empirical literature also supports the value of planning to the organising process (Aldrich and Baker, 2001). Several studies have shown that inadequate pre-start-up and post-start-up planning by entrepreneurs hinders the acquisition of the necessary resources (Trow, 1961; Woodruff and Alexander, 1958), and that planning enhances the development and performance of start-ups after founding (Van de Ven, Hudson and Schroeder, 1984). This is despite the fact that Jenkins (1997) thought many entrepreneurs would respond flexibly to new opportunities as they come along rather than plan for a particular future.

Several questions in the survey and interviews with entrepreneurs were dedicated to this topic, focussing on future choices of location, or relocation, and cooperation with universities and the reasons behind these choices. The relevant outcomes (from Question 26) were computerised and the following charts display the information in detail. The analysis of what the interviewees talked about regarding this issue also provides supplementary standpoints. Overall, the outputs reflect character in terms of how respondents would plan to better compete with their targeted rivals. The respondents realised that human capital is a very important factor in improving their competition with rivals, and this is why

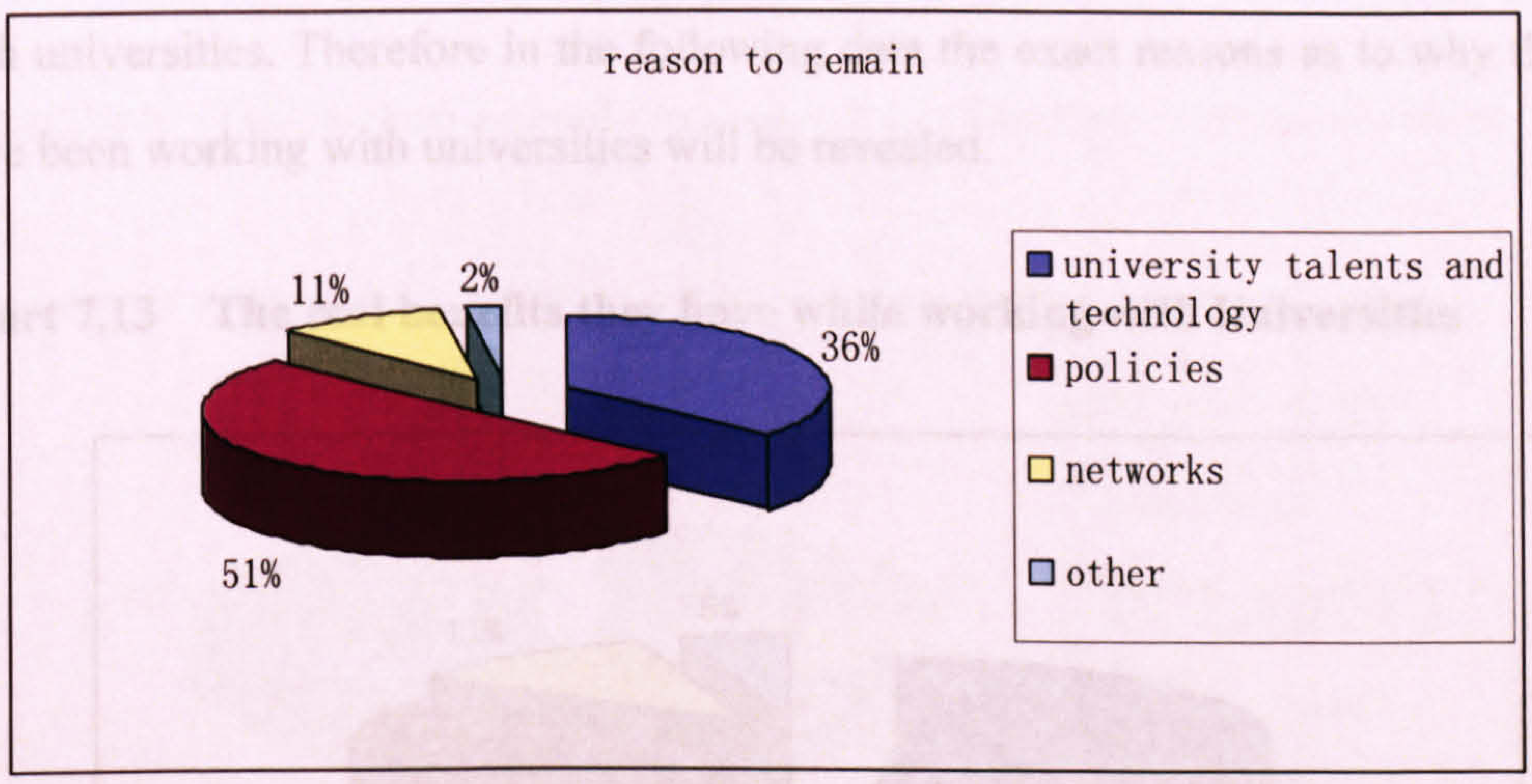
*** Decisions about locating and cooperating with universities are based on concerns regarding human capital**

Chart 7.10 The rate of continuing to locate within STIPs



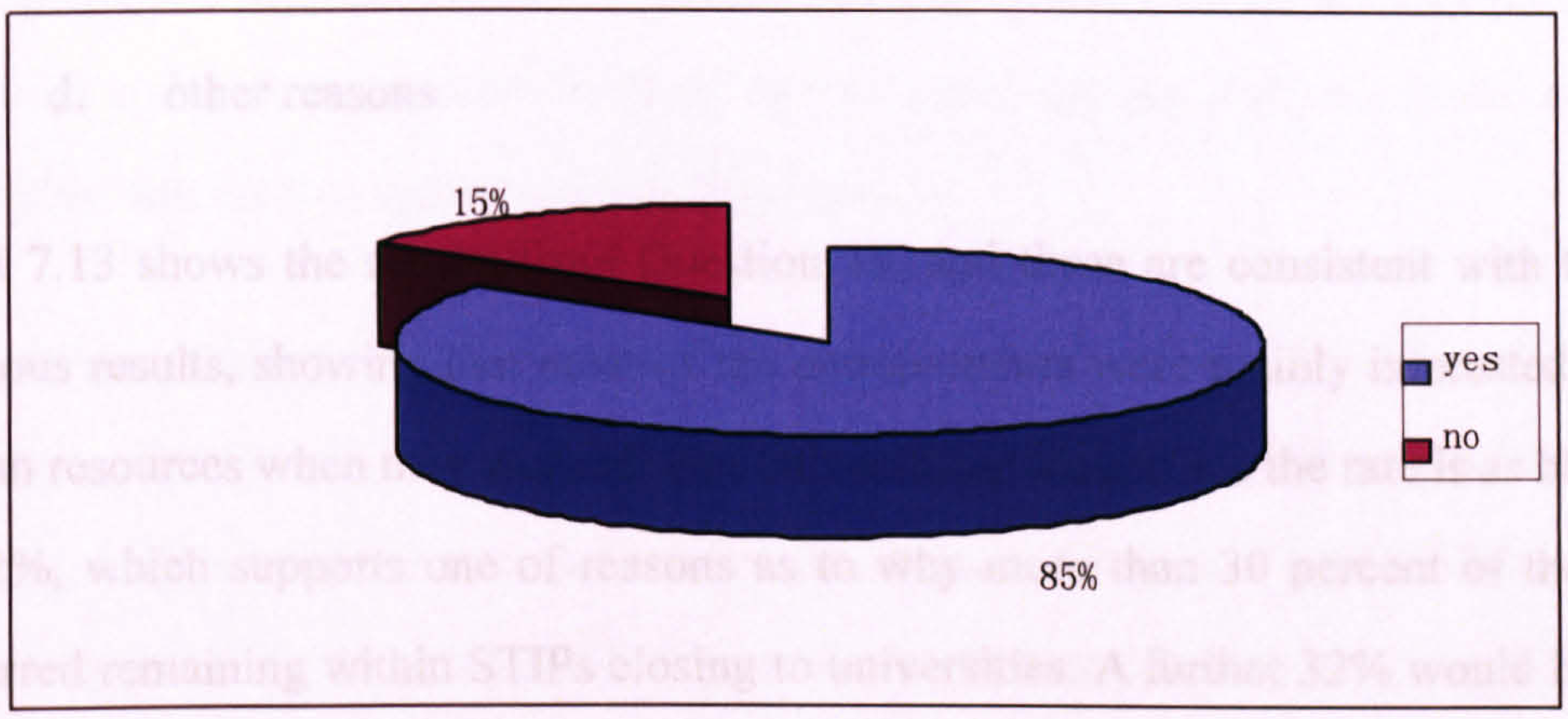
In terms of future location, the pie chart above shows that about half the respondents would like maintain their offices within STIPs, about 32% of respondents were unsure, and 13% would like to move away from STIPs.

Chart 7.11 The reasons of remaining within STIP



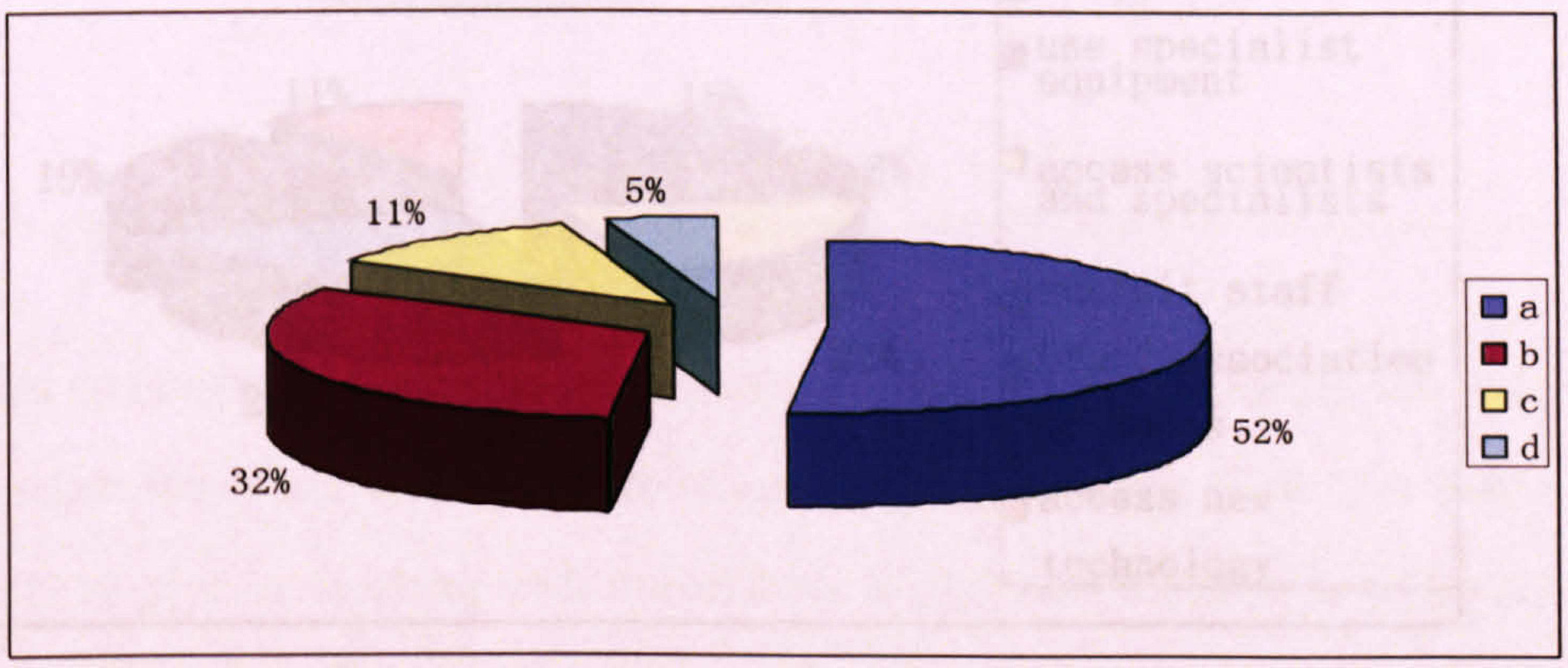
According to the Chart 7.11 (showing outcomes from Question 27 of the survey), the Government's policies are the dominant reason keeping the respondents within STIPs; they can cut their costs by benefiting from some of the preferential policies. Some science parks are also very close to universities, or even within universities, and this is another important way for companies to be able to utilise universities' talents.

Chart 7.12 The intention of continuing to work with universities or not



The pie chart above (results from Question 23 of the questionnaire) shows that most of them, 85%, would still like to work with universities. This does not completely coincide with the argument that businesses were reluctant to cooperate with universities. Therefore in the following data the exact reasons as to why they have been working with universities will be revealed.

Chart 7.13 The real benefits they have while working with Universities



a. to have access to scientists/students as potential employees

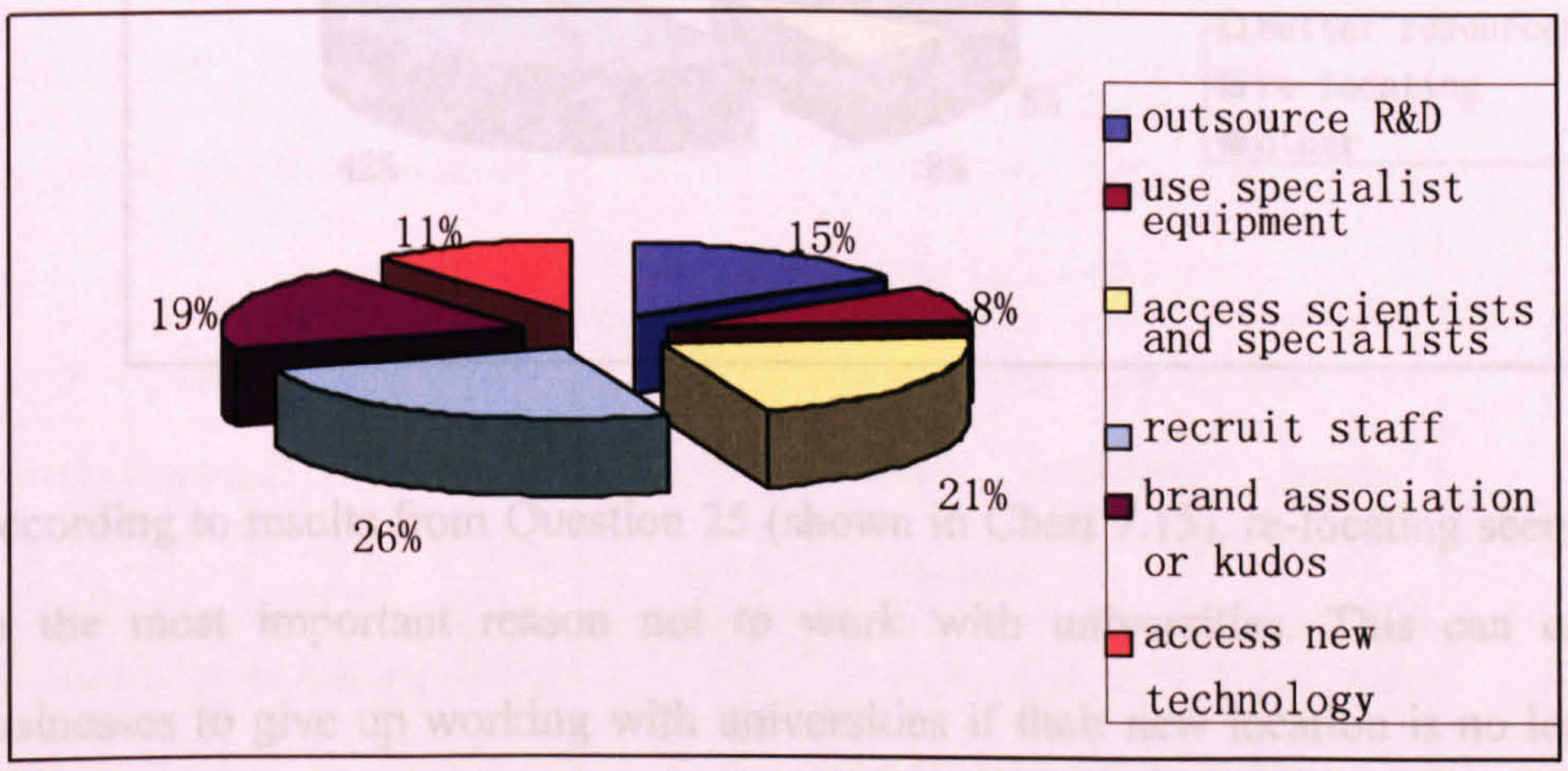
b. to have them carry out R&D for the company (outsourcing)

c. to purchase their innovation

d. other reasons

Chart 7.13 shows the results from Question 19, and these are consistent with the previous results, showing that most of the entrepreneurs were mainly interested in human resources when they worked with universities. We can see the rate is as high as 52%, which supports one of reasons as to why more than 30 percent of them preferred remaining within STIPs closing to universities. A further 32% would like to allocate some R&D projects to universities, with their operational guides, according to the results from interviews. It appears that the respondents rarely accept the innovation of universities (only about 11%), which is again consistent with the reluctance of the majority of respondents to cooperate with universities for technology transfer.

