AN INVESTIGATION OF FACTORS INFLUENCING PERFORMANCE IN SINO-FOREIGN HIGH-TECHNOLOGY JOINT VENTURES

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An Investigation of

Factors Influencing Performance in

Sino-Foreign High-Technology Joint Ventures

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SUMMARY

The objective of the project is to look for some key factors that influence the performance of Sino-Foreign high-technology joint ventures. It may then be possible to provide some information to benefit future foreign investment cooperation in China.

Following this principle, the research began with a literature review (chapter two) to see what previous studies have been made in this area of study.

The research focuses on two areas and analyses the key factors determining a joint venture's (JV) performance. One area, the influence of the Chinese investment environment on the establishment of joint ventures, is described in chapter three. The other area is the effect of technology transfer and management on the operating performance of JVs, which is considered as having a crucial role in the performance of high-technology joint ventures. Within this area several case studies and related analyses are addressed in chapter four and chapter five. The conclusions for factors influencing the performance of Sino-Foreign high-technology joint ventures are drawn in chapter six.

Key words: Environment, Policy, Training, Rate, Quality.

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INTRODUCTION

In recent years, since 1979, China has made remarkable achievements in economic reforms. Among these, absorbing foreign direct investment into China has been considered as an important aspect of the open-door policies.

Within this policy, more than 42,000 Sino- Foreign Joint Ventures have been set up , and it seems that there is a tide of foreign investment into China with rapid rate of growth since the beginning of 1992. Over time, the established Sino-Foreign Joint Ventures have experienced the results of their operations. Most of them have been successful, although some have experienced less success or even been failures.

What is the definition of success for a Sino-Foreign joint venture? Foreigners and the Chinese may have different views. In general, foreigners view that a successful joint venture can offer their business with great benefit; while the Chinese think that success is gaining advanced technology and management skills as well as earning foreign exchange.

The importance of the current situation is why the author chose this project. Its relevance is justified because the result of the findings will provide useful information and benefit the future collaboration for both sides of Chinese and

foreign investment projects.

The research was conducted by investigating some existing Sino-Foreign joint ventures, of which most ware based on the background of high-technology. The foreign partners of these joint ventures are different nationalities, but most are from the United Kingdom. According to the definition mentioned above, some of them have been successful. Some have been also less successful and a few might be regarded as failures.

It seems there are many factors that may or may not influence the performance of joint ventures and previous studies of the area have suggested a variety of such factors. Thus a practical question arises here, which are factors determining performance?

Using previous findings, and additionally the information collected from certain cases, the research focused on two areas to analyze the key factors determining a joint ventures's performance. One area is the influence of the Chinese investment environment on the establishment of JVs. The other is the effect of technology transfer and management on the operating performance of JVs, which is considered as a crucial role of success in high-technology joint ventures.

First of all, from the perspective of the Chinese investment environment, it introduced the background of economic reforms, the natural resources and

industrial foundation. In particular, it will stress the aspects of China's unique environment focusing on the government's attitude and privilege policies for absorbing foreign investment together with the aspects of how to manage and enjoy the maximum support from local government and Chinese market potential.

How to conduct technology transfer is an important aspect of the study which involves: choosing a project with an appropriate level technology, matching the partners' technical environment, technical training and technology transfer procedure;

No doubt the significance of technology management after transfer has increasingly been realised. This aspect mainly involves the factors of relationship between the local managers and expatriates and quality management, which seems to significantly influence the successful performance of a high-technology joint venture.

The author hopes the research will highlight some particular factors for determining the joint venture performance which are practically acceptable by both Chinese and foreign partners. Furthermore it can prompt future cooperation of investment projects.

Chapter 1

METHODOLOGY

1.1 Study Framework

1.1.1 Choice of Research Project

1.1.2 Constructing the Research Design

* Defining a Research Approach
* Stating Hypotheses
* Desk Study - Literature Review
* Case Studies- Data Collection

1.2 Limitations

CHAPTER 1: METHODOLOGY

This chapter, will address the methodology adopted for the research. Mainly the study framework is described, which includes how to choose the research project and to formulate the research approach; and how to conduct the academic and field studies.The limitation of the study will also be indicated.

1.1 The Study Framework

Since the project focuses on Sino- Foreign Joint Ventures, the research needs to be viewed from both Chinese and Foreign sides so, before the author came to U.K, the work commenced with some preliminary field work on site in China, from July 1991 to Dce. 1991.

In the first half year of 1991, the Chinese economic reform was deepening. The number of established Sino-Foreign joint ventures reached more than 42,000. Most of them have been successfully running their business, but some have been less successful or even failures. Why? This is a study area of Sino-Foreign joint ventures. This research focuses on investigating the factors influencing the successful performance of a high-technology joint venture.

After the research project was defined and some preliminary field work began

in China, there followed the literature review on the topic. From the preliminary field work and the initial literature review the study framework was constructed (shown in figure 1).

The further investigation was conducted using semistructured (focused) interviews based on the case study method, This was carried out in several relevant companies which have set up joint ventures in China.

Finally, a comparative approach was used to analyze the data collected from the case companies, and integrate it with some academic viewpoints from the literature. Then, hypotheses are tested and relevant conclusions formulated.

1.1.1 Choice of Research Project

As briefly mentioned in the introduction, during more then a decade since China opened its door to the outside world in 1979, more than 42,000 Sino-Foreign joint ventures have been set up. Previous studies on the establishment of joint ventures do not give adequate reasons for a joint venture's success. Thus it prompted the intention to study this subject, and is why the research was titled "An Investigation of Factors Influencing Performance in Sino-Foreign High-Technology Joint Ventures."

1.1.2 Constructing the Research Design

*** Defining a Strategic Approach to the Research**

Within the social sciences, there are many alternative strategic approaches to the research (for constructing and verifying hypotheses), but mainly two are in general use. These are: the Classical Approach and the Grounded Theory Approach. Kenneth D. Bailey has defined them as following:

The Classical Approach. The Classical Approach consists of three distinct stages. Stage 1 consists of defining the concepts and writing a proposition stating a relationship between them. Stage 2 consists of devising ways to measure the concepts empirically, and includes formulating hypotheses on the project; Stage 3 consists of gathering and analyzing data in an attempt to verify the hypotheses.

The Grounded Theory. The Grounded Theory is a theory that is discovered or generated from data rather being abstract and tentative. Grounded Theory is developed by 1) entering the field work phase without a hypothesis; 2) describing what happens; 3) formulating explanations as to why it happens on the basis of observation.

The advantages of the Classical Approach are that: 1) it is complete, includes all stages , and takes maximum advantage of both theorizing and data analysis;

2) it also can utilize abstract concepts that have generalizability. The chief disadvantage of the Classical Approach is the opportunity for measurement error, which occurs if the measurement does not adequately represent the abstract concept.

In contrast, the chief advantage of the Grounded Theory Approach is that the probability of measurement error is reduced, since concepts are mirror images of empirically observed data. Its disadvantage is that the emphasis on empirical concepts makes it difficult to use abstract concepts and thus limits theorizing to a certain extent. In addition, the emphasis on empirical data in a special location may make the findings difficult to generalize across another time or place.

In practice, it is difficult to follow either the Classical or Grounded Theory approach. Therefore, this research is based on a systematic study focusing on a number of chosen themes, drawing from both theoretical approaches as appropriate.

Considering the concept "there are some key factors influencing the performance of joint ventures" the research should be helpful in providing guidance for future cooperation of investment. It is better to make hypotheses before entering the real situation, and devising some empirical measures.

*** Statement of Hypotheses**

The research dealt with the concept " there are some key factors influencing the performance of joint ventures" to define two areas of study and constructed six related hypotheses.

The first area is the influence of Chinese investment environment on the establishment of JVs. Within this area, there are two hypotheses:
1) investment incentives are a necessary prerequisite for direct foreign investment in China; 2) local government's support is more important than that of central government.

The second area of the study is the effect of technology transfer and management on the operating performance of JVs. Relating to this area, four hypotheses are formulated as follows: 1) long periods of on-the-job training are more important to a JV's operating performance than short intensive training during the setting-up phase; 2) the operating performance of a JV is more dependent on the rate of technology transfer than the level of technology transferred; 3) the type of relationship between the local managers and expatriates has an effect on the performance of a JV; 4) motivational and awareness aspects of quality management are more important than the implementation of formal standards.

Within these two areas of the study and six detailed hypotheses the related

aspects are chosen for the research.

How were these six hypotheses formulated? Some of the hypotheses were derived from the literature review, some from the preliminary investigation and some from the researcher's experience.

Those involving investment incentives for DFI and the type of relationship between the local managers and expatriates came from the literature review. One study [Eassen 1991] addressed the relatively hospitable tax incentive environment provided by the Chinese government and encouraged the researcher to look at the effect of more incentives and how they compare with other countries.

Another study [Campbell and Cheng, 1991] showed the management of relationships in JVs but mainly for the general management. Hence it provided the motivation to formulate the hypothesis that technology transfer and management is effected by the relationship between the local managers and expatriates.

The hypotheses concerning local government support and long periods of on-the-job training were derived from a preliminary investigation in one case company, Shanghai Yoahua Pilkington JV. The managers indicated that their JV had enjoyed the maximum support from local government and the operation had been set-up successfully. They also indicated that one Sino-US

glass-making JV in Shengzhen was less successful with its short term intensive courses in technical training. Therefore two hypotheses were formulated from the one source.

The final two hypotheses relating to the technology transfer rate and quality management came mainly from direct experience. The researcher had organized some domestic technology transfer schemes between the Semiconductor Institute and various enterprises. One project was a "Lighting Generator for Automobile" transferred from Semiconductor Institute to Taiyuang Machinery Factory. Experience from this scheme provided the information for the two hypotheses.

There are several possible methods (tools) to conduct the research here, the research mainly used two: Desk Study- Literature Review and Case Study analysis.

*** Desk Study - Literature Review**

Through the literature a researcher can get to know the background and the state of previous studies of the chosen topic. It is very useful for gaining academic views and constructing the research. So, the author spent two months exclosively on literature review. and continued the review throughout the remaining period of the research.

To evaluate the literature it is divided into four main areas: 1) general survey studies; 2) management of joint ventures; 3) analytical studies; and 4) comparative studies. The detailed literature review is presented in Chapter 2.

*** Case Study Analysis**

The research is an "explanatory and analytical study" rather than a "descriptive study". It will address the question of why some Sino-Foreign joint ventures have been successful; and how success has been achieved? The researcher chose the case study method with certain companies as examples. Although the scope is limited, it can still be conducted quite deeply compared with a survey study where the scope is wider but the analysis not so deep.

Within this principle, the research used semistructured (focused) interviews, based on the chosen hypotheses and using an open-ended questionnaire (shown at the end of the thesis). When permitted the researcher also used a tape recorder during the interviews.

In order to obtain complete data, both Chinese and foreign partners were interviewed. Information was not only gathered from China but also from the foreign parent companies in the UK. This provided the chance to interview previous joint venture managers (expatriates) about their experience in China. The researcher visited some key case study companies for two days. In order to get detailed information, some people were interviewed twice.

The author also had an opportunity of taking part in some technical training classes held for JVs' engineers and customers. This provided the opportunity for the researcher not only to communicate with several JV's local engineers and its customers but also enabled more in-depth investigation into the views of different people, including top sales managers, project and maintenance managers, quality executives and trainers. Therefore, more detailed information on the JV's background, its technology transfer mechanisms and management were gathered. The researcher was also able to observe directly how the parent company was conducting its technical training.

The researcher also played an important role to help setting-up a new Sino-UK technical Service Centre. The activities of setting up this new joint venture started from June 1992, and it negotiations lasted for five months. In November 1992 the contract for this new JV was signed in Beijing. The JV will operate from April 1993. The researcher used the knowledge gained from case study companies and previous studies to help in setting up this new JV particularly with respect to how to choose an appropriate Chinese partner and the choice of joint venture type. These direct observations and the participation experience provided useful data for the research.

The following companies were used in connection with the case study analysis.