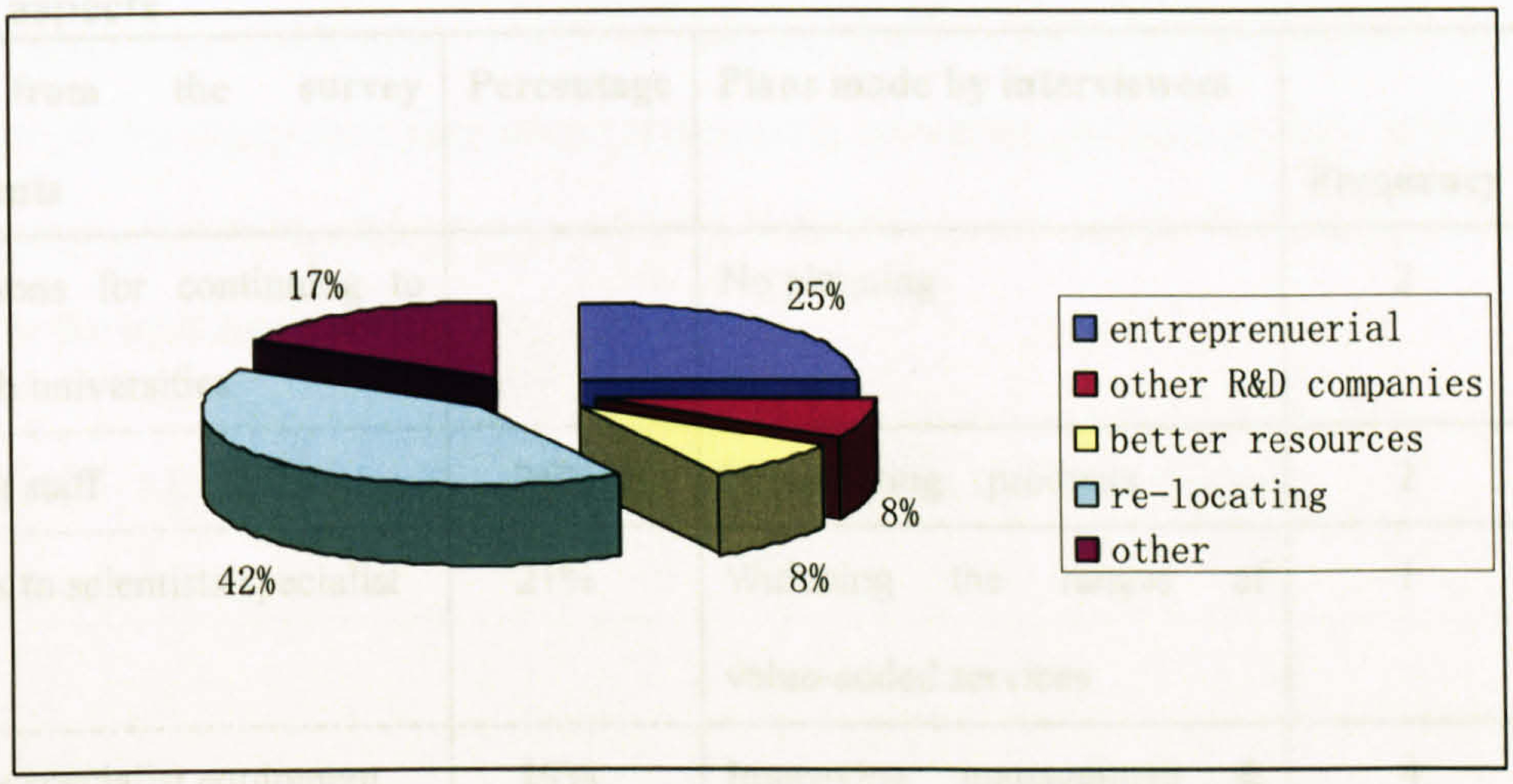
Chart 7.14 The various benefits expected from working with universities



Similarly to the previous statistics, the above pie chart (results from Question 24) shows that one relatively important benefit of working with universities is the ability to absorb available human resources from universities. One of the reasons companies scout for talent at universities is to gain the human resources required for running software businesses. Software firms often have major costs in human resources and so it is desirable for them to seek better quality staff at a lower cost. Inevitably universities appear to be an ideal source.

Of the entrepreneurs, 11% believe that cooperating with universities is beneficial. However, there is also the view that universities tend to be more academically oriented, and there is gap between academia and the real business world. Therefore most entrepreneurs do not think they can access new technology by cooperating with universities.

Chart 7.15 Reasons why entrepreneurs do not work with universities



According to results from Question 25 (shown in Chart 7.15), re-locating seems to be the most important reason not to work with universities. This can cause businesses to give up working with universities if their new location is no longer conveniently situated with regards to a university. This further implies that working with universities is not a priority even though they are technology-based firms.

Another reason is that universities can lack an entrepreneurial culture, which also could explain why the universities would not object to companies moving away from them. Companies therefore find other companies to cooperate with on R&D or on better resources. Interaction with universities does not appear to satisfy entrepreneurs in the same way and their expectations are often not met.

In the interviews the entrepreneurs' future plans to compete with rivals also reveal that they did not consider cooperating with local universities as a priority to enhance their technological abilities. Respondents talked about their future plans, of future locating, working with universities, or not, and why, despite a lack of probing on this topic. This is shown in the pie charts. What they had talked about might also show how they intended to strengthen their companies to better survive or compete with rivals. The results from the survey and the interviews with entrepreneurs are concluded in Table 7.12.

Table 7.12 Future plans to better compete with rivals or strengthen firms in various aspects

Plans from the survey respondents	Percentage	Plans made by interviewees	Frequency
The reasons for continuing to work with universities		No planning	2
To recruit staff	26%	Diversifying products	2
To access to scientists/specialist	21%	Widening the ranges of value-added services	1
To access specialist equipment	19%	Improving management & better allocating internal resources	4
To outsource R&D	15%		
The reasons for remaining within STIPs		Cooperating with universities to absorb talents & reduce R&D cost	2
To benefit from government's	51%		

policies			
To access talent and technologies from universities nearby	36%	Cooperating with other firms	2
To maintain networks	11%	Others	1

According to the above table, there is no evidence to show that the entrepreneurs actively intended to cooperate with universities for transferring technology. The results above reveal that they realised the importance of some aspects like human resources, specialist equipment and also would like to make efforts on improving internal management and diversifying products. Thus they intended to maintain their relations with universities to either acquire relevant resources or outsource some R&D projects which could be helpful to cut cost from their perspectives.

7.3.3.2 Scenario in the next 5 years

Besides enquiring about some plans as demonstrated in the previous section, in Question 30 the researcher also asked about what would be entailed in their future development, direction and how to achieve it in the next 5 years. The results are shown in the next few charts.

Chart 7.16 Likely future development directions in the next 5 years

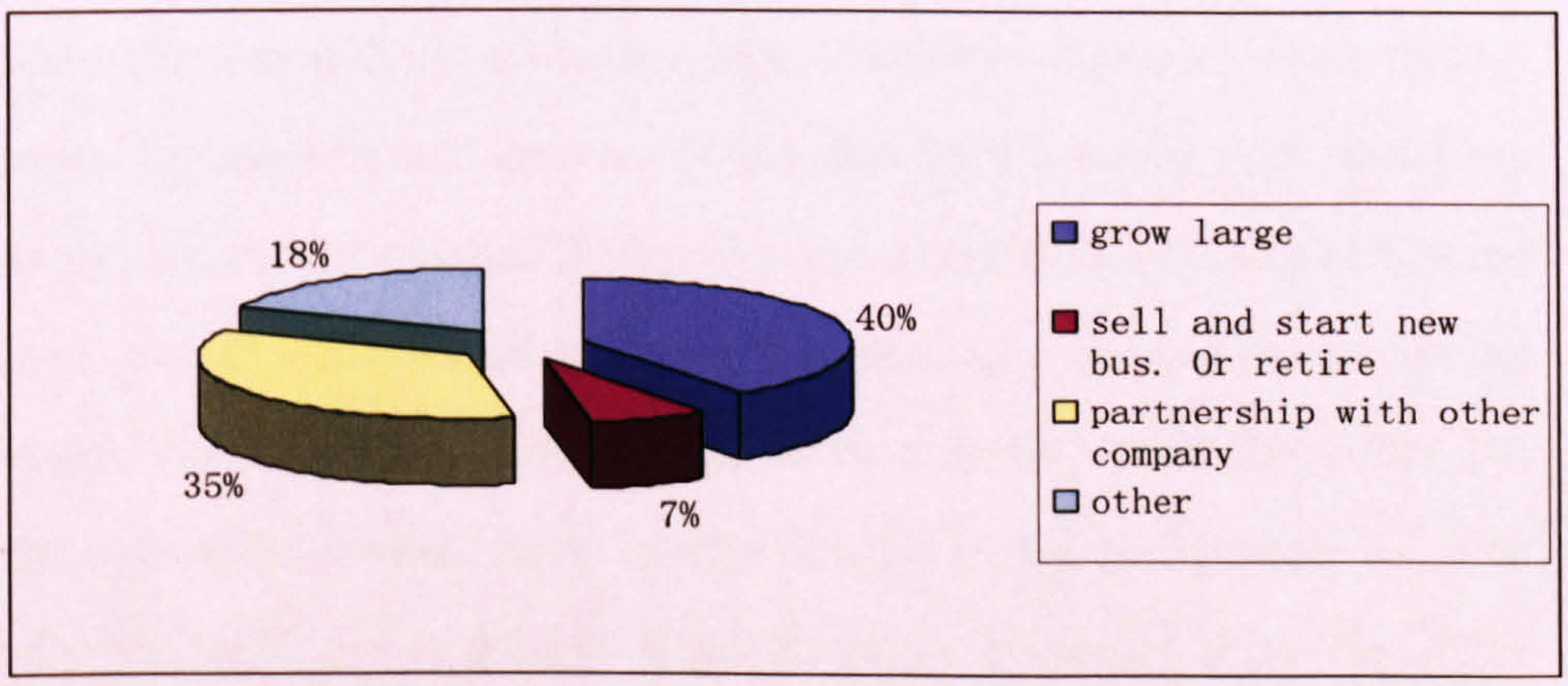
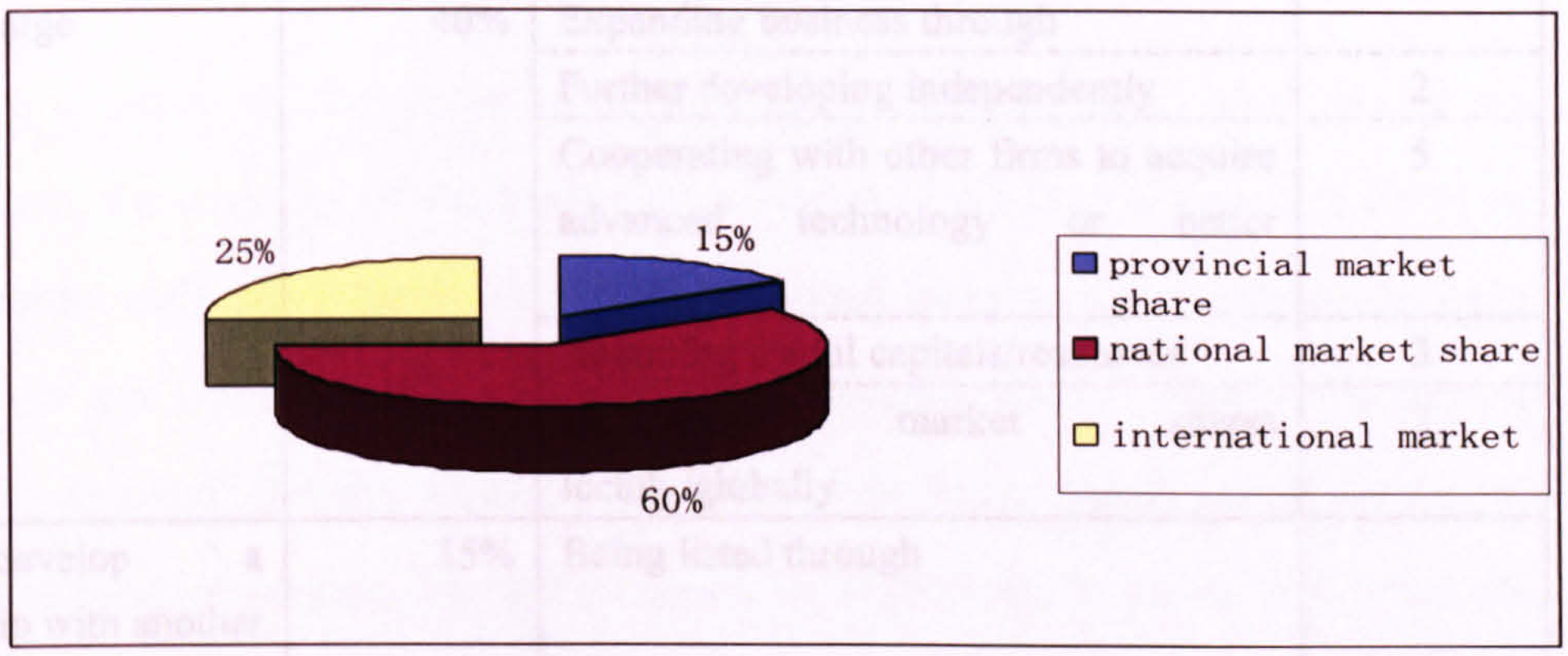


Chart 7.17 Reasons for seeking co-operators



Charts 7.16 and 7.17, generated with data from the survey, show that 40% of respondents have a dream of further developing their business and aim to be listed in the future, 35% of respondents would like to cooperate with other companies in order to expand their business nationally and just 7% of respondents intend to sell their business either to set up new business or to retire.

The outcomes further explain the various plans made by the entrepreneurs to meet their respective scenario. The information from both the survey and the interviews is demonstrated in the following table.

Table 7.13 **Directions for future development within 5 years**

Future directions (data from survey)	Percentage	Future goals and how to achieve them (data from interviews)	Frequency
To grow large	40%	Expanding business through	
		Further developing independently	2
		Cooperating with other firms to acquire advanced technology or better marketing	5
		Acquiring useful capitals/resources	3
		Expanding market shares locally/globally	2
To develop a partnership with another company	35%	Being listed through	
		Improving performance	5
		Acquiring more human capital	1
		Acquiring more financial capital	2
		Developing better products & marketing properly to improve market share	3
To sell and start a new business or retire	7%	Maintaining the clients to be more profitable	1
		Selling business	1
To have other plans	18%	No plan	1

The major theme from the above information is:

*** Plans for future development are mainly driven by seeking more profit**

Even though it seems that the majority of them were quite optimistic and ambitious for their future and would like to expand their businesses through various means, the outcomes for the relevant question imply that they actually need to take a shortcut to get investment returned. Being listed or cooperating with other firms are just vehicles used to achieve their goals – being profitable and getting investment returned soon. This could also be interpreted as showing that those companies that are wholly privately owned have comparatively higher motivation to plan strategically for the future to achieve financial gains. Therefore those 7% of the respondents who were only small shareholders, such as Mr. Zhang, whose company shares were mainly dominated by other big state shareholders, tended to be less motivated to make a long – term plan; Mr.Xue would even prefer to retire.

To sum up, driven by the desire to be more profitable, or get a quick return on investments, the majority of entrepreneurs intended to get their companies listed or to cooperate with other firms owning technology advantages which could help them either get listed sooner or acquire larger market shares. Thus even though they were aware of the importance of real business performance, either for being listed or expanding further, the central aspect of a good performance for them still relates to acquiring more resources. Further, being more profitable within a shorter period of time was seen as more important than how to allocate resources to gain sustainable development through innovative activities.

7.3.4 The innovative capabilities implied by the relevant findings

Some scholars whose works were reviewed previously (see Section3.3.1), like Barney (1991) and Penrose (1959), contributed to resource-based theory. They stated that a venture performance is not only affected by internal or external resources owned by a company, but is also by how the company organises or utilises those resources to gain competitive advantage. Hence resources and capabilities are considered the determining factors of being innovative or generating competitive advantage.

For technology-based firms, innovation is seen to be central in creating a competitive advantage. This is done by perceiving or discovering new and better ways to compete in an industry and bringing them to the market (Porter, 1990).

In order to be innovative and gain competitive advantage companies must effectively manage relevant resources such as human resources and financial capital, and they must have the ability to react to the external environment, for example government policies and IPR issues. Porter (1990) also emphasised that the strongest competitive advantage often emerges from clusters that are geographically localised, because he thought that firms in a cluster will gain advantage over international rivals if they could find new and better means to compete with better linkages, spill-overs and innovation.

The entrepreneurs' individual capabilities can be observed by referring to the findings from the survey and the relevant interviews regarding how they managed resources, reacted to and utilised the government policies, dealt with the issue of IPR protection and especially how they handle technology transfer and compete with various rivals.

The findings reveal that most of them preferred to locate within STIPs in order to benefit from the relevant government policies. In actual fact however, the only benefit they could get was tax incentives instead of being driven to be more productive or innovative by the relevant policies.

In terms of human capital, the findings show that the entrepreneurs were confident with their own technological capabilities due to the fact that they were basically well-educated. The main grounds for them to acquire talented workers were the universities which is why they maintained contacts within universities. Some of them also chose to locate near to universities. Information from the Introduction indicated that even though the academic institutions have become a breeding ground to provide talents for high-tech industries, the high-tech industries in China are still facing a lack of high-end talents.

Basically for most of the entrepreneurs interviewed and surveyed, the initial major financial input for their companies was made by themselves (46%), with another 30% coming from friends and family. The statistics shows that they were less capable to get financial support from banks or venture capitalists, and the various reasons for this have been stated previously.

Various business strengths were listed to be rated in the questionnaire and, according to the descriptive statistics, the most highly valued strength among the respondents is having technological capabilities, reflected by a mean score of 4.23 out of a possible five. During the interviews, most entrepreneurs also emphasised that they mainly relied on this strength to run their business, however the responses regarding how they competed with their rivals did not support this point. In particular those who competed with state-owned companies or MNCs stressed in the interviews that they competed with state-owned companies by being less bureaucratic and providing better services, and with MNCs by being much closer to clients and providing better prices. Therefore there is no evidence to support that they competed with their rivals by having excellent technological capabilities.

According to the relevant literature (see Chapter3, Section 3.5.2), links with HEIs enable industry to gain early access to technological knowledge, unique research skills and cost reductions. There are also a few factors which could affect the development of HEI-industry links, such as culture, individual motivations, institutional stimuli and structural conditions according to Van Dierdonck and Debackere (1988). The outcomes of the interviews show that most entrepreneurs were not enthusiastic about cooperating with universities, especially for technology transfer. The reasons given were not only from the entrepreneurs' perspectives but also from the officials' view, which is that in Chinese HEIs the structural conditions tend to have a strong academic bias and also there is less financial support for technology transfer from universities.

Theoretically the effectiveness of technological strategy applied could be evaluated by some factors like internal R&D investment, external resources, intensity of product technology, radicalism of new products and copyrights, patents and protection of intellectual capital (Zahra and Bonger, 2000)

The statistics show that there is no correlation between employee numbers and R&D input, or between turnover and R&D input. This could be interpreted to mean that the number of employees does not reflect the intensity of technological talents specifically for R&D. This is because, as stated by some of the respondents, they preferred to provide services instead of products and therefore might hire more technical talents for service business rather than for undertaking R&D. The outcomes from the survey positively demonstrated they were aware of the issues regarding applying for copyright or patents (as shown in the charts above) as they were running businesses with certain numbers of copyrights or patents. In terms of the IPR protection issue, both the entrepreneurs and officials held ambiguous views, however, as previously stated, the protection of IPR within China is currently quite poor. Consequently the above evidence tends to support the view that <u>most of the entrepreneurs have not got efficient technological strategies and high innovative capabilities due to being constrained by internal and external factors</u>. Thereby <u>there is no evidence to support the view that entrepreneurship could positively affect technology transfer from local universities for Chinese small software entrepreneurs.</u>

7.4 Summary

This chapter has discussed the findings from the survey and interviews by integrating the contents from Chapter Two and the relevant theoretical contributions reviewed in Chapter Three.

A new framework was generated from the previous findings and was introduced in the beginning of this chapter. The discussion of the findings embodies the framework. In China, in the economic disequilibrium caused by the huge structural change and the Government's preferential policies, the recent climate is a fertile one for generating software entrepreneurs (see Sections 7.1.1 & 7.1.2); however government policies can only encourage new venture creation and have not worked effectively on increasing the productivity of companies based in STIPs or driving the direction and pace of innovation. This standpoint is supported by the findings on how and why the entrepreneurs chose their locations and finance their firms (see

Sections 7.2.1–3). Therefore instead of demonstrating any function brought during the process of their venture's creation and growth, their entrepreneurial activities tend to reveal their entrepreneurial capabilities. These capabilities dictate how they reacted to the external factors to manage the issues of locating, financing and, especially, generating a technological strategy (see Sections 7.3.1-4).

Given the support of these findings from a large data set, in the next chapter a conclusion will be drawn which covers several research findings in order to answer and explain why entrepreneurship could not positively affect technology transfer from universities for the local small software companies in China. The findings consist of businesses heavily relying on governmental policies to start; some of them only focusing on being profitable and lack of long term plans or goals to build up the company brand or competitive advantage; lack of IPR protection; lack of financial support to carry out technology transfer; and the majority holding a negative attitude towards cooperation with universities for technology transfer

Chapter Eight Conclusions

8.0 Introduction

This chapter presents a conclusion of the research. This will be done by reviewing the essential aims of the research, the relevant industrial context, the theoretical contributions, summarising the major findings of this study and hence policy/practical contributions affecting and providing a recommendation for future research.

The chapter is divided into three main sections.

The first section provides an overview of the research aims that were also presented at the beginning of the study. It briefly demonstrates the industrial context under which the research has been carried out, and the relevant theoretical contributions that guide this research to meet the aims. Additionally this section also explains the methodology used in this research.

Section two of this chapter states the key research findings, and provides conclusions of the data analysis process that was explored and discussed in Chapters Five, Six and Seven .Further explanation is provided on how these conclusions have met the research aims. Consequently this chapter will reveal the process and development from Conceptual Framework 1 to Conceptual Framework 2.

The third section discusses the limitations of this study, and concludes the thesis by providing recommendations for future research.

8.1 Recapping of Research Aim, Industrial Context, Theoretical Contributions and Methods

8.1.1 The central research aim

The central aim of this research was to explore whether entrepreneurship among small and medium sized Chinese IT software firms can positively affect, ultimately effect, technology transfer from universities in China.

Entrepreneurship has been studied from a variety of perspectives in the Western academic world. In China, since 1978 the huge economic structural change, from being a centrally planned economy to a market-oriented economy, has created the uncertainty and disequilibrium which constitute a breeding ground for entrepreneurial activities. The phenomenon has attracted more and more scholars' attention. Research about entrepreneurship in the Chinese context has covered areas such as how technology transfer from universities may be driven by government policies in respect of constraints and impetus measures (Liu and Jiang, 2001). The research had also covered measuring Chinese entrepreneurial motivation from two dimensions; one being personality and the other being environmental influences (Taomina and Lao, 2007). Last, but not least, the research has covered entrepreneurial orientations, strategic flexibilities and indigenous firm innovation in transitional China (Li et al., 2007).

In comparison to the research on entrepreneurship in the Western world, the research on Chinese entrepreneurship is still at an early stage. Also there is very little evidence that shows that the research has been carried out specifically from the perspectives of small and medium sized software companies, meant to demonstrate how entrepreneurship can affect technology transfer between them and local universities under the Chinese context.

The researcher was motivated to explore this issue, and in order to fulfil the task started by searching the relevant information from web sites, journals and books to understand the background of Chinese industrial software (see Chapter Two). Reading was also carried out to understand the various theoretical contributions regarding entrepreneurship and high-tech based ventures (see Chapter Three).

8.1.2 The research in context – the industrial background

As demonstrated in Chapter Two, since the economic reforms in 1978, the Government has issued a great number of policies and regulations aimed to stimulate economic development. China's economic development has become the fastest in the world and GDP has been growing at an average annual rate of 9.4 % for the past twenty-five years.

Along with this rapid change and development, the Government has recognised how I.T. could play an important role in modernising society. Software has been identified as a critical industry that is essential to economic progress and national security. Therefore the Government has launched several policies and projects to assist industrial development as mentioned by the officials and demonstrated in Chapter Two.

Due to the preferential policies and fertile environment, the software industry has made great achievements. According to the officials interviewed in 2007, the revenues of the software industry will be more than 1000 billion yuan in 2010 having reached 480 billion yuan in 2006. The export revenues will reach 10 billion US$ having been 5 billion US$ up to the end of 2006. In 2006, 92% of the revenues came from the domestic market and 8% from the international market.

Owing to many years' development, and having been supported by the government, there are 61 software management companies which have been listed to the top 100 in China among local large software companies and they collectively shared 55% of sales to the Chinese market in 2007. Therefore they have become increasingly attractive in the capital market and have been financed by state owned banks. This can be seen as evidence to illustrate the claims of the two bankers interviewed in part of the fieldwork.

Although a group of Chinese domestic software firms have become reasonably large, the majority are still very small. Therefore instead of researching the development of large sized software companies, the researcher has made efforts to sample small and medium sized companies and tried to explore whether entrepreneurship in small and medium sized software companies can affect technology transfer from universities.

8.1.3 Summary of the relevant theoretical contributions

The theoretical underpinnings of this study are built on the view obtained from the literature that entrepreneurship has been researched in various scientific paradigms. The researcher has tried to review the literature regarding entrepreneurship in the individual, entrepreneurship as a process and entrepreneurship as a function.

Behavioural-science research focuses more strongly on the entrepreneur as an individual, and various definitions regarding entrepreneurs have been explored, such as opportunity seeker, risk taker (Cantillon), problem solver (Thunen), decision maker (Menger), and innovator (Schumpeter) (see Section 3.2.2.3). Based on this traditional 'trait' orientated view, Johannisson (1992) further developed the concept as the entrepreneur who is existentially motivated. Further this is the idea that entrepreneurship involves a total commitment on the part of the individual. The theoretical contributions were used to structure relevant questions for the survey and interviews, which helped in the understanding of where the small Chinese software entrepreneurs were from and what motivated them.

The management studies shift towards a more process-oriented definition. Scholars emphasise the emergence of new organisations and the emergence of opportunities.

Therefore entrepreneurship for them is about why, when and how some people can discover and exploit opportunities and take different types of action to create goods and services and bring them into existence (Shane and Venkataraman, 2000). The process involves strategic management, which includes the deliberate and emergent approaches. Several scholars elaborated on the concepts of the deliberate approach, and among them the relatively well-known theories were stressed by Penrose (1959) with her resource-based theory, and by McGrath, Venkataraman and MacMillan (1994) as well (see Section 3.2.1). For them, the approach identifies how entrepreneurs externally acquire resources and integrate with internal resources to ensure maximum profit. In addition the ability to have strategic development potential over a period of time through a relatively unique combination of resources is highlighted.

The advocates of an emergent approach hold different opinions. This is because they think that either business performance does not appear to have a strong correlation with formal planning activity or because the planning approach could be theoretically flawed due to the uncertainty of the future and unpredictable environments (see Section 3.3.2).

Nevertheless scholars all agree that at any point in time the venture will have strategy content and evolve over time. It will also be shaped by a wide variety of organisational and environmental factors, which includes the mechanisms the organisation adopts to control the allocation of resources; the organisation's systems for motivating and rewarding performance; the way the organisation manages information and identifies opportunities; the organisation's technological competence and any technical developments. The dispute between the deliberate approach view and the emergent approach view is just that the entrepreneurial process should be involved with conscious and deliberate strategies for a deliberate approach. However, according to the emergent approach advocators making decisions should not have to refer to an overriding strategic context. (Mintzberg and Waters, 1985).

Whether being conscious or unintentional, the various entrepreneurial capabilities should appear during this process. Therefore instead of focusing on the differences between the two approaches, this thesis only employs the above strategic concept to guide and structure some research questions. This is in order to collect information regarding how entrepreneurs manage the allocation of their resources and react to the relevant external environmental factors in order to exploit their entrepreneurial capabilities.

Theoretically the external environment is also stressed as a very important factor affecting entrepreneurial activities. On one hand, for countries like China, which are experiencing structural changes, the Government is regarded as being part of the main environment creator through issuing various policies, which is considered as institutional environment. On the other hand, the cluster theory mainly contributed by Porter (1998b) is also considered as a useful tool to encourage the creation of new ventures (see Section 3.4.2). Therefore some relevant questions were asked to determine how the governmental policies work from the entrepreneurs and officials' perspectives.

In the field of economics studies, scholars have been interested in researching the function of entrepreneurship in the market place. They attempt to answer what happens in/to the market when entrepreneurs act while having varying capabilities. The economists generally identify the entrepreneurial function as the entrepreneur acting as risk-taker, opportunity seeker and innovator (see Sections 3.2.1.1-2). This is also mirrored in previous definitions used in behavioural research, which focuses on the entrepreneur as an individual. The various definitions give the functions slightly different connotations. The differences are reflected in Schumpeter (1934) and Kirzner's (1973) views on entrepreneurship. According to Schumpeter the entrepreneur creates imperfection in the market by introducing new innovations, but Kirzner saw the entrepreneur as a seeker of imbalance which he/she aims to remove by means of his/her entrepreneurial activity. They generalised what happens in the market when entrepreneurs act with different capabilities. Therefore it is the various capabilities that determine the difference in functions. Their analysis of entrepreneurial capabilities may reflect the attributes of their entrepreneurship.

8.1.4 Multi-method strategy

This section reflects on the research strategy designed and employed for this investigation. In its essence, the theoretical framework developed for this study (see Figure 3.1) and how to meet the research aims drove the research design, which includes the research approach, data collection procedures, and the subsequent process for data analysis.

Within the chapter on methodology and methods, the researcher explained that a multi-method strategy would be adopted for this research (Bryman, 2004). This strategy consists of a mix of the quantitative and qualitative approaches. However, due to the exploratory nature, the analysis of the hard data was conducted by using the approach of outward/forward looking rather than being rooted in the positivist 'hypothesis testing approach'. It is designed to provide some quantitative evidence to explain the findings as a complement to the outcomes from the qualitative research. This also formed the basis for the qualitative research by informing the way in which interviewees were selected and how questions were structured.

The multi-method strategy allowed the researcher to collect multiple viewpoints regarding reasons motivating Chinese people to be small IT-software entrepreneurs. Characteristics within the Chinese context and roles on the market were therefore related to technological issues. The multiple viewpoints were from both quantitative and qualitative data, which yielded a significant benefit and made the findings more convincing.

As explained previously, the questionnaires were structured by following the conceptual framework with some closed questions, but also by asking some open-ended questions. One hundred questionnaires were issued to the software entrepreneurs within the researcher's personal networks in Beijing and Shanghai. Chapter Two explained the industrial background and why the researcher chose the entrepreneurs from Beijing and Shanghai. The main reason being that because the early development of China's software industry was concentrated in a relatively small number of localities, Beijing and Shanghai are the dominant sites of new firms. Beijing is a geographical centre for the software industry with a special district, Zhongguancun "Silicon Valley", remaining dominant because it has a concentration of research organisations and universities, and particularly favourable policies adopted by the local government. Shanghai alternatively is a leading centre for overseas investment given its better facilities, with English exposure, and is therefore more attractive for overseas returnees to start their own business.

The sample size for the survey, with some 100 questionnaires issued, is modest in comparison to the total number of small and medium sized software companies existing in China. However, the response rate was 53 percent, which is relatively good for a widely distributed questionnaire and delivered a 'clean' sample of sufficient size to deliver meaningful analyses in a statistical sense. The questionnaires were well structured and the outcomes should provide quantitative and precise information.

However the results from the survey are also, relatively speaking, too concise to give in-depth views and fully reveal the process of entrepreneurial activities, and in addition could not draw the standpoints of officials and bankers regarding the relevant issues. Therefore as explained previously, a multi-method strategy was adopted for this study by combining the survey and interviews together in order to collect a wide array of information and in-depth thought as well.

The one-to-one interviews were conducted with seventeen entrepreneurs selected from the respondents to the survey who so agreed, two officials from MOST and two bankers, one from a state-owned bank and one from an investment bank. The interviews consisted of a comprehensive set of open questions basically following the structure of the questionnaire. These semi-structured interviews aimed to capture a further and deeper explanation of various reasons why the entrepreneurs started their businesses and how they managed their entrepreneurial activities within the Chinese institutional environment. Hence with regards to evaluation, they were critical in gaining access to qualitative data sources. Through combining this with the quantitative data, the researcher was able to explore whether their entrepreneurship positively affected technology transfer from local universities.

Practical issues that resulted from the research design – i.e. data gathering procedures, sample selection, and sample size – were dealt with bearing in mind the design crafted at the beginning of the data collection exercise. The sample was randomly selected from Beijing and Shanghai. It is important to mention that the sample from these two cities should be fairly representative of the wider Chinese setting because Beijing gathers more software enterprises and Shanghai is relatively more attractive for overseas returnees to have their start-ups (see Section 2.2.2.2). The two officials were the heads respectively of the Software and the Science Park divisions of MOST, and the two bankers were from one of the biggest state-owned banks and one of state-owned investment banks respectively. Their prestige makes their responses more reliable, or at least credible, in terms of the intended governmental policies. The researcher also gathered a significant amount of secondary background data, as shown in Chapter Two, such as the industrial history, structure, and characteristics of the Chinese economy in terms of human resources, financial capital and technology issues. The research approach was extremely effective in yielding information that was extensive, appropriate and convincing for this study.

8.2 The Major contributions

One major contribution from this study is the development of a suitable conceptual framework that can be applied to a study of entrepreneurship in the Chinese transitional economy context. The large number of empirical studies in the Western academic world developed in this field enabled the researcher to be able to draw up an initial model and conduct the study.

The study has also devised a static framework (see the following Conceptual Framework II) of active response behaviour among Chinese software entrepreneurs starting businesses, growing their businesses and managing their technological issues in the specific Chinese institutional environment.

This research is also more extensively targeted at small and medium sized firm level and focused on the software industry by specifically linking entrepreneurship with technology transfer from universities. The investigation was carried out by combining both a survey and interviews. On the one hand, the quantitative data can provide relatively precise information and the qualitative data makes the researcher able to explore the arising phenomena in more depth. Such a novel combination makes the findings of the study more convincing. On the other hand, the study fills the gap in Chinese entrepreneurship literature by providing a systematic examination of entrepreneurial activities related to the technology transfer issue within the Chinese software industry. The findings generated from this study can exclusively be referred to by industrial participants to some extent.

In addition, this research examined how the entrepreneurs reacted to the relevant Government policies and thereby carried on their entrepreneurial activities. By using the sample from one industrial sector, a further question could be asked: after the Government collects the relevant feedback from market players and adjusts some policies accordingly, will this improve the institutional environment and the preferential policies to work more efficiently? Contributions in answering this question are indeed offered and converted from this academic research.

The following subsections examine the main findings from analysis of the survey and the semi-structured interview responses, and secondary data examined in Chapter Two. Although discussed in full detail earlier in Chapter Seven, the findings in the following subsection are outlined with some standpoints by explicitly considering the essential conclusions from the extensive body of discussions presented in Chapter Seven. These are on: the characteristics of Chinese small software entrepreneurs; how they run their businesses under the Chinese context; what kind of attributes they have demonstrated in reaction to the Government's policies; and how they have managed their technology and innovation issues.