** **Shanghai Nicera Sensor Co. Ltd. (Sino- Japan)**

** **Shanghai Yaohua Pilkington Glass Ltd. (Sino-UK)**

** **Shanghai International Digital Telephone Equipment Co. Ltd. (Sino-UK)**

* **Xinhuan Technology Development Ltd. (Sino-Singapore)**

* **Zhong Yi Technology Development Company. (Sino- HongKong)**

* **Foseco-Foundry Services Company. (Sino-UK)**

** **SEM-C.E.L Technical Service Centre. (Sino-UK) (new)**

* **Standard Chartered Bank Shanghai Branch**

(This is a wholly foreign-owned enterprise rather than a JV, but it provided some information of DFI in China)

1.2 Limitations

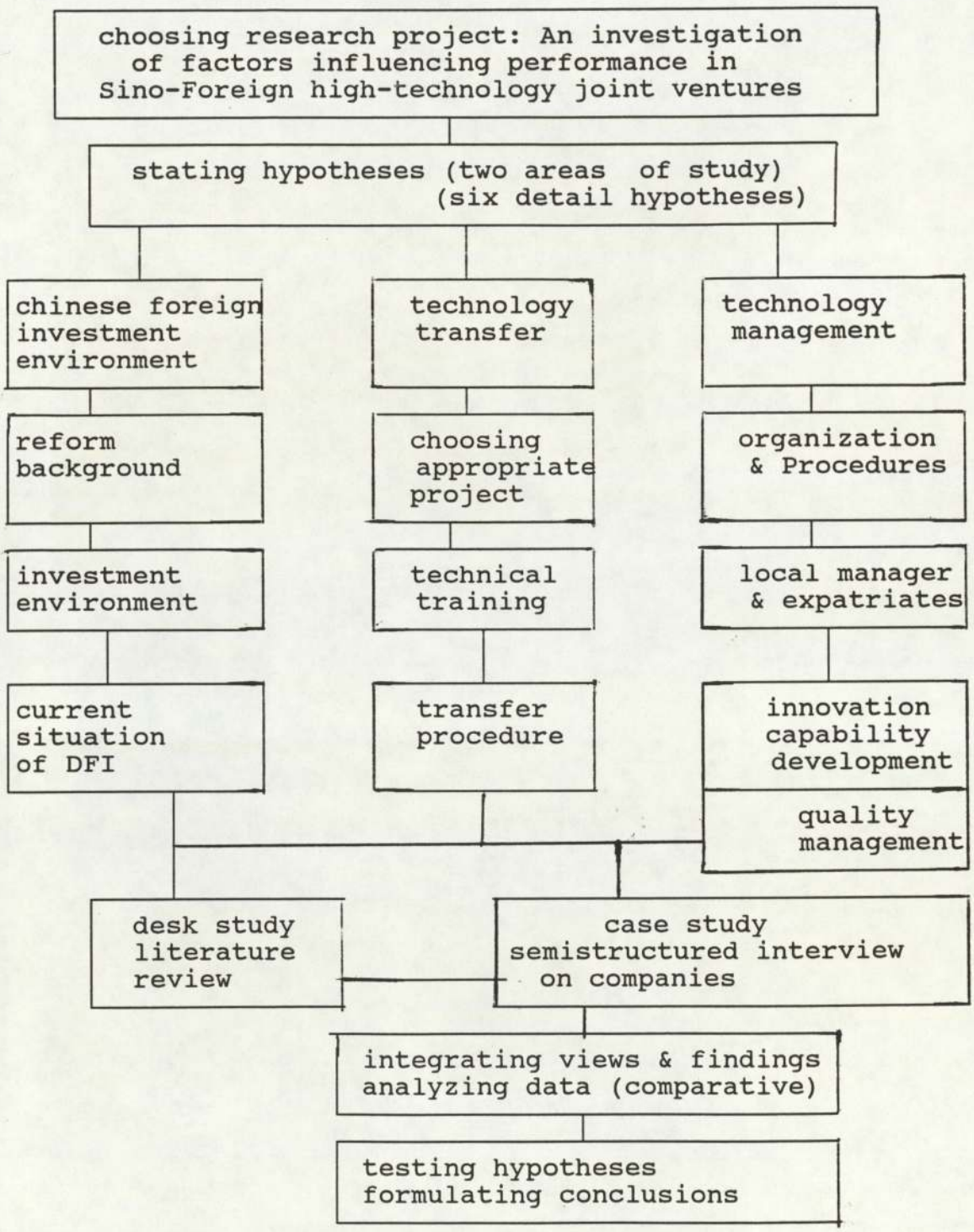
Due to various reasons, the research is limited in certain respects. The following should be noted:

1) lack of sufficient literature. Since the history of Sino-Foreign joint ventures is short, previous studies of the area have been limited; Also, some recent

studies have not yet been published. The research was therefore somewhat limited in its literature search.

2) Restrictions to finance and time have limited the scope of the research. The research only used eight companies as cases for the study.

3) The foreign direct investment in China has developed rapidly since the beginning of 1992, and the environment is changing and developing in many respects. Some of the research will therefore be out of the date in terms of certain items of detail. However, the basic principles and concepts will remain valid.



THE STUDY FRAMEWORK

Chapter 2

LITERATURE REVIEW ON SINO-FOREIGN JOINT VENTURES

2.1 General Survey Studies

2.2 Management of Joint Ventures

2.3 Analytical Studies

2.4 Comparative Studies

2.5 Conclusions from Literature Review

CHAPTER 2

LITERATURE REVIEW ON SINO-FOREIGN JOINT VENTURES

For more than a decade, the reform of China's economy has been developing rapidly. Especially important is the rapid rate of growth of foreign investment in China and the number of Sino- Foreign joint ventures that have been set up. Why has the growth of foreign investment been so rapid? And what is the situation of the Sino-Foreign joint ventures? A number of scholars have been interested in these questions and have studied these areas.

Scholars who have published their findings have presented them from different viewpoints and positions. This chapter will give a summary of literature in the area. Here, twenty previous studies have been divided into four categories: general survey studies; management of joint ventures; analytical studies; and comparative studies.

Most of the literature is described in brief, but some important studies are

reviewed in detail.

2.1 General Survey Studies

A number of scholars have surveyed the general situation of Sino-Foreign joint ventures.

In a study by **Zhang and Li (1990)** the history of Sino-US general trade from 1870 through 1986 over the 116-year period is reviewed, in order to identify the bottlenecks that may hinder the progress of this trade flow. This research suggest that in a long period, the trade between countries had developed in a zigzag way with great ups and downs; Only recent years after China implement the open policy, Sino-US trade has entered a new phase and has become an important component of the overall Sino-US relations.

Their study finds that adverse political events may be the bottleneck impacting the trade relations between two countries. However, from this study, we can see that China and United States stand to mutually gain from more trade between the countries.

Frankenstein (1990) used structured interviews collecting his data from groups in two different years: one group, in 1984, came from 26 business people, all of them were foreigners, but the other group, in 1988, came from half ethnic Chinese, and half foreigners.

The study suggested that Chinese business style, in both negotiations and in implementation, could be conceptualised as a spiral process characterized by continuous engagement, constant negotiations and persistent attempts to deepen commitment.

From the study, it is very interesting to see that foreign businessmen have realized that they should pay more attention to the personal relationship in doing business with Chinese. This might be an important experience, which they learned from the Chinese culture in helping their business. A Hong Kong Chinese with extensive experience in China trade remarked," The reality is you can't push your Chinese partner, you have to lead him, give hints and talk business in personal terms. It is difficult to settle issues around a negotiation table".

The Chinese Investment Guide Fourth Edition (1988) is a useful comprehensive guiding hand-book. The authors are China International Consultants Inc. Although this book is not a research book, it provides more detailed data on the environment for foreign investment, which is useful for both the researchers on the area of DFI and foreign investors who are considering to invest into China. The data include: the background of Chinese reform, the introduction of China's key industrial sectors; the natural resources of China; even the organizations and local information for every province in the country.

Especially, from the data relating to foreign investment policies, researchers and investors can see what the attitude the Chinese government has towards the foreign investment; what priorities the government will give to the investors. Because the interests of foreign investors are concerned with these relating policies.

A paper by **Campbell (1990a)** uses the data from Chinese published sources and focuses on the pattern of equity joint ventures. The data used contains details of 496 equity joint ventures with countries other than Hong Kong and Macao. The United States and Japan are the major investors. The paper is based on an analysis of equity joint venture statistics for the period 1979-1986 that reveals what sectors and locations foreign investors prefer, and what differences exist between investor nations.

Teagarden and Von Glinnow(1990) adopt the systematic approach to discuss the mechanism of the types of Sino-Foreign joint ventures.

From their viewpoint the Chinese entered into various alliances with foreign firms. These Sino-Foreign alliances mainly include several investment modes: 1) equity joint ventures; 2) contractual joint ventures; 3) process/assembly-buyback agreements; 4) long-term licensing agreements; 5) dynamic technology transfer agreements; 6) compensation trade agreements including counter-trade and counter-purchase; and 7) exploration and research consortia.

They also identified the variations in the operational characteristics of the alliance types which are observed in strategic flexibility; parental operating autonomy and partner interdependence; and alliance-related decision-making control.

It is clear, the study provides the useful information to recognize the types of Sino-Foreign joint ventures and the related operating characteristics of these various types in general, which is a better starting point for future Sino-Foreign strategic alliance research. It is also helpful for both Chinese and foreign investors to choose a reasonable mode for their alliances.

2.2 Management of Joint Ventures

A considerable body of literature has dealt with the management style of joint ventures. As **Campbell (1989)** noted: "Equity joint ventures are generally considered to be the most challenging form of foreign direct investment because they involve the foreign partner not only in contributing risk capital but also in sharing responsibility for the day-to-day running of the venture. In a country like China this can give rise to formidable problems..."

Campbell and Cheng (1991) studied Relationship Management in Equity Joint Ventures in China. Their paper is concerned with relationship management in equity joint ventures based on a review of the literature and the findings from interviews with six British Companies.

From the study we can see that there are several key factors which influence the management relationship in equity joint ventures:

1) The impact on the relationship can arise from the external environment. A key aspect of the external environment is the level of demand for the J.V's products outside China and extent of competition.

2) If the organizations of Chinese and foreign partners are very different, the relationship between them can often be difficult.

3) If the strategies are complementary, it will be easier for the two partners to develop their relationship. The ideal seems to be where the Chinese supply raw material of the necessary quality, and labour capable of efficient production. The foreign partner provides the technology and export market. In this way, the objectives of both partners are met. 4) Chinese managers from Hong Kong frequently play a key role. Because the cultural differences between mainland Chinese and Westerns are difficult to bridge without interpretation.

This study is quite useful for building up good relations and trust between Chinese and foreign partners, which can heavily influence the success of Sino-Foreign joint ventures, because the finding provides such practical factors influencing the relationship management in joint ventures.

Battat (1986) in his study using a comparative case study method introduces the history of China's technology transfer from abroad. He divides the Chinese technology transfer into two main waves of the 1950's and 1970's.

The study compares the differences and similarities between the two waves of technology transfer. They differed in a number of ways. In the 1950's the source of technology was only the Soviet Bloc; in the 1970's, the OECD countries. The first transfer was quite comprehensive setting the foundation for China's modern industry; the second was highly selective, filling gaps in the development of a few national industries. Yet the technology transfer waves show two striking similarities: 1) the management of the technology after transfer, and 2) the extent to which known-how, whether transferred or developed, resulted in innovative capabilities.

The important thing is that the study let people realize that the technology recipients' ability to manage properly and efficiently their part of the transfer process is clearly crucial to the outcome of the transfer. Also their ability to create and manage the necessary environment for the correct and efficient use of the technology, once transferred, would undoubtedly determine the degree to which the technology is adopted to meet the needs of the local environment, and is assimilated within the society. The subsequent development of technology is a function of degree of success of both its transfer and use.

In fact, the issue of how to manage the technology after transfer is now not only faced by the Sino-Foreign joint ventures but also in the situation of Agreed Technology Transfer where some lessons have been learned in this aspect. Due to poor management and inadequate capability for technology innovation many projects did not reach the technology level expected or

planned. Therefore, this issue should be given more attention.

A study conducted by a joint foreign and Chinese research team, **(Child, 1990)** was based on an interview case study. Thirty joint ventures were chosen for cases,twenty three in Beijing and seven in Tianjing and Shanghai. In these companies 38 foreign and 41 Chinese managers were interviewed altogether.

The study provided several useful findings, described briefly as follows:

1) With the exception of American joint ventures the distribution of ownership between partners was not of great consequence for managerial style.

2) The American joint ventures were characterized by a relative high equity holding on the American side and this was reflected in a higher number of American managers in post.

3) Most joint ventures adopted centralized decision-making,

(categorized as high, medium and low) though few were characterized by an authoritarian style. European joint ventures were attempting to develop and motivate their Chinese staff through involving them in decisions.

4) Communications among Chinese staff relies heavily upon informal channels; formal task-related information is often poorly communicated.

5) American joint venture partners were making a greater effort than others to introduce their domestic approach to management.

By contrast, European and Japanese managements were moving towards a more mixed approach to management in which overseas and Chinese

elements are combined.

The study examined the management approaches adopted by different companies of different nationalities and the kind of problems.

We can see that the findings provide considerable systematic analysis from a wide range of case data. The results of findings show that the existence and characteristics of Sino-Foreign joint ventures depend on the different nationalities. This will provide some management experience for joint ventures and future cooperation between Chinese and foreign investors.

Nyaw (1990) compares the role of trade unions between stated-owned enterprises and Sino-Foreign joint ventures.

The study suggests that the trade union of a joint venture in the PRC plays an important role in the political education of the workforce, including the workers with the virtues of diligence and hard work. In contrast to state-owned enterprises, a party committee is generally non-existent or if it exists is not a formal organization in international joint ventures. The trade union is therefore charged with the above responsibilities.

They also valued the trade union of a joint venture "it is a management-assistance tool and it is also an organization that looks after the personal needs and welfare of employees."

The finding of this survey is an important area as well, since the Chinese government pays more attention to the interests of workers and staff in joint ventures. It is emphasized that the trade-union of a joint venture has a duty to represent the interests of the staff and workers, and shall have the right to represent them in signing labour contracts with a joint venture and supervising the implementation of such contracts. (Article 96, Joint Venture Implementation Regulations).

A paper by **Henley and Nyow (1990)** focuses on the management system and functioning of joint venture arrangements. Consideration is given first to the authority and responsibilities of the board of directors; the role of general managers and the interface of management with the enterprise trade union.

It can be seen that this study provides useful information about the system of management and performance of joint ventures. This is particularly so for new joint ventures, while they are at the start-up stage when they need to learn more about how to form the system of management and how to exploit the function of this management system. This study might provide the answer to their questions.

2.3 Analytical Studies

It is now more than a decade since 1978 when China opened its doors to the outside world. Its international cooperations have achieved remarkable

success. These cooperations include mutual trade, technology cooperation; foreign direct investment and a number of Sino-Foreign joint ventures have now been operating for several years. Therefore, some scholars have begun to investigate what is China's foreign trade strategy, and the factors that lead to joint venture success.

Wiedemann (1990) studied the Sino-U.S economic relations through an analysis of China's open door policy and its foreign trade strategy.
From the viewpoint of the study we can see that China is a nation with which the United States has traditionally had warm friendly relations except for a couple of decades of mutual misunderstanding. Today the United States views China as a developing, strong force in the world, and firmly stands by China as it seeks modernization. Indeed, the United States has a long-term stake in China's successful pursuit of modernization.

The study also suggests that U.S-China bilateral trade has great untapped potential. Despite its rapid growth in recent years, Chinese experts only account for about 1.4% of total U.S trade, and import from the United States only 12% of China's trade. Full potential can, however, be realized by mutual commitment to an open trade system. The two governments should continue to have frequent and useful consultations on outstanding trade and investment issues.

From an analysis of the study, we can see that it is important for China that

its foreign trade gets back to its requirements for technology and key raw materials, and foreign exchange. Hence, China's foreign investment policy of promoting export and advanced technology joint ventures is a key part of this strategy.

Campbell (1990b) gives a much deeper and practical analysis of how to formulate and implement equity joint ventures. From his study, some important viewpoints can be seen: one is that a firm's strategy for China must be formulated to fit in with the firm's overall global strategy. Is China seen as a low cost source, as a market for equipment and technology, or as an arena in which to steal a march on competitors? Most strategies for China are a complex mixture of these elements. Joint ventures can be part of China's strategy if they support the other objectives.

Second, the joint venture products or services ideally will have an export market; the technology will not require too much training or skilled maintenance, and the partner should bring a dowry of skills and influence with the location convenient for transport.

The other main point is that if the joint venture can earn foreign exchange and control the quality of its inputs and outputs it has a chance of success.

However, it can be see that a well-considered strategy would play a significant role in formulating and implementing a joint venture. The view for a venture's

strategic consideration from this study will give the help to both Chinese and foreign partners.

Another study by **Schlyter and Sebelius (1986)** also concludes that in successful joint ventures they have managed to solve the foreign exchange problem. This is crucial to foreign partners because they need to know whether they can take their profits out of China.

In the study, they also find that the Chinese top management seems to be related to their level of success. Issues, for instance, which require approval and acknowledgement from the Chinese authorities, might pass more smoothly under the guidance of experienced management. Is this view acceptable? This is an argument for future research.

Volker and Schuchart (1991) give a progress report on a long term research project by the Shanghai JiaoTong University and the University of Technology of Berlin joint research team. In this report they suggest that relatively few German companies engage in foreign direct investment or joint ventures in the PRC when compared to their bilateral trade volume. Despite a variety of experiences, there is still uncertainty among the business community regarding the specific problems and critical success factors in joint ventures and any other form of "close" cooperation.

This ongoing joint research project is designed to identify factors for success

in each phase of the cooperation process. However this report just reflects on the methodology used and provides some preliminary results from marketing, organizational, legal and financial perspectives.

Killing (1990) has written a useful book analyzing strategies for joint ventures. Although the author did his study based on European and North American and developing country parent firms, the study seems to fit Sino-Foreign joint ventures as well.

In the study, his basic literature review and case study method analyses information deeply, therefore, he provides good practical findings, which will help an investor to choose a suitable type of venture, and can help managers to improve performance in their ventures. His main findings are as follows:

From a managerial viewpoint, he divides joint ventures into three types:
1) ventures dominated by one parent, these to be called dominant parent joint ventures; 2) those in which both parents play an active role, labelled as shared management ventures; and 3)independent ventures, in which neither parent plays a strong role.

The overall fact presented is that shared management joint ventures have a dramatically higher failure rate than dominant parent ventures, but the author argues that this is because shared ventures are more difficult to manage. The other explanation is that shared management ventures are used to tackle

exceptionally difficult tasks, in which any other type of joint venture could fail.

Thus, the author focuses his study on how to design a shared management joint venture, in order to make the shared management joint venture easier to manage, and thus to lead its success.

The better choice for investors is to therefore avoid shared management type. If one is really needed they should carefully design the venture's structure features including partner selection; staffing and partner pay-offs.

2.4 Comparative Studies

There is a considerable number of studies using the comparative method which have analyzed the attitudes towards doing business with PRC, and factors which influence the success and failure of joint ventures.

Two examples are the studies by **Baird; Lyles; Ji; and Wharton (1990), and Stewart and Him (1990).** These studies consider that the attitudes of Chinese managers about joint venture success and compare these to the attitudes of American managers. From the results of the study, we can see that Chinese and American managers show striking differences when describing an ideal joint venture and its success.

Both groups thought that longevity is a common basis for defining joint

venture success. Both groups felt that disbanding the joint venture within ten years was not descriptive of an ideal joint venture.

They also thought that an ideal joint venture would be characterized by good managerial appraisal systems and subsequent rewards for good performance. However, the basis for these rewards differed.

The Chinese manager felt that an ideal venture would be associated with minimal risk of failure. While Americans appraised success in a joint venture to be related to creativity, flexibility and innovation.

The Chinese perceive personnel training as the most significant element in their success and want to spend more time on it. In contrast, American think there are some key elements: (1) leadership experience of one's career; and (2) personal factors, especially motivational drive.

Americans think that factors leading to joint venture success involve different but equal partners, knowledgeable about each others culture and language, working together on equal footing in conditions of trust to achieve common goals.

In contrast, Chinese managers think that a successful joint venture is based on shared dependency and mutual need (not mutual goal or contributions). Success in a joint venture is tied to the existence of trusting, clan-like

relationship.

From the findings of the survey we can see that the viewpoints for joint venture success of American and Chinese managers are quite different. This results from different cultural backgrounds. Therefore, the studies provide information that in order to implement a successful Sino-Foreign joint venture, partners should try to understand the different cultural background of each other. Careful attention must be paid to determining the basis on which success will be measured and rewards will be distributed, otherwise the two partners will be frequently working at cross purposes and will present a serious challenge of problems in joint venture management. Furthermore it will influence the success of the joint venture.

In another study, **Punnett and Yu (1990)** using a questionnaire survey study method, examine the attitudes of U.S and Canadian executives toward opportunities in the PRC and explore the reasons for U.S companies greater involvement in the Chinese market than their Canadian counterparts.

For the purpose of addressing this question, the study identifies the similarities and differences toward doing business with PRC between American and Canadian companies. The similarity between them is that both of them see the Chinese market as providing many potential opportunities.

Differences between U.S respondents and Canadian respondents suggest that:

(1) Canadians are generally considered more conservative towards business risk which would explain a more cautious attitude towards the opportunities of doing business than their American counterparts, (2) Canadians are more accustomed to government controls while, in contrast, Americans prefer to avoid government controls.

The finding of this study provided quite useful information, from which, it can be seen that different nationalities have different attitudes towards doing business with China. Hence, knowing the varied attitudes of different countries will especially benefit the Chinese government, because a government can provide special treatment towards different nations' business people with their own characteristics in order to meet their varied requirements. This may lead to the result of promoting foreign investments into China.

Clegg (1987) in his study, takes the approach of a comparative study of five major international economies, the USA, Japan, UK, Sweden and the Federal Republic of Germany to search for lessons which can teach us about the causes and methods of international competition.

From the study we can see that the multinational enterprise is at the centre of international competition and the number of multinational firms is continually increasing, especially with the direct foreign investment growing faster than any other form of competition.

The study also found that the intensity of international competition is at its peak between developed countries. Despite these common trends, each country begins from a different starting position.

This might give an explanation of China's current economic reforms, and particularly the situation of the rapid growth of direct foreign investment flowing into China.

Stewart (1990) analyzes the characteristics of investing, cooperating or selling towards doing business with China, and explores the foreign manufactures' strategic options in China.

The study, indicates that the "just selling" strategy is of course, a real one but the general trend is clear: selling will not be enough in many cases, for example in high technology.

Both the Manufacturing Equilty Joint Venture (MEJV) and cooproduction, involve technology transfer and long-term commitment of the parties. Training in all forms and the supply of new production equipment are likely to be included. In coproduction, however the foreign partner does not share the responsibility for managing the Chinese factory nor for dealing with the Chinese infrastructure, neither does he make an equity contribution to the establishment of the factory. Risk and responsibility for taxes are divided between the parties.

Therefore, the study presents the view that to many foreign companies coproduction provides an immediate alternative strategy while providing China with a rapid high technology input, enables the foreign partner to test the market, discover the strengths and weaknesses of his Chinese partners, and develop solutions to problems before proposing investment.

The conclusion from this study seems to be a slightly conservative one, but it is more practical. Because careful considerations will help in the selection of the best business options for both the Chinese and foreign partners.

2.5 Conclusions from Literature Reviews

In reviewing the above twenty typical literature sources, we can see what some previous studies in the area of joint ventures have involved. They can be divided mainly into four categories as follows:

1) General Survey Studies. The scope of these studies gives the general situation of Sino- Foreign joint ventures, such as the discussion of a venture's type, China's environment, reform background and so on. In addition, these studies account for preliminary research on the project.

2) Management of Joint Ventures. This is the broad body of the study, which can involve many aspects. Previous studies on management have already focused on the decision making; relationship management, the

management structure or system; the cross culture, and the communication between partners.

(3) Analytical Studies: Studies of this category involve deeper research into venture issues. **" Formulating and Implementing Equity Joint Ventures in China" and "The Strategies for Joint Venture Success" Cambell (1990b) and Killing (1990)** analyze the ventures' strategies in both theory and practice, which generally should be considered as key elements when you set-up a joint venture.

* Making sure that formulating a joint venture is a part of a global business goal.

* China's venture strategy should consider what advantages China has: as a low cost source, as a market for equipment or technology, or as a sound investment environment.

* One study indicates that a better type of JV is a dominant management venture rather than a shared management one, which is quite difficult to run, and has a much higher rate of failure.

* In the case of a shared management type of joint venture, careful consideration should be given to design of the venture's structure, including selecting a partner, staffing and partner pay-offs.

4) Comparative Studies. The characteristic of these studies is that they generally use a comparative method, in order to identify some issues of joint ventures, because a comparison makes it easer to find the differences and

similarities. Studies in this category, such as " **Multinational Enterprise and World Competition" (Clegg 1987), and "Attitude towards Doing Business with the P.R.C" (Punnet & Yu 1990)** mainly compare the attitudes towards doing business with China of different countries' business people.

Other studies focus on analyzing the success or failure of Sino-Foreign joint ventures,by comparing the different firms and different nationalities. The basic opinions of the factors leading to joint venture success are quite different between foreigners and Chinese. Foreigners often think that equal partners, knowledgeable about each other's culture and language, working together on equal footing are in conditions which first achieve common goals. They also have the strong view that successful joint ventures should solve the foreign exchange issue as well.

In contrast, Chinese managers think that a successful joint venture is based on shared dependency and mutual need (not mutual goal or contributions) and success is tied to the existence of a clan-like relationship. They also think that personnel training is the most significant element in their business success.

According to the literature the main problems are the local supply of materials and utilities; the quality of the labour; and foreign exchange availability. These have caused production delays, an increase in costs and a drain on the foreign exchange reserves.

We can see that previous studies involved considerable research in the area of Sino-Foreign joint ventures. They provide important findings from different viewpoints, which are useful for guiding future business cooperation between China and foreign countries.

Previous studies in the area of Sino-Foreign joint ventures have involved aspects of investment environment, the venture's strategies, types, cross-culture and its management. They have also given consideration to the venture's success. However they still have some limitations within the research area. First, with regard to the area of Chinese investment environment, previous studies often analyze the general situation, although some have narrowed on legal or policy aspects. They have not focused on China having its own unique investment environment and the fact that more incentives are provided by the Chinese government, particularly the support from local government, compared with other countries. This research will not only address the general question of the reform background and natural environment but will specifically highlight the above aspects on which previous studies did not focus.

Second, regarding the question of technology transfer, some studies focus on the point of view of technology suppliers only, and rarely consider the issue of the technology receivers. Few studies focus on how to conduct technology transfer successfully though the performance of both supplier and the receiver but this research will attempt to do so.

This research is also a study looking for the factors determining performance of Sino-Foreign joint ventures. There is an underlying principle for the research design which includes: 1) To provide different views from previous studies 2) To examine views that might be acceptable by both Chinese and foreign partners; 3) To provide guidance for future investment cooperation between Chinese and foreign investors.

Following this principle, therefore, this research is conducted based on the cases of high-technology joint ventures. the research defined two areas of the studies and constructed six related hypotheses.

The first area is the influence of Chinese investment environment on the successful establishment of JVs. Within this area, there are two hypotheses: 1) investment incentives are a necessary prerequisite for direct foreign investment in China; 2) local government's support is more important than that of central government.

The second area of the study is the effect of the technology transfer and management on the operating performance of JVs. Relating to this area, four hypotheses are formulated as follows: 1) long periods of on-the-job training are more important to a successful JV's operating performance than short intensive training during the setting-up phase; 2) the operating performance of a JV is more dependent on the rate of technology transfer than the level of technology transferred; 3) the type of relationship between the local managers

and expatriates has an effect on the successful performance of a JV; 4) motivational and awareness aspects of quality management are more important than the implement of formal standards.

These hypotheses might be the key factors influencing the performance of a Sino-Foreign joint venture.

Chapter 3

BACKGROUND AND INVESTMENT ENVIRONMENT IN CHINA

3.1 The Background in Brief

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- 3.2.1 Policies Concerning the Absorption of Foreign Investment
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- 3.3.1 Current Situation
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- 3.3.4 Foreign Investment Sources

CHAPTER 3

THE BACKGROUND AND INVESTMENT ENVIRONMENT IN CHINA

3.1 The Background in Brief

A brief background of the foreign investment situation in China should introduce China's current economic reform and its open policy.