8.2.1 Key Research Findings – Reflections and Implications

By collecting data from the survey, various interviews and also being assisted by the information from the Government's website and public journals, the researcher analysed the respondents' entrepreneurial activities from three main angles by following the conceptual framework drawn from the Literature Review. These angles are entrepreneurship in the individual, entrepreneurship as a process and entrepreneurship as a function. Some characteristics of their entrepreneurial activities can be summarised as follows.

1. Business heavily relying on Government policies to start but feeling increasingly less support

The Government's focus on the promotion of high technology industries and the development of the Chinese software industry has been an important influencing factor on the entrepreneurs studied (see Sections 2.3.1 & 6.3).

Some of the Government's preferential policies, like tax incentives and high-end talent incentives within STIPs, have encouraged some people, educated locally or overseas, to start software business. This is because the nature of the software business requires more intangible assets, like technology and skilled talent, and fewer tangible assets like huge equipment inputs and raw materials (see Section 6.2.1).

Through the establishment of STIPs, a developmental function based on the so-called 'effectiveness of clusters', suggested by Porter, has emerged. Basically its embodiment is the stimulation of the formation of new businesses, which expand and strengthen the cluster, thus forming a virtuous circle or positive feedback. Based on this projected advantage more and more software firms have been located within STIPs (see Section 6.3.1). Of course, there is not unanimity amongst Chinese software entrepreneurs as to the desirability of locating within STIPs.

As stated previously the Government facilitates STIPs with first-rate infrastructure like roads and office buildings, which appear to be a major part of the attraction for some enterprises. However there was not sufficient evidence gathered in this study to show that these small and medium sized software firms located within clusters could well enjoy the other benefits delivered by a cluster as listed by Porter, such as an ideal atmosphere for innovation (see Section 3.3.2.2).

Despite additional efforts made by the Government to drive and lead the direction of innovation through providing relevant preferential policies, such as national projects, special funds and purchasing policies, from the entrepreneurs' perspective it seems that the large sized high-tech firms could benefit more from these preferential policies.

Thereby on the one hand, the small and medium sized software firms heavily rely on the Government in order to start and run their business, due to the business opportunities brought by the Government's encouragement of developing high-tech industries and the cost advantages brought by the relevant preferential policies, but on the other hand, they expect even more effective preferential policies suitable for small and medium sized software firms to enable them to better develop and expand their business.

2. Social networks being helpful in seeking business opportunities to some extent, but comparatively less useful in helping entrepreneurs to access financial capital

In terms of how social networks could impact on setting up their business, the relevant analysis shows that social networks do enable some entrepreneurs to spot business opportunities to some extent (see Table 7.2).

During the survey and interviews, the entrepreneurs additionally were asked to give their opinions regarding how networks and the business plan could respectively play roles in acquiring financial support. The results from the entrepreneurs' comparison of social networks and business plans, with respect to their effectiveness in accessing financial support, indicate that they had less confidence in benefiting from social ties (see Section 7.2.3.2).

3. Some of them only focusing on being profitable and lacking long term plans or goals to build up the company brand or competitive advantage

The information synthesised previously demonstrates that the majority of interviewees show their propensity for operation motivated by profit-goals no matter whether they are going to become listed companies or cooperate with universities. In particular one mentioned that when value has been accumulated to a certain level, he would consider retirement and has therefore not got a long term plan. Some of them seemed to struggle with the uncertain nature of the software industry and thus also did not have any long term plans (see Section 6.2.4.3).

For those interviewees who did have plans for future development, when they talked about their plans, they rarely mentioned how to develop the company brand or their technology advantage. This is a factor that should play a very important role within a high-tech firm in order to compete with rivals and develop sustainably (see Section 6.2.4.3).

Their decision-making about where to locate and how to utilise and recruit human resources has partly revealed that their major concern is about cost control (see Section 6.2.2.1).

4. Lack of IPR protection

The outcomes of the interviews with entrepreneurs demonstrate that they admit the importance of IPR protection. They also emphasised that the government has made a lot of effort on improving IPR protection. Even though they appeared quite ambiguous towards the possible negative influence brought by lack of IPR, the majority of them considered that IPR has not been well protected. According to the officials, in terms of this situation, the judicial authority should be responsible for implementing legislation effectively, and the software firms should establish their own personnel rules properly to avoid piracy.

5. Short of financial support to carry out technology transfer

The relevant evidence from the survey and interviews shows that major initial financial capital for starting up their businesses is provided by the entrepreneurs themselves; very few were able to access financial support, at that stage, from banks or venture capitalists. The bankers also proved that normally the large banks are reluctant to provide loans to small and medium sized firms, especially firms with few tangible assets as security. This is to ensure that the Bank's investments are secure (see Sections 7.2.3.1 & 7.2.3.3).

When comparing the importance of networks and business plans in acquiring venture capital, the entrepreneurs generally considered business plans more important. The majority of the entrepreneurs did not have experience of acquiring capital from venture capitalists and found it difficult to attract them. This is because venture capitalists are not confident they will receive a return on their investment when dealing with firms of this size (see Section 7.3.3.2). Although there are some special sponsors from the Government to encourage big projects with universities, large sized firms are able to bid with abundant internal and external resources, leaving very few opportunities for small and medium sized firms.

6. Majority holding negative attitude to cooperation with universities for technology transfer

Previous empirical studies have suggested that effective transfer of technology often requires an adequate infrastructure, which may include scientific institutions, R&D facilities, vocational, technical and management training institutes, skilled personnel, and a suitable cultural environment (see Section 3.5.1).

In reality however, local universities seem quite weak in the aspects mentioned above. According to the respondents in this study, universities are generally too academic and cannot transfer technology into practical products to meet the market needs due to the knowledge gap and communication obstacles. Additionally in order to be promoted university professors conduct research in conjunction with other enterprises but seek to utilise the resources of those enterprises and therefore tend to prefer cooperating with larger enterprises that already have technological advantages (see Section 7.3).

For some start-ups, owned by overseas returnees, the owners emphasised that they had the advantage of setting up communications with counterparts, universities and research institutes overseas. They therefore appeared more confident about transferring technologies from overseas instead of cooperating solely with local universities.

8.2.2 A Reflection on How the Research Findings met the Research Aims

Over the last two decades, the study of entrepreneurship and small businesses has attracted more and more scholars from different scientific disciplines to conduct more systematic research.

Even though the relevant research in the specific Chinese context has not been as rich as that carried out in the Western context, we can still find that theoretically some research has been conducted specifically on the issue of technology transfer. This mainly focuses on two areas: making comparisons with technology transfer in different countries and investigating the effect of Government policy on technology transfer (see Section 3.5.1). Therefore it seems that previous research has not linked entrepreneurship with technology transfer to explore if entrepreneurship can positively affect technology transfer from universities or not. This is with regard to Chinese small and medium sized software firms.

As shown in Chapter Three, the theoretical definition of technology transfer within this thesis is referred to as "the quantum of knowledge by which such inputs as patent rights, scientific principles and R&D are translated into production and marketable industrial materials, components, and end-products", even though technology transfer has been illustrated in diverse ways due to the elusive nature of technology, according to Hawkins and Prasad (1981).

The research aims of this thesis are also strongly related to how to evaluate the effectiveness of technology transfer. Empirical studies on technology transfer, especially relevant to the Chinese context, show that some scholars also emphasised the establishment of an appropriate evaluation system. According to Zhou and Zhu (2008), a more practical/useful evaluation system should focus on the actual industrialisation and commercialisation of the technology rather than on the numbers of patent applications and patents granted (see Section 3.6.1). Their contributions helped the researcher list some factors which in theory are considered as the necessary requirements for successfully undertaking technology transfer, see Diagram 8.1.

Additionally, the sample for this research was selected from industry instead of from higher education institutes. The researcher intended to evaluate the effectiveness by linking entrepreneurship with technology transfer, therefore the evaluation standards eventually should be built up with the factors relevant to entrepreneurial activities.

Previous Western empirical studies suggested that the effective transfer of technology often requires an adequate infrastructure, which may include: scientific institutions; R&D facilities; vocational, technical and management training institutes; skilled personnel; and a suitable cultural environment as well (see Section 3.5.1). Thus using theoretical contributions the researcher established an evaluative structure to examine the effectiveness of technology transfer from universities. Specific information on Chinese software SMEs regarding the adequacy of infrastructure, as mentioned above, could be extracted from the exploration of the nature of their entrepreneurship. Then the link could explain whether entrepreneurship in Chinese software SMEs could positively affect technology transfer from local universities or not.

By adopting a multi-strategy method (issuing questionnaires to 100 Chinese software SMEs, with a 53 percent feedback rate, and interviewing 17 entrepreneurs from the respondents, two officials from MOST and two bankers from a state-owned bank and an investment group), some characteristics among the entrepreneurial activities of the subjects of the study have been identified and demonstrated in the previous section by combining the results from the quantitative analysis with those of the qualitative analysis.

The findings firstly demonstrated that a relatively large number of the sampled software SMEs generally were reluctant to transfer technology from local universities (see Table 7.11), because they did not consider that the technology could effectively be transferred from universities. This was because there was a knowledge gap between the two parties involved.

Secondly although there were some entrepreneurs who did cooperate with local universities for technology transfer, they expressed views that they were and would be heavily constrained by a shortage of financial support to invest on technology transfer, and that the lack of IPR protection might ruin their innovation enthusiasm as well.

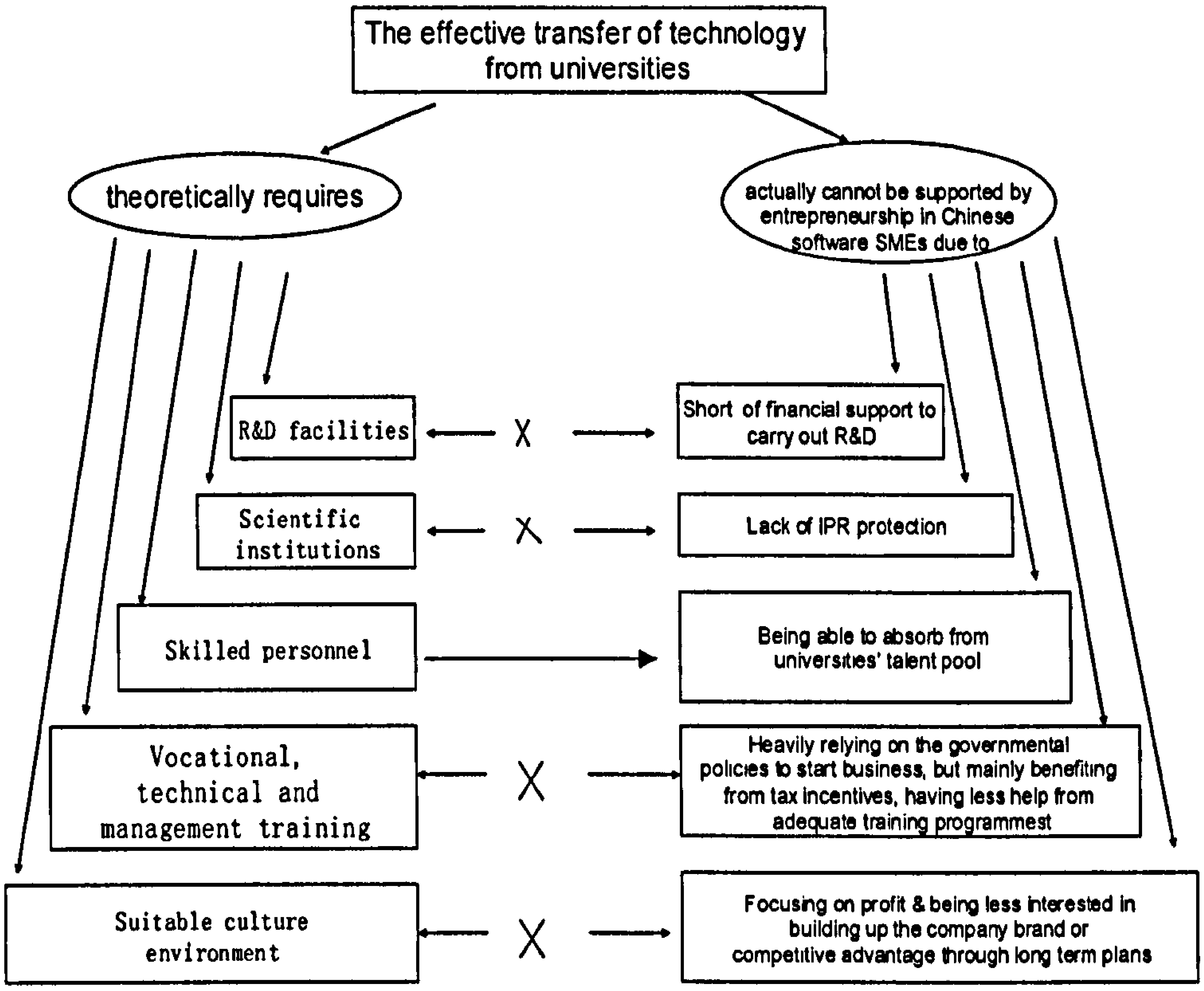
The majority of them acted as opportunity-seekers in order to gain a greater profit as quickly as possible by utilising Government policies rather than by taking time to build up brand or technology advantages (see Section 7.3.3.2).

Consequently the findings stated above can draw a picture about how the sampled software SMEs carried out their entrepreneurial activities. This picture exactly explains the attributes/nature of Chinese software entrepreneurship, particularly in the small and medium sized software sector. Their attributes were also specifically linked towards how to affect transfer technology from local universities. Thereby the answer to the research aims could be given as that entrepreneurship in the specific Chinese software SMEs has not been able to positively affect technology transfer from local universities in a systematic fashion thus far.

The research process and details of the consequent results are demonstrated in Section 8.2.3 through explaining the evolution of the initial conceptual framework to a new conceptual framework which answers to the research questions.

The following diagram additionally illustrates how the researcher meets the research aims in greater detail.

Diagram 8.1 The Effectiveness of Technology Transfer



The diagram above illustrates that theoretically the transfer of technology from universities requires the support of several factors, mentioned in this diagram on the left-hand side. However the actual nature of entrepreneurship in Chinese software SMEs reveals some characteristics listed on the right-hand side of the diagram. Due to being short of financial support to carry out R&D, lack of IPR protection, being able to benefit from the preferential policies like tax incentives, having less adequate training programmes, and the culture of mainly focusing on being profitable without long term plans to establish brand or competitive advantages, it is obvious that the nature of entrepreneurship could not help the entrepreneurs of Chinese software SMEs. This was largely owing to the fact that these entrepreneurs do not possess the majority of the factors required for effective transfer technology from universities.

The outcomes did not show that the SMEs sampled were lacking skilled personnel, and the relevant evidence from the introduction of industrial background also explained that there have been more and more well-educated talents supplied, following the comeback of the national examination system and returnees overseas. However the majority of entrepreneurs held negative views towards cooperating with local universities for technology transfer. Therefore the intention for them in cooperating with local universities is mainly to acquire human resources and access specialist equipment and advanced technology in order to organise R&D internally and be able to provide value added services by relying on the highly qualified talent within the universities (see Chart 7.5 & Table 7.13).

Theoretical definitions of the entrepreneur, and the concept of the entrepreneurial process, helped guide the researcher in structuring the questions for the survey and the interviews to collect the relevant information. The analysis of the outcomes of the survey and interviews focused on exploring the process of their entrepreneurial activities, especially understanding the attributes related to the issue of technology transfer. Hence the findings and the diagram above draw a picture regarding the situation of technology transfer between academic institutes and small and medium sized software enterprises, and thus answer the main research question: whether entrepreneurship could positively affect the technology transfer from local universities for small software entrepreneurs in China.

8.2.3 Evolution to the initial conceptual framework

The initial conceptual framework driving this research is shown below:

Theoretically entrepreneurship can be, and has been, researched in three main fields. These are entrepreneurship in the individual, entrepreneurship as a process and entrepreneurship as a function.

*The individual aspect of entrepreneurship is about the definition of the entrepreneur, as a risk-taker, an innovator, a decision-maker, or an opportunity-seeker.

*These particular individuals exploit the opportunities that arise and integrate their resources to create and expand ventures, and ultimately make profits, thereby generating a process. In theory, this process has both strategic management and emergent management implications.

- The environment gives the opportunities for venture creation and growth and, according to some scholars, the Government especially plays a major part in creating and affecting the relevant environment in China.

- Networks as an important factor exist among the entrepreneurial activities and affect their decision making. These can be heavily influence by their in-born, social surroundings or cultural layers.