It has been 13 years since China began to implement its economic reform and open policy. Such an endeavour has brought about tremendous changes in the country.

The reform has created profound changes in the economic structure and operating mechanism. So far a diversified pattern of economic sectors has been formed in which public ownership still plays a dominant role. Enterprises have gradually gained their autonomy, such as decision making power; the right for pricing and the distribution of their products. The network of

markets under state macro-control has been developing continuously.

China has opened its doors to the outside world. A coastal economic open strip which includes special economic zones and open coastal cities has been gradually formed. It is this area of China with the most dynamic economic development and greatest economic strength.

China's import and export trade has multiplied, Statistics [1] show that during the open decade, China invested 16,58 billion US$ to introduce the foreign projects, with which it could increase industrial output by RMB 874.2 billion, and 15,600 products reached the level of the world standards. In the first seven months of 1992, the volume of the country's total imports and exports was US$ 820.7 billion, an increase of 19.3% over the same period of the previous year.

Foreign business people have been active in making investments in China.[Ruong Yiren 1992a] From 1979 to the end of 1991, China has approved more than 42,000 project of DFI for a total foreign commitment of US$ 52.3 billion.

The reform and open policy have brought evident growth in China's economic strength.[Ruong Yiren 1992a] From 1980 to 1991, in terms of comparable

1. Data obtained from State Planning Commission, inside report, 1992.

price, China's GNP registered an average annual growth rate of 9% compared with the 3% average annual growth rate of the world in the same period and is also higher than China's average growth rate for the 30 years prior to the implementation of its reform and open policy.

People's living standards have been steadily improving. In the early half year 1992, the value of the commercial total sale increased 14% over the previous year. During the same period, consumption of people also registered an average annual growth of over 6%. [Rong Yiren 1992b] Reform and an open policy have brought about considerable development in China and tangible benefits to its people. This policy seems to be irreversible.

China is a developing country with a large population and a relatively weak economic base. Its endeavour to build a strong and prosperous country involves many aspects of work and creates many problems. It has tried to gain its own experience and find a way more suited to China's national conditions, -- a way to build " socialism with Chinese characteristics."

China's recent experience may be summed up as follows: it has taken economic development as its focus, learnt those advanced operational methods and managerial skills, imported foreign capital and technology to promote economic growth.

Following such guide lines, China now is in the process of turning its over-

centralised and rigid product economy of the past into a market economy and carrying out reform in various fields to bring about an appropriate change in the operational mechanism.

This decade has been crucial for China's socialist modernization programme. Not long ago,at the beginning of 1992, Mr.Deng Xiaoping, the initiator of China's reform and open policy, proposed that China should further emancipate its thinking, be bold in exploring its efforts and accelerate the pace of reform and open policy, and concentrate the efforts on economic development. These proposals were confirmed by the Political Bureau of the Central Communist Party of China and the National People's Congress. [Rong Yiren 1992b] Therefore, they have become the guiding principles in China for the work in political, economic and various other fields.

Efforts will be made to strengthen the development of the market network, and increase the links between the domestic and international markets. The function of the Government will also be changed, while stepping up Government macro-economic control appropriate efforts will be made to separate the administrative functions of government from the enterprise management, work efficiency needs to be enhanced and bureaucracy reduced.

3.2 Investment Environment

Those who plan to invest in China are naturally concerned about China's

investment climate. Compared with other nations, China's investment climate has its own unique features, namely a vast territory, richly endowed with resources, an abundant supply of currently low-cost labour, steady growth of the economy, and stated consistency of its long-term open policy. China also has a huge domestic market, sizeable forces of science and technology, and a firm industrial foundation.

In order to emphasize the environment uniqueness of China in this chapter, more attention will be given to the soft environment in terms of policies and incentives provided by the Chinese government and the support from local authorities. The market potential is also introduced. A general perspective on China's natural resources and its industrial structure is provided in Appendix III.

3.2.1 Policies Concerning the Absorption of Foreign Investment (Soft Environment)

Since 1979, when the country adopted its policies of economic reform and opened up to the outside world, the successful introduction of investment into China has been realized, of which the absorbtion of foreign investment is an important part. So far, the Chinese government has adopted a series of measures to improve its investment environment.

First, the legal system has been continuously improved; in recent years,

China has enhanced its legislative efforts to the effect that more than 200 laws and regulations concerning foreign interests have been enacted, of which some 50 are directly related to direct foreign investment. These include: Chinese Foreign Equity Joint Venture Law; Chinese Foreign Contractual Joint Venture Law; Wholly Foreign-Owned Enterprise Law; Foreign Economic Contract Law; Income Tax Law for Enterprises with Foreign Investment and Foreign Enterprises; Patent Law; Trade Mark Law; Copyright Law, etc. [The China Investment Guide 1988]

These Laws include many favourable incentives for foreign investment which are not enjoyed by local enterprises. The main points are as follows:

a) Joint ventures can have the right to conduct import and export trade within their operating scope.

b) Joint ventures can enjoy some tariff preference, for example, exemption from customs duty on export products and imported goods used for export products.

c) Income tax preference; joint ventures have a period of two tax-free years starting from the profit-making year. After the tax-free period, joint ventures can still enjoy a tax-rate reduction of half normal profit tax if the joint ventures' export products are over 70%.

China has signed bilateral investment protection agreements with 36 nations, and has concluded investment insurance agreements with the United States and Canada. China has signed agreements on the avoidance of double taxation

with 32 countries. China has also joined the Paris Convention on the protection of industrial property rights.

At present, China is preparing for entry into the Universal Copyright Convention and Berne Convention for the Protection of Property Rights of Literary and Artistic Works.

The above agreements and treaties together with China's legislation serve as effective legal protection for the investments and interests in other forms of economic and technical cooperation by the citizens and enterprises from the countries concerned.

Second, since 1980, vast regions have been declared as open areas. China has established , one after another, the five current Special Economic Zones of Shenzhen, Zhuhai, Shantou, Xiamen, and Hainan province. In 1984, China opened 14 coastal port cities from Dalian in the North to Beihai in the south. In 1985, it created the Yangtze River Delta, Pearl River Delta and Southern Fujian Triangle areas. Then the Liaodong Peninsula was designated an open economic area. In 1990, the State Council decided to open up and develop the Shanghai Pudong area. The above areas enjoy rich agricultural products, availability of various industries, good conditions for agriculture, and well-developed rural and township enterprises. There are also superior infrastructures and living facilities, which help create a better investment and living environment for foreign investors.

Third, decentralization of authority for higher working efficiency. In order to simplify formalities and raise administrative efficiency, the central government has decided to decentralize certain powers for project approval to the governments of provinces, municipalities and the 14 coastal cities as well as the ministries under the State Council.

In order to speed up the pace of the reform and open policy, some provinces and cities have further delegated authority for approval of foreign investment projects to lower levels, and some approval authorities of provinces and cities have adopted the "one stop" approach which shortens, to a great extent, the time needed for approval. All kind of special organizations catering for foreign investment have mushroomed, such as foreign investment service centres, material supply companies, law firms, and accounting firms and so on, which offer various types of special service to foreign investors and have met with wide-spread approval.

Priority Sectors for Foreign Investment in China.

The key areas of development in China from now on are agriculture, energy, transportation, raw materials and raising the technology level of existing industries. At present, the areas that encourage foreign investment are:

--- Agriculture development and industrial projects involving new technologies for agriculture applications;

--- Infrastructure such as energy, transport and industrial products for raw

material in greatest need.

--- Technologically advanced industrial projects that can improve the product function and reduce energy consumption, increase production capacity and raise economic efficiency;

--- export-oriented industrial projects that can adapt to the needs of both home and foreign markets, upgrade product levels, expand export and increase foreign exchange earnings;

--- New equipment, new material projects that meet shortages in domestic production and meet market requirements;

---From the beginning of 1992, commercial cooperation and land leasing are also open to foreign investors.

In 1992 the Chinese government decided to open the regions of cities along the Yantze River, the border areas and all capital cities of inland provinces, thus, an overall opening-up structure has been formulated throughout the country.

Compared with other countries it can be seen that China has its unique environment for direct foreign investment. It can be characterized as follows.

(1) Economic reforms have provided a strong incentive to absorb DFI while other countries do not have this type of situation. The main objective of China's economic reform is to realize its industrial modernization. It needs to introduce advanced technology, equipment and management skills from

industrialized countries, in the form of DFI, as a quick way to achieve China's goals. The Chinese governments incentive to absorb DFI into China has resulted in great efforts being made to improve its investment environment. Most other countries have not experienced this type of reform background and the government's incentive for absorbing DFI.

(2) China has the most underdeveloped and biggest market in the world. China sealed itself off from the outside world almost 30 years. During that time, China's economy developed very slowly, and only few opportunities could be offered to foreigners doing business with China. On the other hand, China has the biggest population in the world. The markets of industrialized countries and most developing countries like South-East Asian region are almost saturated, and their markets are relatively narrow.

(3) China has advanced technology features in some sectors, such as space and nuclear industries. As mentioned in Appendix III, China is now able to make and launch various satellites and has entered the international market in this area. These technological features demonstrate that China has a good scientific and technical base compared with some Arab countries, which have a weakness in engineering. **[Abdelkader D. 1990]**

(4) The Chinese government provides more investment incentives for DFI than that of in other countries, for instance;

* The Philippines has a regulation on foreign investment which strictly permits only pioneering foreign companies to have a share of over 30% of paid-up capital, **[Sinichi, I. 1990],** but China has no limitation for the share of foreign investors.

* Most Arab countries have set restrictions to limit dependence on foreign capital and prevent uncontrolled actions which might jeopardise national economic goals. In contrast, China allows more dependence on DFI. Foreign investors can send their profits out of China. They can use their capital to reinvest in foreign countries, but reinvestment in China is also encouraged.

* Compared with other countries China provides a relatively hospitable tax environment [Easson,A. 1991] The most important tax incentives offered by the Chinese government are: tax exemption during the first two profit-making years; a tax rate reduction for a number of subsequent years if a joint venture is established or expanded as an export-oriented or technologically advanced enterprise; and a refund of tax for (previously taxed) profits that are reinvested in China. In the case companies, foreign managers often reported that they enjoyed greater priority of business tax in JVs, not only in comparison with Chinese local enterprises but also with other countries.

In summary, China has a unique investment environment, which provides a strong incentive for DFI. It has an underdeveloped and large market, advanced technology features, more incentives than in other countries and

low cost of labour and raw materials. Given these features, there is a better opportunity to generate greater profits than in other foreign locations.

These investment incentives are a necessary prerequisite for DFI in China, and they have been promoting the flow of foreign investment into China.

3.2.2 China's Market Potential

Although China has made remarkable achievements in the economy since it opened its door to the outside world, it is still as was mentioned earlier a developing country with weak economic base. Many commentators suggest that China is the last undeveloped market in the world, in terms of its has a great market potential.

One reason is that China has a huge population of over one billion, which accounts for almost one-fourth of the world's population. For durable consumer goods alone, the growth in demand has increased rapidly. For example, in 1986 the output of refrigerators was six million. In the year 2000, the expected demand for refrigerators will be 4.3 times the output of 1986. Washing machines became available in 1970s, sales have increased rapidly not only in urban areas but also in the suburbs and vast rural areas; the demand for washing machines was 12 million in 1990. These simple figures show how huge the consumer market is in China with such a large population.

Another important reason is that due to the weak economic base and lack of sufficient advanced technology, in order to accelerate China's economy, the Chinese government has a great incentive to introduce advanced technology and equipment from the outside world including:

** import of advanced technologies and equipment from abroad for the priority sectors of energy, telecommunications and raw materials production;

** import of generating equipment for thermal, hydro and nuclear power;

** enhancement of mining and mechanization;

** solutions for transportation difficulties;

** development of natural gas and oil reserves;

** development of the chemical industry;

** improvement of quality of basic components in machinery and equipment industries.

** enhancement of the quality and variety of electronic products;

** acceleration of the development of large- scale integrated circuits, computers, microelectronic technology, optical fibre, program-controlled telephones and satellite communications;

** development of light industry, textiles, food processing pharmaceutical and other industries to meet the needs of people.

Therefore, such an undeveloped market has been providing foreign business people with many business and investment opportunities.

3.2.3 Support From Local Authorities

From the above discussion it can be seen that China really has its own investment environment characteristics, with a large population, rich resources and a fairly sound foundation for science and industry. What is more, the Chinese government's attitude towards incentives, and the open-door policies are a necessary prerequisite for direct foreign investment in China. Although all joint ventures share the same macro environment provided by the central government the support from local government authorities is probably more important.

One of the case study companies, a Sino-Japanese sensor JV encountered personnel difficulties when an innovation was being exploited. The technology of raw sensor materials was a research achievement with advanced features but lacking good process technology. It had to innovate to match the two parts of the technology. In this case, it needed engineers with more experience of process technology to undertake the innovation task, but the company had few such qualified engineers. Usually the company selected engineers from Chinese parent institute or received graduate students, without working experience from universities. Such students were assigned by the relevant authority. However, The company thought that engineers from the institute or university students were not competent enough to develop the process technology. For this reason, the local authority allowed a change of personnel policy whereby the company could employ qualified engineers from other enterprises. With this qualified engineering team the innovation was developed smoothly.

Another typical example of a JV that is declared to be successful is Shanghai-Yoahua Pilkington Glass Ltd; This is a Chinese-British joint venture, that has become a "model" business with foreign investment, It won the title of "excellent foreign investment enterprise" of 1990 and 1991 for its outstanding economic and export performance. (awarded by Ministry of Foreign Economic Relations and Trade)

In its early stage, this company was in difficulty with its market. At that time the company's only strategy was to sell into the domestic market, because in the contract there is a limitation that this joint venture can not sell its products to 26 countries. Unfortunately, the Chinese government limited the scope of civil engineering building at that time, which seriously affected the float glass business, so the company was running at a large loss of 16 million RMB (U.S$ 3 million), in the first operating year of 1988. [Ginty 1992]

From 1989 the company responded by shifting from the domestic market to the international market. It set-up an international sales team with more than 30 sales engineers who were selected from experienced people with a background of both technology and trade. With such a sales team, the company has gradually become successful in exploiting the international market.

Meanwhile, the Shanghai local government authority made efforts to solve the company's financial difficulty. The local authorities helped the company in

two ways, one by providing the bank loans to the company and secondly by giving exemption from profit tax for two years. When the company's condition improved, the local authorities still gave tax-rate reductions to the company for a period of further two years .

When the company's international market operation met difficulty, due to a lack of containerised transportation, the local government gave it special priority, so that the company could build its own berth for international shipping nearby. The company is only one out of several hundred factories along the Huang Pu River to enjoy its own berth.

When the company met with the difficulties of raw material supply and foreign exchange, the Shanghai authorities also made efforts to solve the company's problems. The Shanghai government authorises contacted with the related Jiangxi local authority to provide help in the raw materials supply for the JV. Fortunately, things were running smoothly between authorities to solve the JV's problems. To solve the foreign exchange problem the Shanghai government authority found an enterprise which had foreign currency reserves so that it could offer the foreign currency to the JV by changing RMB.(the no-convertible local currency)

This was all due to the company's good relationship and timely explanation of the difficulties to the local authorities to get their full support. The local government also got the incentive by having more successful DFI in their own

territory.

Thus, the company enjoyed the maximum support from the local government. The former General Manager Dr. Ginty still tells people:" Up till now, the local government's support has played a key role in the company's success. Without this strong support, the company couldn't have managed during a very difficult time."

The companies' cases show that the support from local authorities plays a more important role in influencing the performance of a joint venture. This is because the local authorities could make the effort of solving JVs specific difficulties while the central government offers investment policies and improves macro investment environment in the country.

3.3 Current Situation of Foreign Investment

3.3.1 Latest Situation

Since China adopted the open policy in 1979, absorption of direct foreign investment has made remarkable achievements. Statistics [2] show that from 1979 to the end of 1991, China has approved more than 42,000 projects for foreign investment, from 70 countries and regions, a total foreign commitment

2. Data obtained from Ministry of Foreign Economic Relations & Trade.(MOFERT)

of US $52.3 billion, of which U.S$ 23.3 billion has so far been brought in.

At the beginning of 1992, Mr. Deng Xioaping visited southern China. During his visit, he made a significant proposal that China should further open its thinking; be bold in exploring its efforts to accelerate the pace of reform and pursue an open policy, and concentrate the efforts on economic development. Following these guiding principles, foreign investment has flowed into China like a tide and statistics show that 22,000 foreign investment projects were approved with a value of U.S$ 24.1 billion in only the first eight mouths of the year 1992. Thus, the figures for new projects and the value of investments are up 150% and 170% respectively on those for the same period in 1991.[3]

3.3.2 Regional Distribution of Foreign Investment in China

Due to the priority given to the East Coast Area, this region is now regarded as a "Golden Area" for foreign investment, which includes Five Special Economic Zones and Fourteen Coastal Cities. One advantage is that this area already had good land and water transportation. Another advantage is that the industrial base in the area is much better than in the other areas of the country. What is more, the Chinese government has given the Five Special Zones and Fourteen Coastal Cities more priorities within the open policy. Guangdong province has received the largest share; 45% of the total foreign

3. Data obtained from People's Daily Overseas Edition, 29, Oct. 1992.

investment in the country. Now the distribution of foreign investment covers all provinces, autonomous regions and cities under central jurisdiction. Hence, an initial pattern of foreign investment has taken shape, spreading from the coast to inland areas. This provides foreign investors more location choices for their ventures. The main Region Distribution is shown in figure 3.1, and the whole regional distribution is shown in table 1 (Appendix IV).[4]

3.3.3 Distribution of Foreign Investment in Trade

The basic starting point in formulating policies and laws on investment is the encouragement of foreign investment in key economic construction projects and making adjustments according to the needs of the national economic development plan. However, the Chinese government gives some priority sectors for foreign investment as mentioned previously in this chapter. It will be a direction for foreign investments.

The distribution of investment in trade is given in fig. 3.2, another further detail of the distribution in trade is shown in table 2 (Appendix IV).[5]

From fig. 3.2, it is seen that there is more investment in the hotel and service industries. China has so far failed to make a breakthrough in introducing foreign investment into production of energy, steel and precision machinery

4, 5. Data obtained from MOFERT, inside report, 1991.

and communication equipment, which are badly needed for China's economic development, so efforts should be made to readjust the structure of further investment.

From 1992, the Chinese government has been carrying out a more open policy for foreign investment, especially the Land Leasing and Commercial Trade policy for foreign investors. Hence, this has created a new peak for foreign investment in the year 1992.

3.3.4 Foreign Investment Sources

Between 1979 and 1990 China absorbed foreign investment through diversified channels. Up to now, foreign investments in China have come from more than 70 countries and regions. Among them, Hongkong and Macao have the largest share, accounting for 62.55% of the total investment value, (this figure maybe includes some countries via Hong Kong). This is followed by United States with 8.58%, and Japan with 5.9%. The main foreign investment sources are shown in fig.3.3 and the details are given in table 3 (Appendix IV) [6].

In addition, from the beginning of 1992, the distribution of foreign investment sources has changed considerably. Investment on the mainland by Taiwan

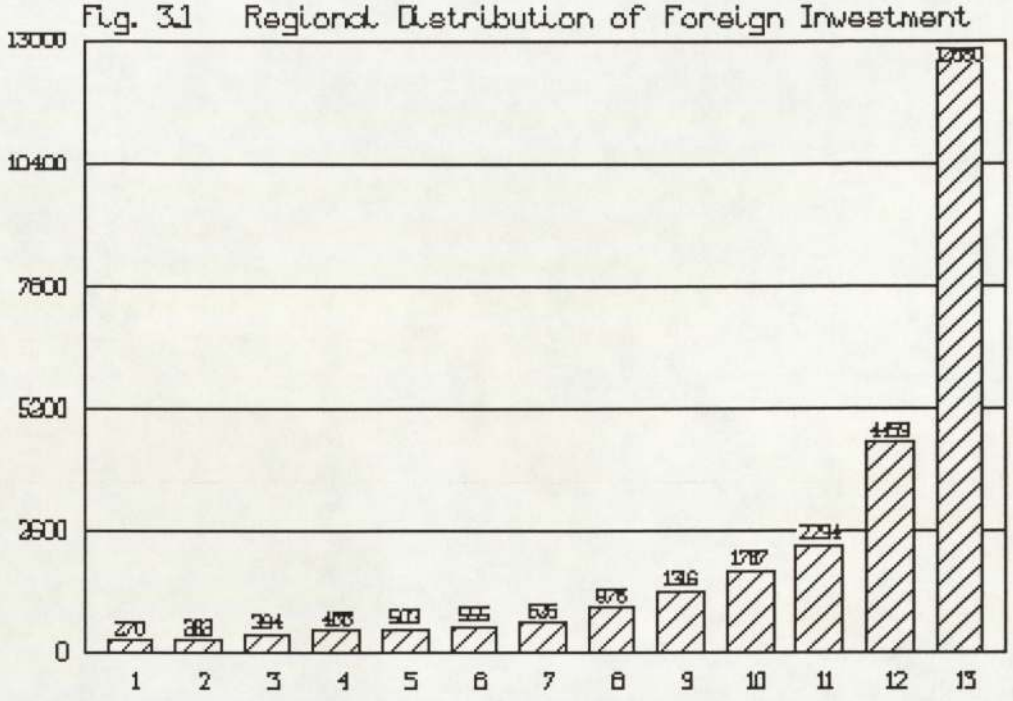
6. Data obtained from MOFERT, inside report, 1991.

investors has shown a remarkable increase. Statistics [7] show that the investment projects approved by Taiwan investors reached more than 3,800 with a value of U.S$ 3.4 billion in only the first three months of 1992; almost two times that the same period of 1991. Therefore, the investment from Taiwan is now greater than that from the United States and Japan. This may result from overseas Chinese now having greater trust in China's reform and open policy.

China has made remarkable achievements in foreign direct investment, especially from the beginning of 1992 when the growth rate of foreign investment has grown dramatically. Undoubtedly, this is assisted by the much more open policies which China has now adopted including more open regions, varied sectors and various forms of cooperation. This improving environment with its own characteristics will continually promote direct foreign investment into China.

7. Data obtained from People's Daily Overseas Edition, 22, June 1992.

Fig. 3.1 Regional Distribution of Foreign Investment

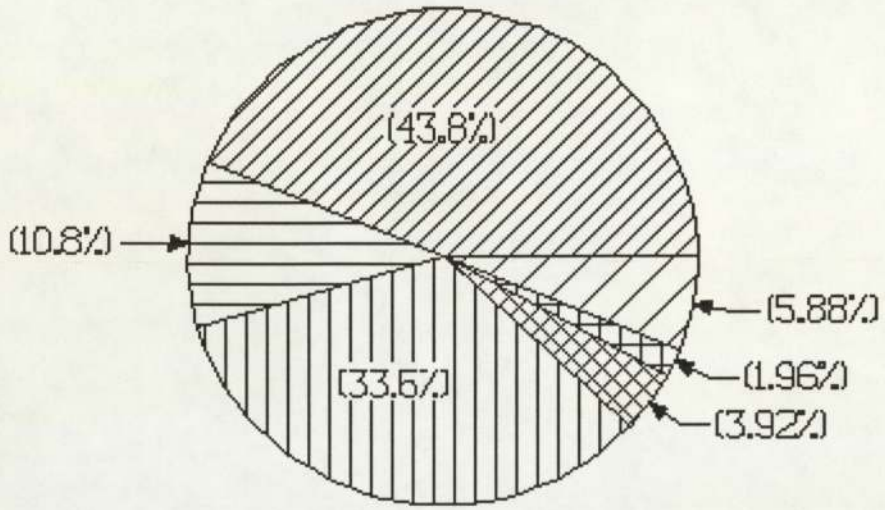


Note:

* Total amount is US$ 28165 million. 1979-1990.
* This Fig. only shows the regions where the proportion is over 1% of the total foreign investment.
* 1-GuangDong, 2-State Enterprises, 3-ShangHai,
* 4-BeiJing, 5-FuJian, 6-ShanXi, 7-LiaoNing
* 8-JianSu, 9-ShanDong, 10-GuangXi, 11-TianJin,
* 12-HeBei, 13-HaiNan

(sources from Ministry of Foreign Economic Relations and Trade-- MOFERT)

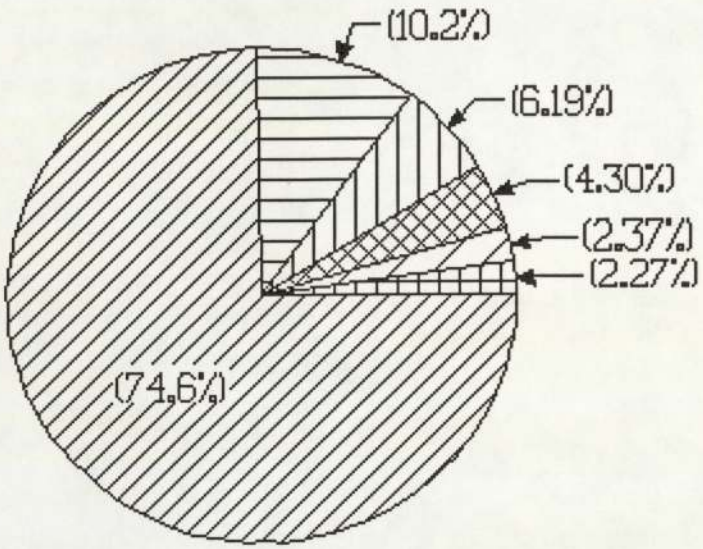
Fig. 3.2 Distribution of Foreign Investment in Trades
(Sources from MOFERI 1979-1987)



Regions

- Hotel and Service industries US$ 3800 million
- Light and Textile industries US$940 million
- Energy industries US$ 2910 million
- Raw and Semi-processed materials US$ 340 million
- Agriculture,Fishery and Animal Husbandry US$ 170 million
- Electronics and Machinery industries US$ 510 million
- Total amount of Foreign Investment US$ 8550 million

Fig. 3.3 Foreign Investment Sources
(Sources from MOFERI 1979-1990)



Regions

Hongkong and Macao	US$	21118	million
Unite state	US$	2896	million
Japan	US$	1752	million
Europe	US$	1217	million
Singapore	US$	641	million
Others	US$	670	million
Total	US$	28294	million

Chapter 4

TECHNOLOGY TRANSFER IN JOINT VENTURES

CHAPTER 4

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Since the founding of the People's Republic of China in 1949, the introduction of technology into the country has been playing a significant role in promoting the development of the Chinese economy. Its transfer can be divided into four distinct phases. [Bennett et al 1992]

The first phase took place in the 1950 when around 160 mainly large scale heavy industrial projects were introduced from the Soviet Union and Eastern Europe. The basis of these projects was to provide the initial foundation for China's industrialization.

During the second phase in the 1960s the transfer of technology from the Soviet Union and Eastern Europe was almost totally suspended. Small amounts of technology were imported from Western countries but this amounted only to key production facilities and instruments used for scientific research.