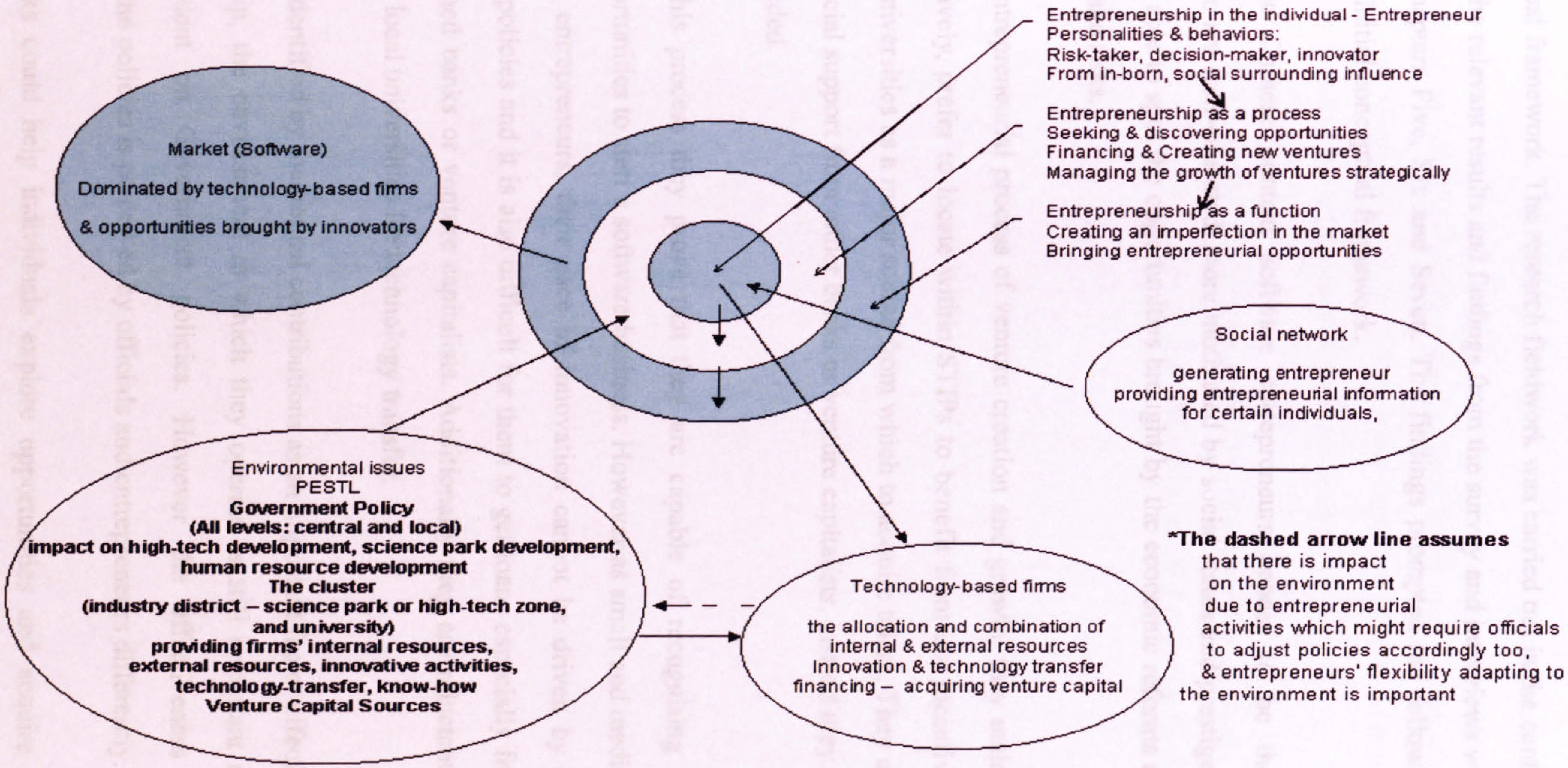
*The entrepreneurial activities are also expected to bring imperfection in the market or create disequilibrium by introducing new innovations, which is the manifestation of entrepreneurship as a function.

- Technology transfer, as an entrepreneurial activity, is related to several factors in terms of its efficiency.

Conceptual Framework 1

(Diagram 8.2)

The Initial Conceptual Framework



The questionnaires and interview questions were designed under the guide of this initial conceptual framework. The research fieldwork was carried out in the context of China, and the relevant results and findings from the survey and interviews were explored in Chapters Five, Six and Seven. The findings prompted the following changes to the initial conceptual framework.

In the specific Chinese context software entrepreneurs appear to be those individuals who are well-educated, more motivated by social status and prestige of the family, are able to spot the opportunities brought by the economic reforms and are willing to take risks.

During their entrepreneurial process of venture creation and growth, they mainly, but not exclusively, prefer to locate within STIPs to benefit from tax incentives, and consider universities as a major source from which to acquire talent. They also have less financial support from either banks or venture capitalists, instead they are mainly self-funded.

Thus during this process they prove that they are capable of recognising the necessary opportunities to start a software business. However as small and medium sized software entrepreneurs, their pace of innovation cannot be driven by the Government's policies and it is also difficult for them to get loans especially from large state-owned banks or venture capitalists. Additionally they are reluctant to cooperate with local universities for technology transfer.

Nevertheless, identified by theoretical contributions as an important factor affecting entrepreneurship, the environment in which they operate is still important and mainly dependent on Government policies. However the effectiveness of implementing the policies is perceived by officials and entrepreneurs differently.

Social networks could help individuals explore opportunities and acquire the necessary resources to start and develop their software businesses; however the respondents did not appear confident in relying heavily on their social ties to gain financial support.

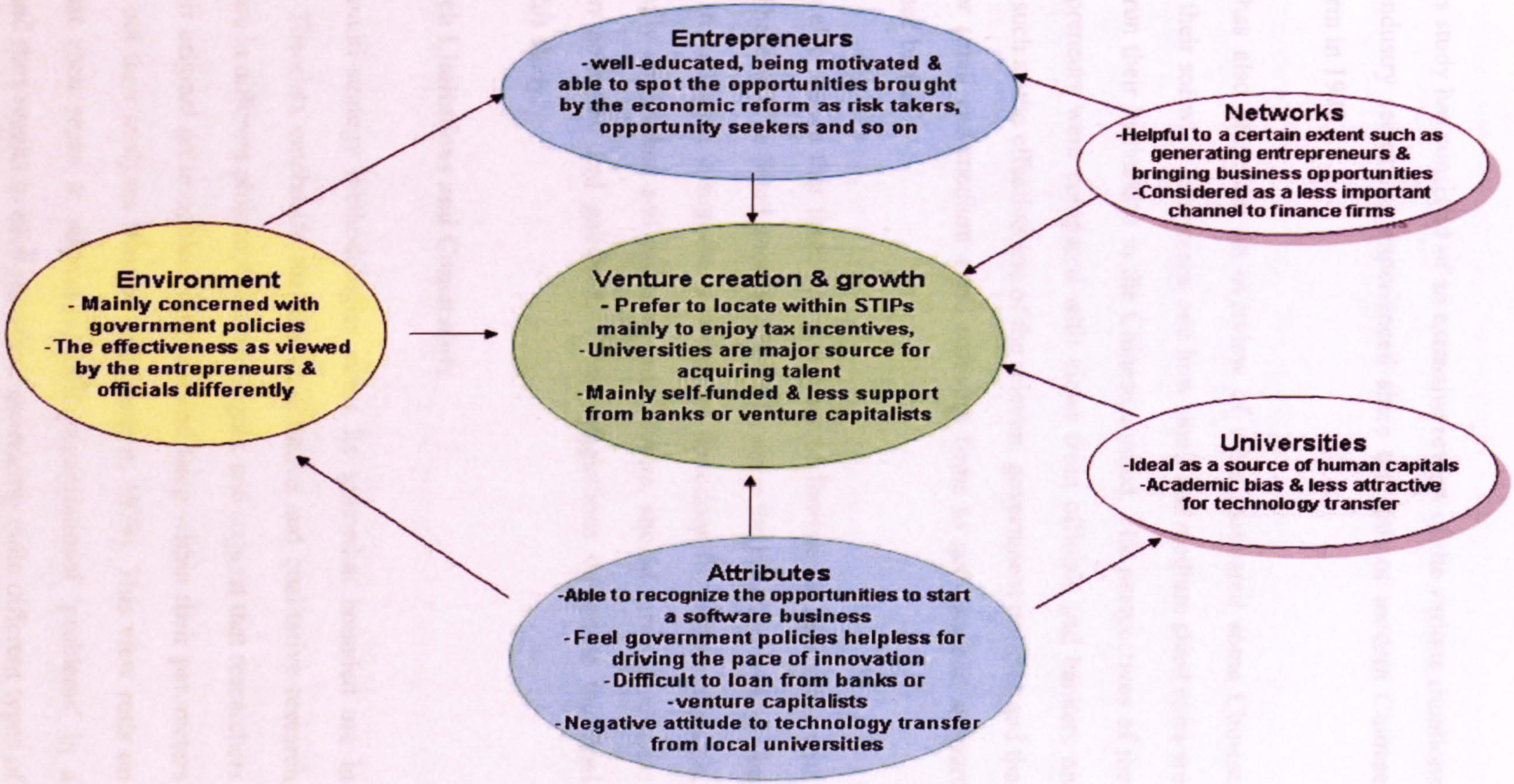
For them, universities are an ideal human resources pool, but cannot be considered as good partners for cooperation to carry out technology transfer due to such reasons as the gap between the academic and business worlds.

As a consequence of the outcomes noted above, the researcher has adjusted the conceptual framework taking into account the difference as shown in the Revised Conceptual Framework.

Conceptual Framework 2

(Diagram 8.3)

Revised Conceptual Framework



8.3 Study limitations and Recommendation for Future Research

To sum up, this study has consisted of an extensive review of the various situations the software industry sector has experienced since the start of modern Chinese economic reform in 1978.

The research has also presented an overview of what motivated some Chinese people to start their software businesses, and how small and medium sized software entrepreneurs run their businesses in the Chinese context. The perspectives of the sampled entrepreneurs were compared with views from officials and bankers on certain issues, such as the effectiveness of the relevant government policies and the possibilities for small and medium sized software firms to get financial support from state-owned banks.

This study has also shown that there are a number of limitations associated with this research. These will be listed shortly. Similarly, since the present investigation is determinate in its scope, it suggests prospective directions for further research, which, when fully undertaken and explored in the future, should serve to advance the information collected and gathered. These suggestions constitute the final subsection of this study.

8.3.1 Research Limitations and Constraints

Criticisms of multi-strategy methodologies stress its somewhat bounded use in theory testing. Theorists emphasise that the quantitative and qualitative research strategies operate in different philosophical paradigms, and suggest that researchers stay within their original philosophical tradition and keep within their parameters when carrying out their analyses (Burrell and Morgan, 1979). This view rests on the premise that each seeks to address specific organisational 'problems' in a different way and thus results in each paradigm generating quite different types of organisational analysis.

However within this study, it is these different types of analysis that helped the researcher to explain and demonstrate the research findings by relying on both quantitative and qualitative analysis. This lends the findings more weight and provides a richer content with greater depth.

In terms of methodological issues, the first limitation of this study rests with its sample size and location coverage. The vast geography and development imbalance within China make it difficult to sample across the country, therefore two main cities, Beijing and Shanghai, were chosen, further constraining the sample size. Even though they are representative (see Section 2.1.2.2), this research's final sample size was relatively small in comparison to the total number of small and medium sized software enterprises present in the entire Chinese market.

Theoretical data collection and analysis issues within the confines of this study can also pose a number of problems. The research has been conducted by positioning itself between positivism and interpretivism and having a slight bias towards positivism. Due to the nature of interpretivism and the data structuring, the processing and analysis of the data, especially from interviews, necessarily involved the personal views of the researcher to some degree; thereby making the results subjective.

The third limitation of this study extends into the target realm of the survey and interviews, as both were only conducted among the software entrepreneurs, officials and bankers. The study has not attempted to collect data from the perspectives of universities, and such institutes are involved with technology transfer as well. Hence the research was lacking with regards to input from some parties for particular technology transfer issues.

Finally, the fourth research limitation stems from the temporal dimensions associated with this research. The specific, small-size, software business sector within the Chinese IT industry was used as the laboratory for this research, with the economic reforms movement acting as the catalyst of entrepreneurship for examining its effectiveness in technology transfer. However, the essence of transitional economies is that they are dynamic in character and that it is necessary to take account of changes in institutional environment. Therefore certain relevant policies, either in development or currently underway, may create possible impacts that this study has missed due to timing.

8.3.2 Recommendations for Future Research

Future research on the conceptual framework should serve to advance much of the groundwork established in this study. Therefore, the following representative propositions are recommended as the basis for future explorations. However, given the depth of this research, numerous other broad relationships and directions for future research that have not yet been considered within this section may indeed be explored too.

First one must develop a more complete understanding of how small and medium sized Chinese software firms undertake their entrepreneurial activities under the Chinese economic reform context, which could be done by expanding the research sample size. For instance, further investigation could choose to examine those software firms located not just in Beijing and Shanghai, but also in some other cities recommended such as Shenzhen, Chengdu or Shenyang. Here small and medium sized software firms can also be found. Studies of these cities may reveal other interesting and creative models of entrepreneurial phenomena. Future exploration could also choose to examine entrepreneurial activities among the large sized software firms, in comparison to small and medium sized firms. Larger firms may benefit and respond to the Government's preferential policies differently, therefore this would be of interest to examine on a comparative basis.

Second, as mentioned previously, the data used has been collected mainly from entrepreneurs, therefore, the results generated above have excluded views from universities. In the future, some research could be undertaken by collecting data relevant to the same topic from universities too. It would be worth exploring how the academic world responds to the Chinese economic reforms and especially the Government's emphasis on 'rejuvenating the country through advanced science and technology'.

Third, it would be worthwhile examining the concept of perceptual lags and how firms assess and/or react to the changing environment resulting from the adjustment of the relevant Government policies a few years from now. Perhaps the factors impacting their attitudes towards technology transfer may well alter significantly in the next few years, because the entrepreneurial context might change. For example, in terms of financing, there has been historic discussion about setting up a 'second board' in the Chinese stock market like "Nasdaq" which will be ready for some high-tech SMEs. Recently the proposal has been mentioned again formally. If the second board is set up, it is worth noting what kind of influence can be brought to the SMEs and the development of software industry in China on relevant issues like financing firms and benefits for technology transfer. Therefore it would be of particular interest to conduct an analysis to examine or compare the evolution of how entrepreneurship may be able to play a role in technology transfer from universities for small and medium sized software companies if their financial status were to be improved.

Finally, as the software industry was the laboratory for this research, the laboratory itself may be changed. This examination may be conducted on firms from different high-tech sectors such as high-tech electronic goods producers or biochemical sectors that have been exposed to face the same technology transfer issues. It would be interesting to explore the nature of their entrepreneurial activities and how they respond to institutional environment.

Appendix I

Questionnaire to conduct survey

<u>Personal Details, Details about your company and Reasons for Starting up Your Business</u>

1. Respondent's Name:__________________

2. Company's Name:______________________________________

3. When did start your software business?
Please indicate year:____________________

4. How old were you and what were your qualifications when you started your business?

Age		Qualification	

5. Why did you start a software business? (Please tick a – g as appropriate. You may tick more than one answer for this and the following questions)
<u>Because</u>
□ a. of individual ambition (possibly due to an inherent desire to take risk and the prospect of greater job satisfaction through working for yourself rather than for somebody else)
□ b. of the possibility of utilising preferential policy in creating a university spin-off, or by being an overseas student etc.
□ c. of my ability to recognize the opportunities among networks
□ d. I had a good business idea
□ e. I had developed a product and/or service which I thought people wanted to buy
□ f. I wanted to make money and create a better life for my family
□ g. Other reasons

6. Where is your business located? (Please tick as appropriate)
□ a. in science park □ b. near a university □ c. near customers
□ d. other location (please specify)

____

7. Why did you choose this location? (Please tick/circle a – e as appropriate)
□ a. because of the cheap rent
□ b. because of its proximity to software programmers based at the university
□ c. because it is near to my customers
□ d. because of tax advantages
□ e. other reasons(please specify)______________________________________

8. What are the strengths of your business? (Please give each option a score between 1 and 5, such that 1 = very poor; 5 = very good)

□ a. your staff working in the business
□ b. your intellectual property
□ c. your brand
□ d. your financial resources
□ e. your physical location
□ f. your networks
□ g your technological capabilities

9. To what extent did you rely on your social relations/network (guanxi) to help you acquire the following resources. (Please give each option a score between 1 and 5, such that 1 = irrelevant; 5 = very important)
□ a. to establish my business
□ b. to get business opportunities
□ c. to obtain my start-up capital initially
□ d. to get access to further finance/loans
□ e. to find good staff
□ f. other (please state):

Growth from Start-Up and Environmental Factors

10. How did you finance your company when you started it? Please indicate sources and their approximate percentage contribution to total start-up capital.
Percentage of Initial Start-up Capital obtained from:
Self ____________________ %
Family ____________________ %
Friends ____________________ %
Loan from Bank ____________________ %
Venture Capital ____________________ %
Other ________________________ %

11. Please indicate the importance of your social networks (guanxi) and business plan in obtaining sources of finance (Please tick such that 1 = unimportant; 5 = very important)

Social networks	□1	□2	□3	□4	□5
My business plan	□1	□2	□3	□4	□5

12. Please indicate the growth of your company annually since you started your business. Please fill in as appropriate or leave blank where this information is not available.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
No. of Employees										
Turnover inYuan										
Growth (p.a. in %).										
R&D input (p.a. in %)										

13. Which government policies have helped your business: (Please tick as appropriate according to 1 = not important; 5 = very important)

a) at start up,

	1	2	3	4	5
Preferential policies for high-end talents (tax incentives, package service)	□	□	□	□	□
Preferential policies for Science Park (tax incentives, package service)	□	□	□	□	□
Market entry policies for small enterprises (information security, e-government)	□	□	□	□	□
Government purchase policies	□	□	□	□	□
Government training policies	□	□	□	□	□

b) since starting your business:

	1	2	3	4	5
Preferential policies for high-end talents (tax incentives, package service)	□	□	□	□	□
Preferential policies for Science Park (tax incentives, package service)	□	□	□	□	□
Market entry policies for small enterprises (information security, e-government)	□	□	□	□	□
Government purchase policies	□	□	□	□	□
Government training policies	□	□	□	□	□

14. To what extent do the following factors constrain or impede the technology transfer from universities/research institutes to develop/grow your business? (Please tick as appropriate 1 = hardly at all; 5 = very strong)

Factors \ Constraints	1	2	3	4	5
Lack of entrepreneurial capability of innovation	□	□	□	□	□
Lack of internationally competitive innovation	□	□	□	□	□
University bureaucracy	□	□	□	□	□
Lack of IPR protection	□	□	□	□	□
Inadequate venture capital	□	□	□	□	□
Lack of Human resources with relevant skills	□	□	□	□	□
Government policies	□	□	□	□	□
Others	□	□	□	□	□

Factors \ Impetus	1	2	3	4	5
Entrepreneurial culture within universities	□	□	□	□	□
Availability of business advice for science park/University based start-ups	□	□	□	□	□
University networks	□	□	□	□	□
Financial and legal advise	□	□	□	□	□
Government policies	□	□	□	□	□
Competition	□	□	□	□	□
Human resources with relevant skills	□	□	□	□	□
Others	□	□	□	□	□

Intellectual Property and Innovation

15. What intellectual property does your company have? (Please tick a – d as appropriate)

□ a. copyright
□ b. trademark
□ c. software patent
□ i) invention patent
□ ii) new application patent
□ iii) appearance design patent
□ d. other (please specify)________________________________

16. How many new intellectual property items have you developed since 2000? (Please circle number for each)

□ a. patent □0 □1 □2 □3 □4 □5 □6
(specify if more)________________

□ b. trademark □0 □1 □2 □3 □4 □5 □6
(specify if more)________________
□ c. copyright □0 □1 □2 □3 □4 □5 □6
(specify if more)________________
□ d.other(please specify)____

17. How do you think that the development of your company's intellectual property is linked to your company's size or your R&D expenditure per annum? (Please tick as appropriate 1 = hardly at all; 5 = very strong)

	1	2	3	4	5
Linked to company's size	□	□	□	□	□
Linked to R&D input	□	□	□	□	□

18. What was the source of your company's technology? (Please tick as appropriate)

□ a. spun out from universities
□ b. self-innovated
□ c. product idea imitated
□ d. or other

19. If you work with a university/universities, why do you work with them? (Please tick as appropriate a-c)

□ a. to have access to scientists/students as potential employees
□ b. to have them carry out R&D for the company
□ c. to purchase their innovation
□ d. other reasons(please specify)____
____

<u>Competition with rivals and future planning</u>

20. Who are your competitors? (Please indicate as appropriate)

□ a. other small entrepreneurial Chinese software companies
□ b. Chinese SOEs
□ c. foreign multinationals
□ d. other____

21. How do you compete against them? (Please tick a – f appropriate)

□ a. by price
□ b. by superior technology
□ c. by greater variety of products
□ d. by service
□ e. by added value (please specify what the added value is)
____
□ f. by having better "guanxi"

□ g. by other strategies (please specify)

____

____

22. What will be your R&D investment plan for future business expansion?

	0%	1-5%	6-10%	11-15%	16-20%	Other %
Next 1 – 3 years						
Next 3 - 5 years						
Next 5 – 10 years						
10 year after						

23. Are you going to continue working with a university/universities further?
□YES □NO

24. If YES, please elaborate what sorts of benefits you expect to have for your business development. (Please tick as appropriate)
□ a. You can outsource your R&D to them
□ b. You can use their specialist equipment
□ c. Access to scientists and specialists
□ d You can recruit staff to your company
□ e. Brand association or kudos of working with a university
□ f. You can buy/access new technology to develop/grow your business

25. If No, please indicate why not. (Please tick as appropriate)
□ a. Because university staff are not very entrepreneurial
□ b. Because the university has inadequate technical facilities
□ c. Because the company needs to work with other R&D companies elsewhere
□ e. Because I can get cheaper/better quality resources/technology elsewhere
□ f. Because we are re-locating and it will be difficult to maintain contact with the university staff and resources once we have moved
□ g. Other (please specify)______________________________

26. If your business is currently located on a STIP do you see yourself staying there in the next 3-5 years? (Please delete as appropriate)
□YES □ DON'T KNOW □ NO

27. If YES, why do you want to remain, because: (Please tick as appropriate)
□ a. of proximity to university talents and technology
□ b. of preferential policies
□ c. of networks
□ d other(please specify)______________________________

28. If you <u>DON'T KNOW</u>, this is because: (Please tick as appropriate)
□ a. you are not sure where could be more helpful for your business development.
□ b. you are concerned about cost.
□ c. other(please specify)____

29. If <u>NO</u>, why do you want to relocate, because: (Please tick as appropriate)
□ a. you want to be nearer your customers
□ b. you need bigger/different premises
□ c. you can get better resources and technology elsewhere
□ d. other(please specify)____

30. What will you do with your business in the next 5 years? (Please tick as appropriate) And explain why.
□ a. grow sufficiently large to get listed

____

□ b. sell your business and use the profits to start another business or retire

____

□ c. go into partnership with another company to get new technology and/or market
□ i) aim to get provincial market share
□ ii) aim to get national market share
□ iii) aim to sell (more) on the international market

____

□ d. other:____

THANK YOU FOR YOUR TIME AND FOR FILLING IN THE QUESTIONNAIRE.

Appendix II

Reliability Test (preparation for correlating)

(a) at starting up stage

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	V80	3.1887	1.3164	53.0
2.	V81	3.7170	1.2149	53.0
3.	V82	2.6226	1.2592	53.0
4.	V83	2.2453	1.1587	53.0
5.	V84	2.1887	1.1445	53.0

N of Cases = 53.0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	13.9623	19.5755	4.4244	5

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
V1	10.7736	13.5631	.4413	.3771	.7716
V2	10.2453	14.3425	.4083	.3229	.7783
V3	11.3396	11.4978	.7602	.6002	.6536
V4	11.7170	13.5914	.5433	.6728	.7345
V4	11.7736	13.1785	.6122	.6585	.7124

\-

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

Reliability Coefficients 5 items

Alpha = .7745

(b) at developing stage

****** Method 1 (space saver) will be used for this analysis ******

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	V85	3.2885	1.2261	52.0
2.	V86	3.8077	1.1554	52.0
3.	V87	2.7115	1.3186	52.0
4.	V88	2.3846	1.2857	52.0
5.	V89	2.0769	1.2021	52.0

Statistics for	Mean	Variance	Std Dev	N of Variables
SCALE	14.2692	21.8084	4.6700	5

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
V1	10.9808	15.6663	.4779	.8081
V2	10.4615	15.8220	.5061	.7990
V3	11.5577	13.3888	.6924	.7422
V4	11.8846	14.0256	.6365	.7609
V5	12.1923	14.1976	.6807	.7483

Reliability Coefficients

N of Cases = 52.0   N of Items = 5

Alpha = .8101

Appendix III

Themes generated from each question shown by tables detailing each survey respondent's choices

Table 1 Motivation for Starting High-Tech Business (Issues Raised)

+ affirmed by interviewee as a motivating factor

Name of Entrepreneur	Technology owned/developed by Entrepreneur	Ambition	Encouraged by Reforms and Business Environment in China	Own business know-how and experience	Own high level of education	Good networks	Own ability to spot the business opportunity	Wanting to Improve Life for Family
Chen	+			+				
Chi	+		+	+			+	
Dai	+	+	+	+				+
Gong	+		+	+				
Wu		+						
Li	+	+	+					
Liu	+					+	+	
Liu	+							
Lu	+		+	+				
Tan		+		+	+			
Cao				+	+			
Wang				+	+		+	
Xie	+	+			+	+	+	+
Xue						+		
Yao						+	+	
Zhang	+						+	
Zhou	+		+					
Total	11	4	6	7	4	4	6	2

Table 2 Reasons for decisions about locating

+ affirmed by interviewees as a reason for locating

Name of entrepreneurs	Locating within STIP				Locating near to clients		Locating near to universities		Other locations
	Tax incentives	Innovative atmosphere	Cheap rent	Agglomeration externalities	Convenient transport	Good communication	Human resources	University's facilities	
Chen	+	+							
Chi	+	+							
Dai						+			
Gong	+	+							
Wu									+
Li	+						+		
Liu	+								
Liu								+	
Lu	+		+				+		
Tan			+					+	+
Cao	+		+		+		+		
Wang									+
Xie						+			
Xue									+
Yao									+
Zhang				+					
Zhou				+					
Total	7	3	3	2	1	2	3	2	5

Table 3 The various strengths providing competitive advantages for business development

+ affirmed by interviewees as a strength delivering competitive advantage

Name of entrepreneurs	Advanced technology for niche market	High-tech products	Hard working employees	Available financial support	Good networks with clients	Good team	Excellent R&D capabilities
Chen	+						
Chi		+				+	
Dai					+		+
Gong		+					+
Hua		+	+	+			
Li			+				
Liu						+	+
Liu	+						+
Lu	+				+		+
Tan					+		+
Cao		+					
Wang			+		+		
Xie			+		+		
Xue		+			+		+
Yao					+		
Zhang •							
Zhou •		+					
Total	3	6	4	1	7	2	7

Table 4. Comparative importance of social networks and business plans in financing companies
+ affirmed by interviewees as stated influence

Name of entrepreneurs	Both social networks and business performance equally important	Social networks more important	Business plan more important	Both not important	Ambiguous view
Chen			+		
Chi			+		
Dai		+			
Gong		+			
Wu	+				
Li				+	
Liu	+				
Liu			+		
Lu			+		
Tan			+		
Cao			+		
Wang	+				
Xie	+				
Xue			+		
Yao			+		
Zhang					+
Zhou					+
Total	5	2	8	1	2

Table 5. The various benefits gained from the different government policies for business development
+ affirmed by interviewees as a benefit/reason for business development

Name of entrepreneurs	Government policy bring no benefit at all			Benefit from tax incentives	Benefit from locating within STIP	Benefit from some government funds		No benefit from training programmes	No benefit from purchasing policy
	Business development not relying on the government policies	Technology more important	Policymakers not familiar with the relevant field			Funds for national projects	Fund for SMEs		
Chen	+								
Chi				+	+			+	+
Dai									
Gong							+		
Wu				+					+
Li					+			+	+
Liu								+	+
Liu						+		+	
Lu			+						
Tan		+						+	
Cao				+			+	+	+
Wang				+					
Xie				+					
Xue	+								
Yao			+						
Zhang				+	+			+	+
Zhou				+			+		
Total	2	1	2	6	3	1	3	7	6

Table 6. The different influence given by the various factors to transfer technology from universities

+ affirmed by interviewees as a factor influencing technology transfer from universities

Name of entrepreneurs	The universities' bureaucracy			The government policies		Lack of IPR protection	Available human resources	Lack of venture capital	Innovative capabilities	Entrepreneurial environment within universities	Academic bias in universities	Networks on campus	Services provided by counselling firms		No cooperation
	Constraint	Avoided	Not bureaucratic	Little influence	Impetus	Constraint	Impetus	Constraint	Impetus	Impetus	Constraint	Impetus	Impetus	Helpless	
Chen															+
Chi					+		+	+			+			+	
Dai	+				+		+		+	+		+		+	
Gong	+				+		+	+			+			+	
Wu					+		+	+	+				+		
Li						+	+				+	+			
Liu	+			+		+	+	+			+		+		+
Liu								+							
Lu		+		+			+		+	+				+	
Tan															+
Cao															+
Wang					+		+		+						
Xie			+		+		+								
Xue															+
Yao															+
Zhang					+				+						
Zhou															+
Total	3	1	1	2	7	2	9	5	5	2	4	2	2	5	7

Table 7a The factors benefiting business development and future plans to enhance the innovation capabilities

+ affirmed by interviewees as an advantage to business development

Name of entrepreneurs	Products with advanced technology			Products available for markets			Good and suitable services		Strong tech. team
	Self-invented	Transferred from top HEIs	No source	No source	Reintegrating from overseas	Imitating & improving existing ones	Being close to clients	Having abilities to adjust	
				+					
	+								
							+		
			+				+		
		+							
				+					
	+								
				+					
									+
					+			1	
						+			
				+					+
				+			+		
	+						+		
			+						
Total	3	1	2	5	1	1	4	1	2

Table 7b The future plans for enhancing innovative capabilities
+ affirmed by interviewees as future plan to enhance innovative capabilities

Name of entrepreneurs	Acquiring more talents	Acquiring more financial capitals	Cooperating with other firms	Cooperating with Universities	Better allocation of internal resources & Absorbing more technology	More market research	Investing more in/strengthening R&D
Chen							
Chi	+						+
Dai					+		
Gong					+		
Wu					+		
Li	+	+					
Liu				+			
Liu							
Lu							
Tan							
Cao						+	+
Wang	+		+				+
Xie	+						
Xue							
Yao							
Zhang							
Zhou							
Total	4	1	1	1	3	1	3

Table 8. The status of IPR protection in China and any influence this has on business development
+ affirmed by interviewees as the relevant status

Name of entrepreneurs	Not well protected	Negative influence	Little negative influence		Positive influence	Other
			Providing service mainly & not copied easily	Products well designed & rarely copied		
Chen	+		+			
Chi				+		
Dai	+		+			
Gong				+		
Wu	+					
Li		+				
Liu						+
Liu	+			+		
Lu				+		
Tan						+
Cao		+				
Wang						+
Xie	+	+				
Xue				+		
Yao					+	
Zhang						
Zhou						+
Total	5	3	2	5	1	4

Table 9a. The target rivals and how to compete with them
+ affirmed by interviewees as a rival/competitive way

Name of entrepreneurs	Small & medium sized firms			SOEs			MNCs		Rivals not clarified by interviewees			
	Good service & staff	Close relation with clients	Advanced technology	Being more flexible	Staff work harder	Closer to clients	Better price	Closer to clients and a shared culture	Advanced technology	Value-added service	Choosing a purely new market	Good networks
Chen	+	+										
Chi									+	+		
Dai											+	
Gong					+							
Wu	+											
Li												
Liu	+											
Liu							+					
Lu									+			+
Tan							+	+				
Cao									+	+		
Wang								+				
Xie				+	+	+						
Xue												
Yao												+
Zhang									+			
Zhou			+				+					
Total	3	1	1	1	2	1	3	2	4	2	1	2

Table 9b. The future planning to better compete with rivals
+ affirmed by interviewees as a planning

Name of entrepreneurs	Future planning						
	No	Diversifying products	Widening the ranges of value-added services	Improving management & better allocation of internal resources	Cooperating with universities to absorb talents & reduce R&D cost	Cooperating with other firms	Others
Chen	+						
Chi				+			
Dai			+				
Gong				+			
Wu				+			
Li					+		
Liu		+					
Liu				+			
Lu		+					
Tan							
Cao							
Wang					+		
Xie						+	
Xue	+						
Yao							
Zhang							+
Zhou						+	
Total	2	2	1	4	2	2	1

Table 10. The directions for future development within the next five years and how

+ affirmed by interviewees as a development direction/way

Name of entrepreneurs	Expanding business through				Being listed through				Maintaining the clients to be more profitable	Selling business	No plan
	Further developing independently	Cooperating with other firms to be acquire advanced tech or better marketing	Acquiring useful capital/resources	Expanding market shares locally/globally	Improving performance	Acquiring more human capital	Acquiring more financial capital	Developing better products & marketing properly to increase market shares			
Chen		+									
Chi		+			+						
Dai							+				
Gong		+			+						
Wu		+			+						
Li	+										
Liu						+	+				
Liu	+										
Lu					+						
Tan								+			
Cao			+	+				+			
Wang			+	+							
Xie					+			+			
Xue										+	
Yao									+		
Zhang											+
Zhou		+									
Total	2	5	3	2	5	1	2	3	1	1	1

References

Acs, Z.J., and Audretsch, D.B. (1987) 'Innovation, Market Structure, and Firm Size', *The Review of Economics and Statistics,* 69(4), pp.567-574.

Acs, Z.J., and Audretsch, D.B. (1988) 'Innovation in Large and Small Firms: An Empirical Analysis', *American Economic Review,* 78(4), pp.678-690.

Acs, Z.J., and Audretsch, D.B. (2003) *Handbook of Entrepreneurship Research.* Dordrecht: Kluwer

Akerlof, G. A. (1970) 'The market for lemons: qualitative uncertainty and the market mechanism', *Quarterly Journal of Economics,* 84(3), pp.488-500.

Aldrich, H. (1997) 'Entrepreneurial Strategies in New Organizational Populations', in Swedberg, R. (eds.) *Entrepreneurship: The Social Science View*. Oxford: Oxford University Press, pp. 211-228.

Aldrich, H. and Wiedenmayer, G. (1993) 'From traits to rates: An ecological perspective on organizational foundings', in Katz, J.A. and Brockhaus, R.H. (eds.) *In Advances in entrepreneurship, firm emergence, and growth.* Greenwich, CT: JAI Press, pp. 145-195.

Aldrich, H. and Baker, T. (2001) 'Learning and Legitimacy: Entrepreneurial Responses to Constraints on the Emergence of New Populations', in Schoonhoven, C.B. and Romanelli, E. (eds.) *The Entrepreneurship Dynamic: Origins of Entrepreneurship and the Evolution of Industries*. Stanford: Stanford University Press, pp. 207–235.

Allen, T.J. (1997) *Managing the flow of technology.* Cambridge, MA: MIT Press.

Allred, A.T. and Addams, H.L. (2006) 'After Receiving Financing, Do INC. 500 Companies Continue to Utilize The Business Plan?', *Journal of Small Business*

Strategy, 17(1), pp.17-26

Andrew, S.K. (1971) *The concept of Corporate Strategy.* Homewood, IL: Dow Jones, Irwin.

Arrow K.J. (1962) 'The economic implications of learning by doing', *Review of Economic Studies,* 29(2), pp.155-173.

Audretsch, D.B. and Lehmann, E.E (2004) 'Financing High-Tech Growth: The Role of Banks and Venture Capitalists', *Business Review: ZFBF,* 56(4), pp.340-355.