In the third stage, covering the 1970s, China's objective was to re-establish the base it had lost during the "cultural revolution" and its ill-conceived "great leap forward". Technology transfer therefore concentrated on importing complete petrochemical installations, steel making plants and electrical power generation equipment in an attempt to transfer the weak and technologically backward sectors.

In the fourth and most recent phase of technology dates from 1980. China invested 16.58 billion us$ to introduce the foreign projects. About 10,000 technology transfer projects were implemented between 1980 and 1990. The current technology transfers differ from the technology transfer waves of the 1950's, 1960's and 1970's. They are now largely involved with direct foreign investment via a joint venture.

As previously mentioned in chapter 3, China's foreign investment policies clearly suggest that the Chinese government has a great desire to absorb direct foreign investment. Its main goal is to gain advanced technology in order to speed up the national economy. Therefore, many Sino-Foreign joint ventures were established with technology transfer objectives. This is especially the case in high-technology joint ventures, in which technology transfer plays a crucial role in their success. That is why this chapter will focus on technology transfer in joint ventures. It will examine it using several factors including: how to choose the technology type; how to conduct the transfer procedure; how to carry out technical training.

4.1 Choosing an Appropriate Project

When investors are making their investment decisions, one of their important concerns is the choice of an appropriate project. How should the choice be made? What factors should be considered? The research finds that partners have mostly common interests, but some differences do exist.

4.1.1 Determining the Appropriate Level of Technology

This factor is mainly the concern of the Chinese side. Generally, the Chinese partner wants a project with the most advanced technology, but the reality is that the more advanced the technology the higher the cost. This is a problem, because China is still a developing country, and although recently there has been a rapid increase in its economic growth, it still lacks enough hard currency to buy high cost advanced technology.[1]

In some cases, to transfer the most up-to-date technology from industrialized countries to developing countries needs government authorization. This is particularly strict for Communist countries like China. On the other hand, the foreign partners such as GPT Ltd may be conservative when considering which level of technology they wish to transfer to China. This is understandable since business people often have the rule of keeping the best

1. Some compaies os Chinese Academy of Sciences

technology for themselves. This is due to the strong world business competition.

Both sides have the basic objective that their project (product) should be of a technology level which provides a strong competitive position in the international market. Otherwise, if the Chinese partner only considers not to pay the higher cost for advanced technology; or the foreign partner provide a lower level of technology, the venture's product will not be able to face competition and there will be no return on the investment.

When considering the above factors, a compromise is often reached based on an appropriate choice of the technology level. What level of technology is it appropriate to choose? A particular level of technology may be the most advanced at a given moment, but after two or three years its position may have changed.

We can divide the technology likely to be transferred into three levels. The first level--the most advanced, up-to-date technology; second level--that which is accepted as a world standard; and a third level--the local or regional standard. In general, a compromise choice seems to be the second level, it being a world standard. How to identify these three levels of technology will raise a further question. This is an issue especially for Chinese engineers, since they have greater difficulties in obtaining more information from abroad. The reasons are complex, some may be due to bad communication with their

counterparts in industrialised countries, with rare opportunities to visit foreign companies [Bennett et al,1992]. Thus this has resulted in many examples of a blind choice of the technology projects. Some of the projects have been at too high a level compared with the Chinese receiver's ability to accept it. This is often due to the difficulty for the Chinese engineers and workforce to manage the technology. Some other projects were at a lower level than the Chinese expected, and this affected the market competitiveness of the product. [Gu 1987]

These facts have taught the lesson that a careful feasibility study should be conducted before choosing the projects. This feasibility study can mainly focus on the level of technology and its market potential.

A good example is the digital telephone equipment company joint venture described in Appendix I. In 1985, when the joint venture was in the negotiating stage, and the level of technology for the project was being considered, the Chinese wanted the latest telephone equipment, but the U.K government would not permit the transfer of this level of technology to China. The UK parent company also thought that this advanced level telephone equipment was too complex for Chinese engineers to master in so short a time. Finally, the project chosen was ISDX telephone equipment with the second level-world standard. However, the company's successful business has proved that its choice for the project was acceptable and practical.

4.1.2 Matching the Technology Type with the Partner's Technology Environment

Matching the technology type with the partner's environment is also a key consideration which will influence the efficiency of assimilation, the capability for technology management and innovation after transfer.

How should the technology type be matched with the partner's technology environment? Where joint ventures have been successful in this respect, the factors they have considered include of the partner's business trade, its technology base, and its technical competence.

Firstly, the events in these joint ventures suggest that the first priority is to choose a partner in the same line of business as the foreign parent company. The Chinese partner will be quite familiar transferring the technology type and will also have more experience in running the local production operations. In this research six of the eight case study companies were matched with partners in the same line of business.

Secondly, the technology supplying-company should evaluate whether the Chinese partner has a sufficient technical base and skilled work force; the technical base being the partner's previous technology level. In Chinese enterprises there may be three levels for the technical base, including the skills of the work force. At the first level, some state enterprises have a

considerably long history, in terms of having more experience in running local product operations. They also have a large technical work force, i.e. skilled engineers and technicians with a proportion of over 30% of their total employees, who are competent to undertake research projects of the level of universities or the other academical institutes. Their product quality matches the national standard;[2] and their business operations are soundly run.

At the second level, most Chinese enterprises have been established for a long period and have extended experience of product operations. They have a skilled work force of 10%-30% of their total staff. Their technical workforce can only undertake research projects below the level of a university or institute. The quality of their products can only reach a "regional" level, and their business management only reaches average performance.

At the lowest level, some collective and rural-township enterprises have recently been set up, often with out-dated equipment. Their technical work force is very weak with few engineers or technicians. Their products are of a lower standard with poor management.

In most cases, it will be very difficult to transfer high -technology to those enterprises which have the lowest technical base. However, the enterprises

2. National standards for products in China are set by The State Quality Inspecting Commission.

with the first and second levels of technical base can be considered for high level technology transfer. The reason is that not only do they have an appropriate technical base and sufficiently high level educated work force, but they also have a motivation to upgrade their products or reach the world standard level of technology.

A new Sino-UK Technical Services Centre described in appendix II is now in the establishment stage, (the author has been playing a coordinating role) The UK company, C.E Commissioning Engineers Ltd. chose a Chinese partner with an academic background, the main consideration being that the Chinese partner should have strong technical & engineering resources. These will provide sound technical support for the new joint venture's business in the field of technical engineering services.

The fact that the above considerations have been met means that a reasonable match has been found for the technology type with the partner's technology environment. Under these circumstances, it will be easier for the Chinese partner to absorb and manage the transferred technology efficiently in a short period of time.

4.1.3 Legal Environment and Knowledge of the Law Concerning Technology Transfer

The case studies suggest that the role of the legal environment and the

knowledge of law have become more important in technology transfer. Generally, Chinese and foreign investors have different legal requirements.

Foreign investors require that China has a legal environment which provides for private property rights and their protection. Some foreign business people complained that Chinese factories sometimes copied their products which seriously influences their market competition. Now, the Chinese government has made efforts to improve the legal system; more than 50 laws and regulations directly concerning the interests of foreign investors have been enacted.

In contrast, the Chinese have learned the lesson that they should have more legal knowledge relating to technology transfer, especially that they should ensure the registration of patent rights and trade marks, which heavily affect the market opportunities of their joint ventures.

In one of the case study companies, the Sino-Singapore joint venture described in Appendix II the Chinese partner was the technology supplier, the technology having been invented there; and the foreign partner only invested the money. Due to both partners lacking the legal knowledge of patent rights, they did not apply for the patent rights in other countries. This resulted in a serious problem when selling the venture's product in some countries whose markets were important to China but where they had not applied for the patent rights.

4.2 Technical Training

Generally speaking, almost all technology transfers involve technical training.In a high technology joint venture in particular, how to conduct technical training is a measure of the quality of the technology transfer .

How should technical training be conducted? The following case evidence reveals that different nationalities and different companies have different methods. However, one fact is worth mentioning: companies which have more experience in the establishment of joint ventures are often more successful in their technical training.

Most successful technology suppliers do their technical training in one of two ways: one is by running intensive courses with guided practice; the other is to have a long-term on-the-job strategic training programme.

4.2.1 Intensive Training Courses with "Guided Practice"

Running intensive courses is a common way of technical training, especially for high-technology transfer. How such courses are run will influence whether efficient training results.

In the Sino-UK glass making joint venture described in Appendix I the UK partner provided courses at different levels and different length. The first level

was for top managers; they chose eight well qualified managers with a technical background. These top managers were trained in the UK parent company for eight weeks before the joint venture started its operation. The aim of training these managers was to put them in key supervisory positions, and they should also be familiar with the entire manufacturing process.

The second level of training was conducted for managers, engineers and senior operators. This training lasted six weeks; 80 people were divided into several groups with varying size, and they were trained in different ways. For instance, computer engineers were trained mostly in the classroom, while manufacturing engineers received practical training in the workshop. After training these personnel were competent to take the responsibility for each process position in the production line.

The most important experience provided by the courses, at different levels was the accompaniment of "guided practice" (trainees do their practice under guidance from instructors). Sixty five expatriates instructed the Chinese engineers and senior-operators on site in each key position, for periods of between six months and two years. This was a convenient way of instructing the Chinese engineers and the good design of technical training with " guided practice" made it easier for the Chinese partner to understand and assimilate the new advanced glass-making technology transferred from the foreign partner.

As a result, the operating test was successfully passed first time, and after two years all expatriates left the Chinese site. The management of the joint venture is now carried out only by Chinese managers and engineers in a sound business, which is introduced from the foreign partner.

4.2.2 Long-Term On-The-Job Training Strategy

Many joint ventures with successful experiences often have a long-term on-the-job training strategy. They think a long-term training strategy to be as important as intensive training in the early stage of establishing a joint venture. The reason for this is that a high-technology joint venture always undertakes the tasks with complex technology, and as time goes by its technology is constantly developing. Hence, the venture needs to train its staff in new techniques to meet the needs of technology development.

How do these ventures plan their long-term on-the-job technical training? The Sino-U.K telephone equipment joint venture described in Appendix I has set a good example in this respect. This joint venture has mainly provided two types of technical training: one is basic training; the other is on-the-job training. All the training courses have been conducted by the UK partner at different places and different times. Both of these two types of technology training focused on the long-term on-the-job training.

For the majority of staff, including engineers and skilled workers, the basic

technical training was held at the Chinese site for one month. The training was designed as an intensive course by instructors from the UK company's Training Centre. From this basic training the local engineers and workers learnt the complex principles of the digital telephone equipment.

How has the venture conducted its on-the-job training? The venture has adopted various ways. One way is to send Chinese engineers to the UK parent company at each phase of the transfer since the venture has adopted the step-by-step approach and low rate of transfer procedure. For instance, in year one only assembly and test technology were transferred to the venture, therefore only two test engineers were sent to the UK company for two months training. During years two and three, more complex technology was transferred to the venture, and computer hardware, software and maintenance engineers were trained in the UK company. In most cases this kind of training was carried out in the laboratory supervised by UK engineers. With careful guidance from experienced UK engineers, and the advantages of computer simulation, the Chinese engineers were able to understand the complex technology. So far about 10 Chinese engineers have been trained in this way. On each occasion two Chinese engineers were sent to the UK for a period of two months.

The other way to carry out on-the-job training is to send expatriates to the venture in China. In this way a few expatriates can guide more Chinese engineers and easily detect any specific problems while conducting the technology transfer. How have these expatriates carried out the training and

how long should they stay there? The answers are varied. The expatriates for basic training, finance and quality management implemented their tasks mainly in the form of courses or seminars for about one or two months. In contrast, as the training tasks were more complex, manufacturing and maintenance instructors have had to stay in China for about five years. The way of training is this; two local engineers were trained intensively in order to reach the higher level, while guiding the majority at the normal level. These higher level local engineers will take over the responsibilities of the expatriates when they leave China.

This joint venture not only has a plan for long-term training, with a fixed period, but also provides immediate training for its staff according to the development of its technology.

4.3 Transfer Procedure

4.3.1 The Strategic Consideration of Transfer

Technology transfers like doing anything, might have more possibilities of success if the strategic aspect has been considered. The facts suggest that this aspect is particularly important in transferring high-technology.

What are the strategic considerations of technology transfer from abroad into China? Chinese and foreigners seem to hold different views.

From Chinese government policy, it can be seen that the Chinese have the strategy to gain advanced technology from industrialized countries, seeing this as a quick way to achieve its industrial modernization and economic growth.

Following this strategy of adopting the form of " know how" rather than only importing equipment is their key strategic consideration for transferring technology from abroad. Although the "know how" form of technology transfer increases the costs (for expertise, training, and expatriates), it can result in a more effective transfer.

In contrast, foreigners often give as their strategic consideration that they prefer the Chinese market potential for gaining more profits. Following this strategy, they do not mind which technology transfer form the Chinese adopt.

However, it should be made clear that if the transfer method chosen does not produce an effective result or even results in failure it might seriously affect any future technology transfer or equipment imports.

Many examples can be given of this happening. Most of them occur when the transfer form was equipment only without "know how". The reasons for this choice of transfer form may have been due to 1) lack of foreign exchange to pay for "know how" technology transfer. 2) lack of qualified engineers and skilled work force to master the advanced technology equipment.

4.3.2 Versatile Forms and the Rate of Transfer Procedure

When the strategic considerations of technology transfer have been made, choosing the form and the rate of transfer procedure are also important. There might be several versatile forms of transfer procedure, but this research finds that the choice can be mainly considered from the following aspects.

1) The transfer procedure can go through the form of an agreement of technology transfer or a Sino-Foreign joint venture.

When interviewing some Chinese authorities who are in charge of technology transfer and importing systematic equipment from abroad, they opined that when the Chinese partner has a qualified team of engineers and a skilled work force, but is short of foreign exchange, the better choice might be to adopt the form of an Agreement of Technology Transfer. This is because limited foreign exchange can buy new equipment with its documentation, and the Chinese engineers will be able to install and manage the new technology after its import.

If the Chinese side does not have a good qualified team of engineers, the setting-up of a Sino-Foreign joint venture, with "know how" technology transfer, seems to be the better available choice. The reason for this choice is that a joint venture is a close form of cooperation with the partners sharing the responsibilities, investment risks, and profits. A joint venture can make the maximum use of both sides' advantages, for example, the Chinese side can

provide low cost labour and raw materials and the foreign side can offer expatriates, technical training, as well as advanced technology.

2) Either a "High Rate" or "Low Rate" can be chosen for the transfer procedure.

The facts from the case study companies reveal that choosing an appropriate rate of transfer is more important for the success of technology transfer. For the purpose of analysis we can classify the rate of technology transfer into "high rate" or a "low rate", the choice being selected according to the process features of the technology and the partner's technical base.

The Sino-UK joint venture described in Appendix I makes "float glass". Its feature is that it is a whole production process, which can not be interrupted after starting its operation. For such a process feature, a "high rate" transfer procedure had to be adopted. It was clear that the whole process technology must be transferred completely in "one step". Only then were the Chinese engineers and work force in a position to master the process technology and set the production line in operation.

In order to complete the technology transfer, as quickly as possible, the foreign partner (technology supplier) held several intensive training courses, for managers and engineers, at its UK parent company including workshop practice. A training course was also held for the skilled work force at the

Chinese site. What is more, at the stage of testing the operation, the UK company sent a team of more than 60 engineers and managers to the Chinese site. These expatriates supervised the work of the Chinese engineers and operators, in each key position, for about half a year.

Within a carefully designed "high rate " transfer procedure, the venture achieved its aim that the production line could start its operation successfully in one step. So far the venture is still in a sound operational state.

Another typical example, the Sino-UK telephone equipment JV illustrates the option of the "low rate" form of transfer procedure. The project was concerned with high-technology digital telephone equipment. The reasons why this joint venture chose a "low rate" for its transfer procedure were that the technology was much more complex and sophisticated, and the technical base of the Chinese partner was not sufficiently strong, so advantage was taken of the fact that its process could be done in separate steps.

In this case, by choosing a "low rate" for the venture's technology transfer two problems were avoided. First, the difficulty that the Chinese staff would have had to master so complex a technology in so short a time. Secondly, the loss of profits that would have occurred if the delivery of the equipment had not been completed by the first stage of the joint venture's establishment.

This "low rate" transfer procedure was conducted in four steps. Step one:

during the first year, before the venture's manufacturing equipment had arrived completely, the product parts were manufactured at the UK company, the product assembly and test was then carried out in China. Step two: during year two, the venture began to manufacture some less important cards for the telephone equipment. Step three: in year three, the venture manufactured important parts of the product. Finally, the fourth step, the venture could produce the whole product in China, when the Chinese engineers and work force had more experience.

The success of the "low rate" transfer procedure for such a venture's characteristics has been proved. The venture obtained its profits in the first operational year. In addition, it gradually set up a strong technical team through long-term training and the guidance of UK expatriates.

As this chapter has discussed, the evidence from the case study companies illustrates that there were several factors influencing successful performance during technology transfer. However, two of these factors may be considered as the most important ones. One factor is technical training. As illustrated in the two case study companies, whatever choice of training intensive or long-term on-the-job they adopted, they had a good plan for conducting this training. The other factor is choosing an appropriate rate for technology transfer. Although the appropriate level of technology is important the choice of a suitable rate for the transfer procedure is even more important, and strongly influences whether the transfer is a success or not. The two case

study companies chose the right rate for their technology transfer because they had previous experience in the matter. They are now approaching successful completion of the transfer of technology.

1.1

2.2

Chapter 5

TECHNOLOGY MANAGEMENT

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TECHNOLOGY MANAGEMENT

It is only recently that people have realised the importance of technology management after technology transfer, particularly in the context of China's current situation.

Technology transfer has played a significant role in promoting China's economic growth, but facts reveal that some of the transferred technology did not reach the expected targets, with the resulting performance of the technology being much lower than it should have been. What are the factors influencing this? [Gu.1987]

Some of the factors are those discussed previously such as: choosing an appropriate project; technical training and transfer procedure; however the management of technology after its transfer is also an important factor.

Avoidance of failure after transfer, due to bad management of technology, is a practical issue facing the Chinese recipient. Some of the case study companies have experienced this problem. Their experience includes four aspects. The first is the organization and procedures; the second is the

innovation capability development and local environment; the third is the relationship between the local management team and expatriates; the fourth is the question of quality management.

5.1 Organization and Procedures

It is important to recognise the need to set up an organization with a permanent technical team of qualified engineers and technicians. A permanent team can accept more responsibilities which include absorbing the new technology and maintaining the equipment and processes to the required standard. The team should also have the innovative capability to meet the needs of the local environment and for technology development. Therefore, these engineers and technicians should be competent to hold key technical positions. Five out of the eight case study companies have set up their own organisations, called
"technical engineering department", to monitor the technical development and innovation.

Just to have a technical team, however, is not enough for good maintenance of the technology; standard procedures are also needed. Within these standard procedures, the workers can learn how to operate the equipment and ensure the required performance of the production processes.

In addition, these companies have found that not only must there be

procedures but it is also important to implement them strictly in practice.

5.2 Innovation Capability Development and Local Environment

The issue of whether the joint venture has extended its innovation capability has been realized as an important factor for the success of technology transfer.

Some companies only import part of the equipment rather than transfer the whole production process. This raises the problem of how to combine satisfactorily the technology of imported and locally produced components. Due to these companies not having qualified engineering teams with innovative capabilities the problem of combining the technologies could not be solved satisfactorily. This produced the result that the imported equipment could not be operated satisfactorily, nor could the quality of their products reach the level expected. [Gu. 1987]

The lesson learned from this problem is that the leadership of these companies did not have a positive incentive for innovation. This might be due to their short-term view of performance or lack of a competitive market strategy.

In contrast, some companies have more appropriate innovative capability. One of the case study companies, the Sino-Japanese sensor joint venture described in Appendix I is a good example of this. As previously mentioned, its technology was transferred from both Japanese and Chinese parent

organizations, so the technology consisted of two parts. The problem was that the Chinese contribution was a research achievement from an Academic Institute. This research achievement had advanced features but the Institute lacked the process technology.

Without good process technology, it was difficulty for the venture to produce the commercial product. In this case, therefore, the leadership of the venture concentrated their attention on extending the innovation capability. They got support for a special personnel policy from the local authority which enabled them to hire engineers and skilled workers from outside rather than from the Chinese parent organization.

With a strong engineering team and skilled work force, the venture also introduced an award system to encourage innovation. This greatly increased the progress of innovation and in six months the process technology problem was solved satisfactorily.

These facts have demonstrated the importance of extending innovation capability and suggest that this aspect involves two key elements. First, the leadership of a company should give strategic consideration of the company's future innovation. Secondly, setting up a strong technical team is a necessary basis for innovation capability.

5.3 Relationship Between the Local Management Team and Expatriates

5.3.1 Types of Relationship

In most cases, Sino-Foreign joint ventures use expatriates from foreign parent companies. They are often employed as general managers and middle managers in manufacturing, engineering and quality management etc. Most of their responsibilities are related to technology management. These expatriates work together with Chinese local managers in the day-to-day operations. Thus, the relationship between them represents a significant factor in the management of a joint venture.

The research finds that there may be three types of relationship between the local management team and the expatriates. 1) a dominated relationship; 2) a shared relationship; 3) a guided relationship.

1) A dominated relationship means that expatriates are in charge of almost all responsibilities, and the local managers only assist in the venture's management. More often this dominated relationship exists in a Sino-US joint venture [Child,J. 1990] or sometimes in a Sino-German joint venture. It has its own characteristics which enable a venture at an early stage to quickly reach normal operational performance. The reason might be that when the expatriates are managing the venture a foreign management style is introduced

more quickly and easily.

The Sino-German Shanghai Volkswagen Santana Automobile joint venture is a good illustration of a typical dominated relationship. In the venture, all important management positions in technical engineering and manufacturing were initially held by expatriates. They had the decision-making power with the local managers and engineers only acting as assistants. As a result, the company quickly achieved a smooth level of operation.[1] [the interview with Chinese and German managers July.1990]

2) A shared relationship provides almost equal responsibility for both foreign expatriates and the local managers in a venture's management. It seems that this kind of relationship mostly occurs in Sino-Japanese and Sino-Hong Kong joint ventures which is maybe due to the partner sharing similar cultures. The characteristics of a shared relationship are that the expatriates and the local managers hold almost equal management positions both in number and level, but with varied responsibilities. More often the expatriates are in charge of technical engineering, manufacturing and quality management while local managers are responsible for personnel, sales and finance.

In the Sino-Japanese sensor joint venture the relationship between expatriates and local managers can be considered as a shared relationship. The positions

1. Interview with Chinese and German managers at Shanghai Volkswagen, July.1990.

of general manager, technical engineering manager and quality control manager were held by expatriates; the Chinese managers held the positions of deputy general manager, administration, personnel and sales manager. Both sides are well on the way to a good working relationship. When people asked why this was so, they said: " First of all, we try our best to achieve a good understanding of each other based on the mutual benefits".

Another case study company, Zhoug Yi Technology Development Ltd. a Sino-Hong Kong joint venture offers an example of the problems of a shared relationship. Originally, Chinese local managers mainly took responsibility for manufacturing and administration while the Hong Kong partner was in charge of marketing. In reality, however, the Hong Kong partner was not really in control of the marketing function because it was combined with that of several of the partner's other private organizations which were dependent on each other. Therefore no one had any direct responsibility for marketing in the JV and this seriously affected its ability to market its products.

3) A guided relationship exists when the expatriates only guide the local managers and put them in charge of most responsibilities in the venture's management. This type of relationship often appears in Sino-UK and Sino-Japanese joint ventures.

The Sino-UK glass making joint venture, is a typical example. The expatriates including the general manager and other middle managers established the

guiding principles and motivated the local managers involved in decision-making. The expatriates gave them careful guidance when the local managers encountered difficulty. Therefore, in only one and half years, a strong Chinese local management team was set up which could manage the company soundly so that all expatriates could withdraw from the venture. This has demonstrated that the guided relationship has the advantage that within a short period of time local managers can be capable of managing a joint venture satisfactorily.

It is true that we cannot hastily draw a conclusion about which type of relationship is good or bad in terms of their characteristics and advantages. Nevertheless, an appropriate relationship between the local management team and expatriates no doubt affects the performance of a joint venture.

5.3.2 The Influence on the Relationship of Cross-Culture

Sino-Foreign joint ventures are international enterprises which involve different nationalities and cross-cultural management. The business background and business principles often vary from culture to culture, therefore it is clear that the relationship between the local management team and expatriates is influenced by cross-cultures. For instance, when a venture makes a reinvestment decision, the foreign partner normally wants to reinvest to extend the business, but the Chinese partner is often more conservative. This difference stems from the cross-culture, in that Western culture seems to be more innovative than Chinese culture. This may explain why the foreign

partner would prefer to take more investment risk than the Chinese partner.

Frequently, business arguments that remain unresolved will seriously affect the relationship between the local management team and the expatriates; and in the worst cases, the venture will face the prospects of a business failure.

How to solve this problem has become a key issue for a Sino-Foreign joint venture. There are some practical solutions. One way is that both Chinese and foreign partners should make the effort to understand each other's cultures, which is the backbone for setting up a good relationship between partners [Cambell 1990b]. The partners should realize the differences in economic and political systems, the historical antagonism between China and the West, and the wide gulf created by cultural differences. It is not surprise that a considerable amount of time is required to understand each other. However the partners must trust each other. The trust is build up as each side learns that the other keeps its promises. Such confidence can only be built up gradually.

The other way, [Campbell and Cheng 1991] is that the joint venture can employ an overseas Chinese general manager from, for example, Hongkong, because overseas Chinese not only share the Chinese culture but are also familiar with the culture of industrialized countries with their international marketing experience. They can play a significant mediating role between the local Chinese managers and foreign expatriates. Thus it is much easier to set

up a good working relationship between them.

5.3.3 The Relationship Between the Period of Secondment and the Number of the Expatriates

The facts from case study companies reveal that expatriates play a significant role in the introduction of advanced management skills into Sino-Foreign joint ventures. A practical questions arises here. How many expatriates should be sent to a joint venture and how long should they stay there?

Most of the joint ventures have experienced that the number of expatriates should relate to the type of technology and its transfer procedure. Generally, if the technology is sophisticated, or a high rate transfer procedure is adopted, there will be more expatriates on the site. Otherwise if the technology is relatively simple or a low rate transfer procedure is adopted, less expatriates will be present.

For example, the Sino- UK glass making JV adopted a high rate transfer procedure with complex technology; the UK parent company sent 65 expatriates to the JV site for six months intensive guidance of the Chinese personnel. In contrast, the Sino-UK telephone equipment JV provided a low rate transfer procedure and kept only two or three expatriates in China for a period of ten years. It also sent expatriates for short periods of one or two months depending on the needs of the transfer task.

Facts also suggest that there is a relationship between the period of secondment and the number of expatriates. In general, at the beginning stage of a joint venture, the number of expatriates is larger but this differs for each project. Over a period of time, the number will be gradually reduced, then after a certain period the number will decline to a minimum or zero.