Baark, E. (2004) *The Evolution of China's Software Industry.* [Online]. Available at:http://www.law.gmu.edu/nctl/stpp/us_china_pubs/6.3_Evolution_of_China_software_industry.pdf (Accessed: 10 May 2006).

Barney, J.B. (1991) 'Firms resources and sustained competitive advantage', *Journal of Management,* 17(1), pp.99-120.

Barney, J.B. (2002) *Gaining and sustaining competitive advantage.* Upper Saddle River, NJ: Prentice Hall.

Beaver, G (2007) 'The strategy payoff for smaller enterprises', *Journal of Business Strategy,* 28 (1), pp.11-17.

Behrman, J.N. and Wallander, H.W. (1976), *Transfers of Manufacturing Technology within Multinational Enterprises.* Cambridge, MA: Ballinger.

Bell, E. R. (1993) 'Some Current Issues in Technology Transfer and Academic–Industrial Relations: A Review', *Technological Analysis and Strategic Management,* 5(3), pp.307-321.

Berger, A.N., and Udell, G.F. (1998) 'The Economics of Small Business Finance:

The Roles of Private Equity and Debt Markets in the Financial Growth Cycle', *Journal of Banking and Finance,* 22(9), pp.873-897.

Bernanke, B.S. (2006) 'The Chinese Economy: Progress and Challenges', Speech to the Chinese Academy of Social Sciences, Beijing, 15 December.

Birley, S. and Westhead, P. (1993) 'A Comparison of New Businesses Established by Novice and Habitual Founders in Great Britain', *International Small Business Journal,* 12(1), pp.38-60.

Blau, P.M. (1977) *Inequality and heterogeneity.* New York: Free Press.

Blaug, M. (1986) *Economic History and the History of Economics.* London: Wheatsheaf Books.

Blogcatalog, (2009) 'Benefits of the SaaS model', *Blogcatalog* [Online]. Available at: http://www.blogcatalog.com/blogs/software-as-a-service.html (Accessed: 20 January 2009)

Bond, M.H. (1991) *Beyond the Chinese Face – Insights from Psychology.* New York: Oxford University Press.

Bossard, J.S. (1932) 'Residential propinquity as a factor in marriage selection', *American Journal of Sociology,* 38(2), pp.219-224.

Britto, J., Cassiolato, J.E. and Stallivieri, F. (2007) 'Sectoral system of innovation and patterns of specialization in the software industry: A comparative analysis of Brazil, China and Russia', Paper presented at Globelics Russia 5th International Conference, Russia.

Brizendine, T. (2002) 'Software Integration in China', *The China Business Review,* March-April, pp.26-31.

Brown, T.E., Davidsson, P., and Wikland, J. (2001) 'An operationalization of

Stovenson's conceptualization of entrepreneurship as opportunity-based firm behaviour', *Strategic management Journal,* 22(1), pp.953–968.

Bryman, A. (2004) *Social Research Methods.* New York: Oxford University Press.

Bryman, A. and Bell, E. (2003) *Business Research Methods.* New York: Oxford University Press.

Burns, P. (2001) *Entrepreneurship and Small Business.* Basingstoke: Palgrave Macmillan.

Burrell G. and Morgan G. (1979) *Sociological Paradigms and Organisational Analysis.* London: Heinemann Educational Books.

Burt, R. (2000) 'The Network Entrepreneur', in Swedberg, R. (eds.) *Entrepreneurship: The Social Science View.* Oxford: Oxford University Press, pp.281-306.

Business Alert (2003) 'Acute Shortage of Senior IT Personnel', *Business Alert – China,* 1 March, [Online]. Available at: http://www.tdctrade.com/alert/cba-e0303sp-10.html (Accessed: 16 March 2004).

Carcia-Herrero, A., Cavila, S. and Santabarbara, D. (2006) 'China's Banking Reform: An Assessment of its Evolution and Possible Impact', *CESifo Economic Studies*, 52(2), pp.304-363.

Cassell, C. and Symon, G. (eds) (2004) *Essential Guide to Qualitative Methods in Organisational Research.* London: Sage.

Castells, M. and Hall, P. (1994) Technopoles of the Worlds: The Making of 21st Century Industrial Complexes. London: Routledge.

CCTD Consulting (2003) 'The Chinese national software exports: will take a long journey to develop further and well', *CCTD Consulting* [Online]. Available at:

http://www.ccidnet.com/news/analyseobserve/2003/02/28/109_83402.html
(Accessed: 15 October 2005).

Chandler, G.N. and Hank, S.H. (1994) 'Market attractiveness, resource-based capabilities, venture strategies, and venture performance', *Journal of Business Venturing*, 9(4), pp.331-349.

Chen, G.J., Li, J. and Matlay, H. (2006) 'Who are the Chinese private entrepreneurs?: A study of entrepreneurial attributes and business governance', *Journal of Small Business and Enterprise Development*, 13(2), pp.153-227.

China (2006), 'Summary of the Tenth Five-Year Plan (2001-2005) – Information Industry', *Chinese Government* [Online]. Available at:
http://unpanl.un.org/intradoc/groups/public/document/activy/unpan022769.pdf
(Accessed: 15 August 2006).

Choi, C.J., and Nailer, C. (2005) 'Pricing and surviving the local competition', *European Business Review*, 17(2), pp.177-190.

Churchill, N. C. and Lewis, V.L. (1983) 'The Five Stages of Small Firm Growth', *Howard Business Review*, 61(3), pp.43-50.

C.O.D. (1964) *Concise Oxford Dictionary*. 5th edn. Oxford: Oxford University Press.

Coleman, J.S. (1990) *Foundations of Social Theory*. Cambridge, MA: Harvard University Press.

Collis, J. and Hussey, R. (2003) *Business Research: A practical guide for postgraduate and undergraduate students*. 2nd edn. Basingstoke: Palgrave.

Cooke, P. and Morgan, K. (1998) *The Associational Economy*. Oxford: Oxford University Press.

Cooper, A. C. (1985) 'The role of Incubator Organizations in the Founding of Growth-Oriented Firms', *Journal of Business Venturing,* 1(1), pp.75-86.

Cooper, A. C. (1993) 'Challenges in Prediction New Firm Performance', *Journal of Business Venturing,* 8(3), pp.241-253.

Coopers and Lybrand (1995) *Report on University-Business Joint Ventures.* Washington, DC: Coopers & Lybrand.

Cope, J. (2005) 'Researching entrepreneurship through phenomenological enquiry', *International Small Business Journal,* 23(2), pp.163-189.

Coval, J. and Moskowitz, T.J. (2001) 'The geography of investment: informed trading and asset prices', *Journal of Political Economy,* 109(4), pp.811-841.

CSIA (2000) *Report on the Chinese Software Industry.* Beijing: China Software Industry Association.

CSIA (2003) *Annual Report of China Software Industry, 2002-2003.* Beijing: China Software Industry Association.

Czamanski, S and Ablas, L.A. (1979) 'Identification of Industrial Clusters and Complexes: A Comparison of Methods and Findings', *Urban Studies,* 16(1), pp.61-80.

De Vaus, D.A. (1991) *Survey in Social research.* North Sydney: Allen & Unwin.

Deng,. S.L. and Dart, J. (1999) 'The market orientation of Chinese enterprises during a time of transition', *European Journal of Marketing,* 33(5/6), pp.631-654.

Denzin, N.K. and Lincoln, Y.S. (eds.) (2000) *Handbook of Qualitative Research.* Thousand Oaks, CA: Sage.

Doeringer, P. B. and Terkla, D. G. (1996). 'Why do industries cluster?', in Staber, U., Schaefer, N. and Sharma, B. (eds.) *Business Networks: Prospects for Regional Development.* New York: Walter de Gruyter.

Dollinger, M.J. (1999) *Entrepreneurship: Strategies and Resources.* Upper Saddle River, NJ: Prentice Hall.

Dubini, P. and MacMillan, I.C. (1988) 'Entrepreneurial prerequisites in Venture Capital backed projects', *Frontiers of Entrepreneurship Research,* pp.46-58.

Eden, C. and Ackermann, F. (1998) *Making Strategy: The Journey of Strategic Management.* London: Sage.

Enright, M.J. (2000a) 'The Globalisation of Competition and the Localization of Competitive Advantage: Policies Toward Regional Clustering', in Hood, N. and Yound, S. (eds.) *The Globalisation of Multinational Enterprise Activity and Economic Development.* London: Macmillan Houndmills, pp. 303-331

Enright, M..J. (2000b) *Survey of the Characterization of Regional Clusters: Initial Results.* Hong Kong: Institute of Economic Policy and Business Strategy, University of Hong Kong.

EOL (2009) *Ministry of Education in China allows 35 Software Institutes to try "two systems in one institute" straightaway.* [Online]. Available at: http://www.eol.cn/dong_tai_2140/20090225/t20090225_360963.html (Accessed: 10 March 2009).

Ernst, D. (2005) 'The New Mobility of Knowledge: Digital Information Systems and Global Flagship Networks', in Sassen, S. (eds.) *Digital Formations in a Connected World.* U.S. Princeton: Princeton University Press.

Ernst, D. and Naughton, B. (2005) *China's Emerging Industrial Economy – Insights from the IT Industry (Draft version).* Proceedings of the East-West Centre Conference on China's Emerging Capitalist System, Honolulu, Hawaii.

European Commission (2003) *SME Definition.* Available at: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm (Accessed: 16 April 2005)

Fang, X.D. and Jiang, S.L. (2004) *China's Silicon Valley Gone?* Beijing: Zhongguo Haiguan.

Feser, E. J. and Bergman, E. M. (2000) 'National industry cluster templates: A framework for applied regional cluster analysis', *Regional Studies,* 34(1), pp.1-21.

Festinger, L., Schacter, S. and Back, K.W. (1950) *Social pressures in informal groups.* New York: Harper.

Floyd, J. and Fowler, J. (2002) *Survey Research Methods.* London: Sage.

Floyd, S.W. and Wooldridge, S. (1996) *The strategic middle manager.* San Francisco, CA: Jossey-Bass.

Foster, M.J. (2009) 'Patterns of FDI into China: and differing impacts across its regions from common, associated policies', Revised version of paper presented at Conference on: 'The state and the internationalisation of business: is there a China or India model?', 28-30 October, Confucius Institute for Scotland, Edinburgh.

Fox, C.R. and Tversky, A. (1995) 'Ambiguity aversion and comparative ignorance', *Quarterly Journal of Economics,* 110(3), pp.585-603.

Freeman, C. (1991) 'Networks of innovators: A synthesis of research issues', *Research Policy,* 20(5), pp.499-514.

Fried, V.H. and Hisrich, R.D. (1994) 'Toward a model of venture capital investment decision making', *Financial Management,* 23(4), pp.28-37.

Garmaise, M.J. (2004) 'Confronting information asymmetries: Evidence from real estate markets', *Review of Financial Studies,* 17(2), pp.405-437.

Gartner, W. (1985) 'A conceptual framework for describing the phenomenon of new venture creation', *Academy of Management Review*, 10(4), pp.696–706.

Gartner, W. (1988) 'Who is an entrepreneur? Is this the wrong question?', *American Journal of Small Business*, 12(1), pp.11-31.

Gartner (2001) 'Financial Software Selection for the Chinese Market', Gartner Research DF-14-5486, November

Gibb, A. and Scott, M. (1985) 'Strategic Awareness, Personal Commitment and the Process of Planning in the Small Business', *Journal of Management Studies*, 22(6), pp. 597-631.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M. (1994) *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. London: Sage.

Glancey, K. S. and McQuaid, R. W. (2000) *Entrepreneurial Economics*. England: Macmillan.

Gnyawali, D. R. and Fogel, D. S. (1994) 'Environments for Entrepreneurship Development: Key Dimensions and Research Implications', *Entrepreneurship Theory and Practice*, 18(4), pp.43-62..

Granovetter, M.S. (1973) 'The strength of weak ties', *American Journal of Sociology*, 78(6), pp.1360-1380.

Greene, P.G., Brush, C.G. and Brown, T.E. (1997) 'Resources in Small Firms: An Exploratory Study', *Journal of Small Business Strategy*, 8(2), pp.25-40.

Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E. and Tourangeau, R. (2004) *Survey methodology, that works*. Hoboken, NJ: Wiley.

Gu, S.L. (1999) *China's Industrial Technology: Market reform and organizational change*. London and New York: Published in association with the UNU Press.

Guo, K.S. (2001) 'The Strategic Adjustment of China's Industry Structure in the Next Five Years', *China & World Economy,* (2) [Online]. Available at: http://www.iwep.org.cn (Accessed: 20 October 2007).

Guowuyuan (2000) *Some Policies regarding how to encourage the development of the Chinese national Software Industry and Integrated Circuit Industry, Circular no. 18.* Beijing: The General Office of the State Council.

Guowuyuan (2002) *Action Programme for Promoting the Software Industry, Notice no. 47.* Beijing: The General Office of the State Council.

Hagen, E. E. (1962) On the Theory of Social Change: How Economic Growth Begins. Homewood: Dorsey Press.

Hamel, G. and Prahalad, C.K. (1996) 'Competing in the New Economy: Managing Out of Bounds', *Strategic Management Journal,* 17(3), pp.237-242.

Hammersley, M. (1996) 'The Relationship between Qualitative and Quantitative Research: Paradigm Loyalty versus Methodological Eclecticism', in J.T.E. Richardson (ed.) *Handbook of Research Methods for Psychology and the Social Sciences.* Leicester: BPS Books.

Hammersley, M. and Atkinson, P. (1995) *Ethnography: Principles in Practice.* 2nd edn. London: Routledge.

Harper, D. A. (1996). *Entrepreneurship and the Market Process: An Enquiry into the Growth of Knowledge.* London: Routledge.

Harwit, E. (2002) 'High-technology incubators: Fuel for China's new entrepreneurship?', *China Business Review,* 29(4), pp.26-29.

Hawkins, R.G. and Prasad, A.J. (eds.) (1981) *Research in International Business and Finance, Vol. 2.* Greenwich and New York: JAI Press.

Herbert, R. F. and Link, A. N. (1988) *The Entrepreneur: Mainstream Views and Radical Critiques.* 2nd edn. New York: Praeger.

Hitt, M.A., Ireland, R.D., Camp, S.M. and Sexton, D.L. (2002) *Strategic entrepreneurship. Integrating entrepreneurial and strategic management perspective. Strategic entrepreneurship. Creating a new mindset.* Oxford, UK: Blackwell.

Hoel, P.G. (1962) *Introduction to Mathematical Statistics.* 3rd edn. New York: Wiley.

Hofer, C.W. and Schendel, D. (1978) *Strategy Formulation: Analytical Concepts.* St. Paul, MN: West Publishing.

Hu, H.L., Lin, Z.X. and Foster, W. (2008) 'China's Software Industry – Current status and development strategies', *China Trade in Services,* 3 September [Online]. Available at: http://tradeinservices.mofcom.gov.cn/en/i/2008-09-03/54732.shtml (Accessed: 12 December 2008).

Hu, Z.Y. (ed.) (2005) *Wen explains proposal on 11th 5-year plan.* 20 October [Online]. Available at: http://www.gov.cn/english/2005/20/content_80097.htm (Accessed: 12 April 2007).

Huang, Y.S. (2008) *Capitalism with Chinese Characteristics: Entrepreneurship and the State.* Cambridge: Cambridge University Press.

Information Industry (2006) *Summary of the Tenth Five-Year Plan (2001 – 2005) – Information Industry* Available at: http://unpal.un.org./intradoc/groups/public/documents/apcity/unpan022769.pdf (Accessed: 12 October 2007).

International Data Corporation (2001) *China Software Market Overview, 2000-2005.* Beijing: IDC.

International Finance Corporation (2002) *China's Emerging Private Enterprises: Prospects for the New Century.* Washington, DC: IFC.

Ireland, R.D., Hitt, M.A., Camp, S.M. and Sexton, D.L. (2001) 'Integrating entrepreneurship and strategic management actions to create firm wealth', *Academy of Management Executive,* 15(1), pp.49-63.

Jenkins, M. (1997) 'Entrepreneurial intentions and outcomes: A comparative causal mapping study', *Journal of Management Studies,* 34(6), pp.895-920.

Johannisson, B. (1992) 'Entrepreneurship - The Management of Ambiguity', in Polesie, T. and Johansson, B. (eds.) *Responsibility and Accounting: The Organizational Regulation of Boundary Conditions.* Lund: Studentlitteratur, pp. 155-179.

Johannisson, B., Alexanderson, O., Nowicki, K. and Senneseth, K. (1994) 'Beyond Anarchy and Organization: Entrepreneurs in Contextual Networks', *Entrepreneurship and Regional Development,* 6(3), pp.329-356.

Ju, D. H. (2008) 'New Steps of China's Software Industry', Paper presented at IPA Forum,Tokyo.[Online]. Available at: http://www.ipa.go.jp/about/news/event/ipaforum2008/pdf/sec_conference2008_ju.pdf (Accessed: 30 November 2008)

Keeble, D. and Walker, S. (1994) 'New Firms, Small Firms, and Dead Firms: Spatial Patterns and Determinants in the United Kingdom', *Regional Studies,* 28(4), pp.411-427.

Kerlinger, F.N. and Lee, H.B. (1999) *Foundations of Behavioural Research.* 4th edn. Orlando, FL: Harcourt College Publisher.

Kirzner, I.M. (1973) *Competition and Entrepreneurship.* Chicago: Chicago University Press.

Klepper, S. (2001) 'Employee start-ups in high-tech industries', *Industrial and Corporate Change,* 10(3), pp.639-674.

Klepper, S. and Sleeper, S. (2005) 'Entry by spinoffs', *Management Science,* 51(8), pp.1291-1306.

Klotz, S. (2004) *The future of China's Software Outsourcing Industry – A Choice of Region to source from.* Master Thesis. Goterborgs University.

Knight, F.H. (1921) *Risk, Uncertainty, and Profit.* Boston, MA: Hart, Schaffner & Marx, Houghton Mifflin Co.

Kono, C., Palmer, D., Friedland, R. and Zafonte, M. (1998) 'Lost in space: The geography of corporate interlocking directorates', *American Journal of Sociology,* 103(4), pp.863-911.

Kroeber, Arthur R. (2001) 'Now for the soft part: China tries the India thing', *China Economic Quarterly,* (1), pp.34-40.

Kwan, S. and Tam, S.J. (1990) 'Some Aspects of Technology Transfer in Hong Kong', *Industrial Engineering,* pp.28 [Online]. Available at: http://sunzi1.lib.hku.hk/hkjo/view/41/4100085.pdf (Accessed: 5 September 2006).

Lagendijk, A. and Cornford, J. (2000) 'Regional institutions and knowledge: tracking new forms of regional development policy', *Geoforum,* 31(2), pp.209-218

Lazarsfeld, P.F. and Merton, R.K. (1954) 'Friendship as a social process: A substantive and methodological analysis', in Berger, M., Abel, T. and Page, C.H. (eds.) *Freedom and control in modern society.* New York: Van Nostrand, pp 8-66.

Li, J. and Matlay, H. (2006) 'Chinese entrepreneurship and small business development: an overview and research agenda', *Journal of Small Business and Enterprise Development,* 13(2), pp.253-254.

Li, Y., Guo, H., Liu, Y., and Li, M.F. (2007) 'Incentive Mechanisms, Entrepreneurial Orientation, and Technology Commercialization: Evidence from China's Transitional Economy', *Journal of Product Innovation Management,* 25(1), pp.63-78.

Liao, D. and Sohmen, P. (2001) 'Entrepreneurship education in China', *Stanford Journal of East Asian Affairs,* 1, pp.27-33.

Lipset, S. M. (2000) 'Values and Entrepreneurship in the Americas', in Swedberg, R. (ed.) *Entrepreneurship: The Social Science View.* Oxford: Oxford University Press, pp.110-128.

Liu, H., and Jiang, Y. (2001) 'Technology transfer from higher education institutions to industry in China: Nature and Implications', *Technovation,* 21(3), pp.175-188.

Locke, E.A. and Latham, G.P. (1990) *A Theory of Goal Setting and Task Performance.* Englewood Cliffs, NJ: Prentice Hall.

Longenecker, J.G., Moore, C.W. and Petty, J.W. (2003) "*Strategies that capture opportunities", Small Business Management: An Entrepreneurial Emphasis.* Mason, Ohio: South-Western.

Lovas, B. and Sorenson, O. (2008) 'The mobilization of scarce resources', in J. A. Baum, J.A. and Rowley, T.J. (eds.) *Advances in Strategic Management: Network Strategy*, Vol. 25. Amsterdam: JAL Press

Lu, Q.W. (2000) *China's Leap into the Information Age, Innovation and Organization in the Computer Industry.* Oxford: Oxford University Press.

Lundequist, P. and Power, D. (2002) 'Putting Porter into Practice? Practices of Regional Cluster Building: Evidence from Sweden', *European Planning Studies,* 10(6), pp.685-704.

MacMillan, I.C., Siegel, R. and Subbanarasimha, P.N. (1985a) 'Criteria used by venture capitalists to evaluate new venture proposals', *Journal of Business Venturing,* 1(1), pp.119-128.

MacMillan, I.C., Siegel, R. and Subbanarasimha, P.N. (1985b) 'Criteria used by venture capitalists to evaluate new venture proposals', *Frontiers of Entrepreneurship Research,* pp.126-141.

Macpherson, A. D. (1992) 'Innovation, External Technical Linkages and Small Firm Commercial Performance: An Empirical Analysis from Western New York', *Entrepreneurship and Regional Development,* (4), pp.165-183.

Mahoney, J.T. and Pandian, J.R. (1992) 'The resource-based view within the conversation of strategic management', *Strategic Management Journal,* 13(5), pp.363-380.

Malerba, F. (2001) 'Sectoral Systems of Innovation and Production: Concepts, Analytical Framework and Empirical Evidence', Paper presented at the EGLS conference, 20-23 September, Eindhoven.

Malmberg, A. (2002) 'Why the cluster is causing continuing confusion: despite being potentially a core concept in economic geography', in Peck, J. and Yeung, H. (eds.) *Global Connections.* London: Sage.

Malmberg, A. and Maskell, P. (2001) 'The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering', in Grabher, G. and Powell, W.W. (eds.) *Networks: Edward Elgar Series Critical Studies in Economic Institutions.* Cheltenham: Edward Elgar.

Marsden, P. V. (1988) 'Homogeneity in confiding relations', *Social Networks,* 10(1), pp.57-76.

Martin, R. and Sunley, P. (2001) 'Deconstructing Clusters: Chaotic Concept or Policy Panacea?', Paper presented at Regional Studies Association conference on Regionalising the Knowledge Economy; 21 November, London.

Marton, K. (1986) 'Technology transfer to developing countries via multinationals', *World Economy,* 9(4), pp.409-426.

Matlay, H. (2004) 'E-entrepreneurship and small e-business development: towards comparative research agenda', *Journal of Small Business and Enterprise Development,* 11(3), pp.408-414

McClelland, D. (1961) *The Achieving Society.* Princeton: Van Nostrand.

McGrath, R.G, Venkatamaran, S. and MacMillan, I.C. (1994) 'The advantage chain: Antecedents to rents from intend corporate venture', *Journal of Business Venturing,* 9(5), pp.351-369.

McGray, D. (1999) 'The Silicon archipelago - The next generation: Work in progress (planned information technology communities similar to Silicon Valley)', *Daedalus,* 128(2), pp.147-149.

Menger, C. (1871) *Principles of Economics.* New York: New York University Press.

Miles, R. and Snow, C. (1978) *Organizational Strategy, Structure and Process.* New York: McGraw Hill.

Mintzberg, H. (1994) *The Rise and Fall of Strategic Planning.* London: Prentice Hall.

Mintzberg, H. and Waters, J.A. (1985) 'Of strategies deliberate and emergent', *Strategic Management Journal,* 6(3), pp.257-272.

von Mises, L. (1951) *Planning for Freedom.* South Holland, III: Libertarian Press.

Nelson, R.R. (1959) 'The simple economics of basic scientific research', *Journal of Political Economy,* 67(3), pp.297-306.

Nelson, R. and Winter, S. (1982) *An Evolutionary Theory of Economic Change.* Cambridge, MA: Belknap Press of Harvard University Press.

neoIT (2003) 'Research Summary: Mapping Offshore Markets', *Offshore Insights White Paper,* Issue 7 [Online]. Available at: http://www.neoit.com/pdfs/whitepapers/Mapping-Offshore-Markets.pdf (Accessed: 20 March 2005).

NUTEK (2001) *Innovation Clusters in Sweden: Practical Lessons from Regional Cluster-building.* Stockholm: NUTEK Klustergruppen (Swedish Cluster Focus Group).

OECD (1999) *Boosting Innovation: The Cluster Approach.* Paris: OECD

OECD (2001) *Innovative Clusters: Drivers of National Innovation Systems.* Paris: OECD.

Penrose, E.T. (1959) *The Theory of the Growth of the Firm.* New York: John Wiley

People's Daily (2003) 'Enterprises in East China Vow to Fight Piracy', *People's Daily,* 28 April [Online]. Available at: http://english.peopledaily.com.cn/200304/27/eng20030427_115874.shtml (Accessed: 2 May 2007).

Peteraf, M.A. (1993) 'The cornerstones of competitive advantage: A resource-based view', *Strategic Management Journal,* 14(3), pp.179-191.

Peters, E. and Hood, H. (2000) 'Implementing the cluster approach', *International Studies of Management and Organization,* 30(2), pp.68-90.

Porter, M. (1985) *Competitive Advantage.* New York: Free Press.

Porter, M. (1990) *The Competitive Advantage of Nations.* New York: Free Press.

Porter, M. (1998a) *On Competition.* Cambridge: Harvard Business School Press.

Porter, M. (1998b) 'Clusters and The New Economics of Competition', *Harvard Business Review,* Nov-Dec, pp.77-90.

Porter, M. (2000) 'Location, competition, and economic development: Local clusters in a global economy', *Economic Development Quarterly,* 14(1), pp.15-35.

Quan, X.H. (2007) *China's Rising Software Industry: A government-driven model.* Singapore: East Asian Institute, National University of Singapore.

Raines, P. (2001) 'The Cluster Approach and The Dynamics of Regional Policy-making', Paper presented at the international RSA conference on Regional Transitions: European Regions and the Challenges of Development Integration and Enlargement, University of Gdansk, Poland.

Redman, J.M. (1994) *Understanding State Economies Through Industry Studies.* Washington, DC: Council of Governors' Policy Advisors.

Ritchie, J. and Lewis, J. (2003) *Qualitative Research Practice.* London: Sage.

Rosenfeld, S. A. (1995) *Industrial-Strength Strategies: Business Clusters and Public Policy.* Washington, DC: Aspen Institute for Humanistic Studies.

Rosenfeld, S. A. (1997) 'Bringing Business Clusters into the Mainstream of Economic Development', *European Planning Studies,* 5(1), pp.1-23.

Saunders, M., Levis, P. and Adrian, T. (2003) *Research Methods for Business Students.* Harlow, UK: Pearson Education.

Saxenian, A. (2003) 'Government and *Guanxi*: The Chinese Software Industry in Transition', Paper presented to 'Global Software from Emerging Markets: An Engine for Growth?' 12 May, London Business School.

Schumpeter, J. (1934) *The Theory of Economic Development.* Cambridge, MA: Harvard University Press.

Schumpeter, J. (1942) *Capitalism, socialism and democracy.* New York: Harper.

Schumpeter, J. (1961) *The Theory of Economic Development.* 7th edn. Oxford: Oxford University Press.

Science & Technology (2004) 'China's New and Hi-tech Development Zones', *Science & Technology Report*, 27 October, [Online]. Available at: http://www.fmprc.gov.cn/ce/cenp/eng/ScienceTechnology/ybxx/t167730.html (Accessed: 20 July 2007).

Scott, M. and Bruce, R. (1987) 'Five Stages of Growth in Small Firms', *Long Range Planning,* 20(3), pp.45-62.

Sharma, P. and Chrisman, J.J. (1999) 'Towards a reconciliation of the definitional issues in the field of corporate entrepreneurship', *Entrepreneurship: Theory and practice,* Spring, pp.37-48.

Singh, J. (2003) 'Country Analysis: China', *Computerworld,* 15 September [Online]. Available at: http://www.american.edu/initeb/js5518a/Country-analysis-china.html (Accessed: 10 June 2005)

Smallbone, D. and Welter, F. (2001) 'The distinctiveness of entrepreneurship in transition economics', *Dordrecht*, 16(4), pp.249-262.

Smith, A. (1776) *The Wealth of Nations*, Edited by Andrew Skinner. England: Penguin Books.

Sorenson, O. and Audia, P.G. (2000) 'The social structure of entrepreneurial activity: Geographic concentration of footwear production in the United States, 1940-1989', *American Journal of Sociology*, 106(2), pp.424-462.

Sorenson, O. and Stuart, T.E. (2001) 'Syndication networks and the spatial distribution of venture capital investments', *American Journal of Sociology*, 106(6), pp.1546-1588.

Stopford, J.M. and Badenfuller, C.W.F. (1994) 'Creating Corporate Entrepreneurship,' *Strategic Management Journal*, 15(7), pp.521-536.

Stouffer, S.A. (1940) 'Intervening opportunities: a theory relating mobility and distance', *American Sociological Review*, 5(6), pp.845-867.

Strauss, A. and Corbin, J. (1998) Basics of Qualitative Research: Technique and Procedures for Developing Grounded Theory, (2nd edn.). Newbury Park, CA: Sage

Suttmeier, R.P. and Yao, X.K. (2004) *China's Post-WTO Technology Policy: Standards, Software, and the Changing Nature of Techno-Nationalism NBR Special Report No. 7.*

Swedberg, R. (2000) *Entrepreneurship: The Social Science View of Entrepreneurship.* Oxford: Oxford University Press.

Taomina, R.J. and Lao, S. (2007) 'Measuring Chinese entrepreneurial motivation personality and environmental influences', *International Journal of Entrepreneurial Behaviour and Research*, 13(4), pp.200-21.

TechTarget (2009) 'Software as a Service', *TechTarget* [Online]. Available at: http://searchcloudcomputing.techtarget.com/sDefinition/0,,sid201_gci1170781,00.html (Accessed: 20 May 2009).

Teece, D.J., Pisano, G. and Shuen, A. (1997) 'Dynamic capabilities and strategic management,' *Strategic Management Journal,* 18(7), pp.509-533.

The Economist (2008) 'China's exports', *Economics Focus*, 3 January [Online]. Available at: http://www.economist.com/finace/economicsfocus/displaystory.cfm?story_id=10429271 (Accessed: 25 March 2008).

Thunen, J. (1966) *Isolated State*. London: Pergamon Press.

Trow, D.B. (1961) 'Executive Succession in Small Companies', *Administrative Science Quarterly,* 6, pp.228-239.

Tschang, T. (2002) *China's software industry and its implications for India.* OECD Development Centre Working Paper No. 205 (Formerly Technical Paper No. 205).

Tschang, T. and Xue, L. (2003) *The Chinese Software Industry: Advantages of the Domestic Marke.* Globalisation Workshop, Pittsburgh: Carnegie Mellon University (Third in a series).

Van Auken, H.E. and Carter, R.B. (1989) 'Acquisition of Capital by Small Business', *Journal of Small Business Management,* 27(2), pp.1-9.

Van de Ven, A.H., Hudson, R. and Schroeder, D.M. (1984) 'Designing New Business Start-ups: Entrepreneurial, Organizational, and Ecological Considerations', *Journal of Management,* 10(1), pp.87-107.

Van Dierdonack, R.V. and Debackere, K. (1988) 'Academic Entrepreneurship in Belgian Universities', *R&D Management,* 18(4), pp.341-353.

Venkataraman, S. (1997) 'The Distinctive Domain of Entrepreneurship Research: An Editor's Perspective', in Katz, J. and Brockhaus, R. (eds.) *Advances in Entrepreneurship.* Greenwich: JAI Press, 3, pp.119-138.

Wang, X.M. and Zhou, X. (1999) 'A new strategy of technology transfer to China', *International Journal of Operations & Production Management,* 19(5/6), pp.527-538.

Wang, Y. and Lu, L. (2007) 'Knowledge transfer through effective university-industry interactions: Empiric experiences from China', *Journal of Technology Management in China,* 2(2), pp.128-131.

Watkins-Mathys, L. (2006) 'Focus group interviewing in China: Language, culture, and sense making', *Journal of International Entrepreneurship,* 4(4), pp.209-226.

Welsh, C. and Piekkari, R. (2006) 'Crossing language boundaries: Qualitative interviewing in International Business', *Management International Review,* 46(4), pp.417-437.

White, S., Gao, J. and Zhang, W. (2002) 'China's venture capital industry: Institutional Trajectories and system structure', Paper presented at International Conference on Financial Systems, Corporate Investment in Innovation and Venture Capital, 7-8 November, Brussels.

Wiklund, J. (1999) 'The Sustainability of the Entrepreneurial Orientation – Performance Relationship', *Entrepreneurship: Theory and Practice,* 24(1), pp.37-48.

Wilson, N.C. and Stokes, D. (2005) 'Managing creativity and innovation: The challenge for cultural entrepreneurs', *Journal of Small Business and Enterprise Development,* 12(3), pp.366-378.

Woodruff, A.M. and Alexander, T.G. (1958) *Success and failure in small* *manufacturing: A study of 20 small manufacturing concerns.* Pittsburgh: University of Pittsburgh Press.

Xinwen Jujiao (2003) 'News Focus: Zhongguo ruanjian chanye quanmian tisu' [News focus: China's software industry completely gaining speed] [Online]. Available at:
http://www.ccidnet.com/news/analyseobserve/2003/03/04/128_83570.html
(Accessed: 20 March 2005).

Xu, S.Y. (1992) 'Computer Development in China', *Computing & Control Engineering Journal* 3(2): pp.57-61

Young, S., Neil, H. and Ewen, P. (1994) 'Multinational Enterprise and Regional Development', *Regional Studies,* 28(7), pp.657-677.

Zahra, S. A. and Bonger, W.C. (2000) 'Technology Strategy and Software New Ventures performance: Exploring the Moderating Effect of the Competitive Environment', *Journal of Business Venturing,* 15(2), pp.135-173.

Zander, I. and Solvell, O. (1995) 'Determinants of Local Technological Activity: Implications for Innovation in the Multinational Firm', Paper presented at the EMOT workshop on technology, 15-16 May, University of Reading.

Zhang, G.C. and Li, W.J. (2001) *International Mobility of Chinas Resources in Science and Technology and its Impact Organization for Economic Cooperation and Development.* Paris: OECD Publishing.

Zhou, F.H. and Zhu, X.Z. (2008) 'University Technology Transfer in China: Do the Resources Matter?', *Journal of American Academy of Business,* 13(1), pp.185-191.

Zipf, G.K. (1949) *Human behaviour and the principle of least effort.* Reading, MA: Addison-Wesley.

Zou, H.L. (2002) 'New fears over software exports', *Shanghai Star,* 21 February [Online]. Available at: http://app1.chinadaily.com.cn/star/2002/0221/bz10-2.html (Accessed: 26 March 2004).