This "certain period" can be called "the withdrawal period". Its length may depend on several aspects, such as the type of technology, the rate of transfer procedure and the type of relationship between the local management team and the expatriates. If the technology is complex or a "low rate" of transfer procedure has been adopted, or the relationship between local managers and expatriates is either "dominated" or "shared", the "withdrawal period" is relatively long. In contrast, if the technology is simple, or the " high rate" of transfer has been adopted or there is a "guided" relationship, the " withdraw period" is shorter.

5.4 Quality Management

5.4.1 The Significance of Quality Management

Generally speaking, the level of quality a product has is very important and whether or not an enterprise has the motivation and awareness for quality management may seriously affect its business reputation. Many Japanese and Western companies are successful but what are the reasons for their success? The reasons may be many and varied but a high reputation for quality is an

absolutely key factor.

In contrast, many Chinese local enterprises have not realized the significance of quality management for their products although they still operate quality standards. Some of them, however, do not even have standards and none of the necessary test equipment; this happens particularly in rural-urban enterprises. Their products often do not possess the features they should have, or are unreliable. Therefore, in many cases Chinese enterprises have no reputation for quality in the marketplace.

In recent years many Sino-Foreign joint ventures have acquired a high reputation for the quality of their products compared with local enterprises. The main reason may be due to the introduction of an advanced foreign quality control system while conducting the transfer of technology into these ventures. They have much stronger motivation and awareness for quality management. In most cases, joint ventures consider quality management as an important part of technology transfer "know how".

5.4.2 The Implementation of Quality Management

Among the case study joint ventures, two of them have been successful in the introduction of quality management. One is the Sino-UK telephone equipment venture, the other is the Sino-Japanese sensor venture. These two joint ventures have many similarities in their quality management procedures.

First, they introduced the concept of quality management that states "the

customer is always right". In order to meet customers' demands the companies sent sales engineers to visit their customers over a fixed period of time. These sales engineers not only gathered information for their products' quality and features, but also provided technical services for their customers.

Following this concept of quality management, the ventures introduced international quality standards from their foreign parent companies. One UK parent company sent a quality executive to the Chinese site several times with a quality standard that was passed on to the Chinese engineers and managers. He also instructed the production workers on the meaning of quality management and how it should be implemented. However, just the introduction of quality standards is not enough. These joint ventures also introduced the techniques for ensuring and managing the quality of the products. Such techniques required the introduction of test equipment. This equipment was more advanced than that normally found in Chinese local enterprises and although it required skilled operators it ensured that the specified level of quality was maintained.

Managing quality is also very important, so these joint ventures have introduced "total quality management". From the top managers and engineers to the production workers, each person has his or her own responsibility for quality management. The foreign general managers are in charge of the total quality programme. For instance, in the Sino-Japan sensor JV, on one occasion a worker dropped a product onto the floor. However, although the

product still subsequently passed the quality tests, the Japanese general manager did not allow this product to be sold. He said to the staff: "We should avoid any quality problem, even one out of ten thousand, because this will affect our future business".

The introduction of a quality management system can result in a high reputation for joint ventures. The author acted as an interpreter in connection with a technical training programme conducted by the UK parent company of the Sino-UK telephone equipment venture for its Chinese customers. These customers had bought 30 sets of digital telephone equipment from the venture. They reported that this equipment has been operating perfectly for more than three years without any serious quality problems. These customers said: " You cannot even compare the quality of products from joint ventures and Chinese local enterprises because the gap is too wide."

From the discussion in this chapter, the evidence indicates that technology management after transfer is clearly a significant factor influencing a joint venture's performance. Technology management involves many factors, such as organization and procedures, and the innovation capability development and local environment, etc. However, two factors are revealed as more important than others. These two factors are: the relationship between the local management team and expatriates; and quality management. This may be because these two factors significantly affect the technology once it has been transferred and whether it can reach high efficiency levels.

1.1

Chapter 6

CONCLUSIONS

6.1 Factors Influencing the Establishment of High Technology Joint Ventures

6.2 Factors Influencing the Performance of High Technology Joint Ventures

6.3 Problems and Solutions

CHAPTER 6 CONCLUSIONS

What are the key factors determining the establishment and performance of a Sino-Foreign joint venture? There may be many different factors. Previous studies have identified several areas, such as choosing a partner, decision making, management structure or system, cross-cultures, foreign exchange and communications. This research is based specifically on some typical Sino-Foreign joint ventures with high-technology backgrounds. The research has evaluated evidence from case study companies and compared it with the viewpoints of previous studies. As a result, the research draws conclusions regarding the key factors influencing the establishment and performance of joint ventures. Some problems and solutions are also discussed.

6.1 Factors Influencing the Establishment of High Technology Joint Ventures

Generally speaking, the establishment phase is the most difficult and important for a Sino-Foreign joint venture. When foreign business people have an outline plan to invest in China it is clear that they should first consider China's foreign investment environment for the establishment of joint ventures.

The perspective of China's foreign investment environment involves many

factors: natural resources, human resources and market potential. However the research reveals two factors as the important ones for the establishment of a JV; (i) the investment incentives from the Chinese central government, and (ii) the local government support.

*** Investment incentives**

Since 1979, when China opened its doors to the outside word, the Chinese government has made a serious effort to improve its foreign investment environment, consequently, many laws and policies have been enacted with regard to DFI. The evidence has demonstrated that without the Chinese reform background, with its open policies and related laws which give more incentives and property protection for foreign investors, there would be no secure opportunities for foreigners to enter China's huge markets, and they would therefore not risk investing their money in China.

Therefore, these investment incentives are a necessary prerequisite for establishing a Sino-Foreign joint venture in China.

*** Support from Local Government**

Although all JVs share the same macro environment provided by Central government, the support from the local government authorities is often more important and can vary significantly. As mentioned above the evidence from

case study companies indicated that the local authorities can solve a JV's specific difficulties such as the supply of raw materials and electric power; transportation, and foreign exchange etc., while the central government offers investment policies and an improved macro investment environment in the country.

6.2 Factors Influencing the Performance of High Technology Joint Ventures

This research is mainly based on high-technology joint ventures, so the factors influencing their performance are considered from the perspective of technology transfer and management.

According to the evidence from the case study companies and comparing this with some viewpoints of previous studies it is possible to conclude that four main factors influence the performance of JV's. (i) technical training; (ii) the rate of transfer; (iii) the relationship between the local management team and expatriates; (iv) quality management.

* Technical Training

Almost all technology transfer involves technical training, particularly in a high technology joint venture. The effectiveness with which technical training is conducted is a measure of the quality of technology transfer.

Evidence gathered from the case study companies suggests that most successful technology suppliers provide their technical training in two ways: by running intensive courses with guided practice and having a long-term on-the-job strategic training programme.

Which is the better choice of training approach for a joint venture to adopt? There are certain factors to be considered. First, the choice should be made according to the characteristics of technology transfer; when a case study company has adopted a high rate of transfer procedure it has also adopted an intensive training programme. Secondly, whichever training programme is chosen, it is important that there is a careful design of the training methods, including an appropriate choice of training period. There are different types and level of courses, different training locations and numbers of instructors. What is more all training should contain guided practice.

*** The Rate of Transfer**

The evidence also demonstrates that, although an appropriate level of technology is important, the choice of a suitable rate of transfer procedure is more important, since it strongly influences whether or not the transfer is a success. This is shown by the fact that two companies, described in chapter 4 chose the most appropriate rate for their own transfer situation.

The significance of studying the "technology transfer rate" is mainly revealed

in three respects; the first is that it has a very close relationship with the technology features and its process characteristics as well as the local technical base.

If the technology is relatively simple, or it is complex but with the whole process inseparable, as in the glass making case company, or the local partner's technical base is quite good, then the "high rate" of transfer procedure is probably the better choice.

When the technology is complex, but it can be done separated, or the Chinese partner has a rather weak technical base, then more often, the appropriate choice seems to be the "low rate" of transfer procedure.

Second, the transfer rate is a linking backbone which determines what type of technical training should be adopted, how many expatriates have to be sent, and how long they should stay in the JV's site.

This particular aspect of the study, the "technology transfer rate", is considered to be the main contribution of this research because it has not been found in any previous study. However, the research has only made a preliminarily attempt to answer the questions:i) what is "high rate" or "low rate" of technology transfer? ii) what is its dependence on technology features and the local partner's technical base? and iii) what is its relationship with technical training type and the number and the secondment period of

expatriates.

Because of the restriction of time and space and the relatively small number of case companies studied the research has been somewhat limited, therefore there is still a need for further study in order to support the original contribution of technology transfer rate,
firstly by more case studies and secondly from survey data.

*** The Relationship Between the Local Management Team and Expatriates**

In most cases, high technology joint ventures have expatriates who take responsibility for technology transfer and management. They work together with the local managers and engineers in the day-to-day operations. Hence a poor relationship between them can seriously affect the performance of the joint venture.

Given this situation, the facts from the case JVs demonstrate that there are three types of relationship. One is the "dominated relationship" in which expatriates take almost all responsibilities with local managers only being assistants. The second type is the "shared relationship" in which both local managers and expatriates share the responsibilities almost equally. The third type is the "guided relationship", in which the expatriates mainly provide guidance and put the local managers into the position of making key decisions.

The case evidence also indicated that the number of expatriates and the duration of their assignment are related to the transfer rate and technical training. A high transfer rate is normally accompanied by intensive training with more expatriates based for a short time period. In contrast, if the low transfer rate is adopted long-term on-the-job training can be regarded as more appropriate with fewer expatriates serving for a longer time period.

From the evidence we cannot be certain which relationship is best because each type has its own characteristics and advantages. The venture should choose the one appropriate to the venture's conditions. However, one should bear in mind that creating a good relationship between local managers and expatriates is a key factor leading to the improved performance of a venture.

*** Quality Management**

Quality management is an important challenge facing Sino-Foreign joint ventures because Chinese enterprises, in most cases, do not have a reputation for good quality. They have not realized the importance of quality management and this has created an adverse background influencing the operating performance of joint ventures.

The more successful case joint ventures have found that motivation and awareness of quality management are more important than the implementation of formal standards. Foreign partners consider quality management to be a key

part of technology transfer "know how". They have sent expatriates to train local managers and engineers to realize the significance of quality management and how it can be applied.

Meanwhile, they have not only introduced the formal documented standards from foreign parent companies but have also strictly implemented these standards in practice.

6.3 Problems and Solutions

Among the case joint ventures, four can be considered as more successful on the measure that they have gradually increased their annual profits and the partners have received a dividend. On the same measure one may be considered less successful and one may be regarded as a failure. The last JV is now in the establishment stage. Whether a joint venture is more successful, less successful or a failure some problems will probably still exist. The solving of problems encountered by joint ventures can be used as a lesson for the future. However, it is only possible to provide some discussion on two of the main problems.

* Supply Problems

As mentioned in chapter 3 China is rich in natural resources and generally the availability of raw materials is not theoretically an immediate problem.

However China is currently short of electrical power and local supplies of components for advanced equipment. These shortages cause problems for joint ventures. One case study company, a Sino-Singapore joint venture met the difficulty of electricity supply at an early stage. The reason was that the venture was located in an area near to a city centre where there was a concentration of enterprises and population. Electrical power was in short supply so the local authority did not permit this venture to start its operations at the planned time. Not only was there a shortage of electrical power but also of building materials which delayed the venture starting its operation until almost two years later than originally planned. Many foreign business people are concerned about this shortage of electrical power and other resources.

The Chinese government is aware that developing the national electrical power capability is an urgent issue so it has made efforts to increase the supply of electrical power. In 1992, throughout the country, 30 major electrical power projects have been started. A new nuclear power plant started its operations in December 1992. and the government hopes to solve this power supply problem completely in a few years.

Component supply is another problem area. Most joint ventures expect components to be supplied from local companies because importing components draws on reserves of foreign currency. One of the case companies, the Sino-UK telephone equipment JV encountered this problem. The JV would prefer some electronic components as well as a computer

printer to be supplied from local enterprises. However, at moment it is difficult to find appropriate local suppliers, the main reason being that the quality of local products does not meet the requirements of the venture's products.

*** Foreign Exchange Problems**

Foreign exchange provision is another severe problem facing Sino-Foreign joint ventures since the Chinese local currency, the Renminbi, is not convertible into other currencies. Joint ventures need foreign currency for many purposes such as expatriates' wages, importing components and spare parts which can not be supplied locally, and the payment of dividends to foreign shareholders. Most case study companies had encountered this problem because foreign partners were originally more interested in the Chinese home market rather than export markets, therefore the ventures have not generated sufficient foreign exchange.

When this problem seriously affects the venture's business operation a solution must be found. Practice has shown that there may be several ways of solving the problem.

One solution is to explore the export markets for generating foreign currency. One case study company, the Sino-UK glass making JV set up an international sales team with more than 30 sales engineers who not only had foreign trade

experience but also a technology background. With such a strong sales team, the venture was successful in breaking into international markets and has cased the problem of foreign currency generation.

The second way is to increase the local supply of raw materials and components in order to save foreign currency needed for imports. Among the case study companies one third have been successful in this aim; one other company is now trying to find appropriate local suppliers.

In addition, the Chinese government has made efforts to solve this issue in two other ways. One is the policy that joint ventures can receive foreign currency from local customers if the venture's product is a substitute for imported goods. Two of the case study companies have benefited from this policy by generating their foreign currency from local markets. However, this method has its limitations, because it may be difficult for every venture to match its products to the goods which need to be imported.

The other way provided by the government is the use of organizations called "Foreign Exchange Adjustment Centres" run by local government authorities. These centres provide a service that exchanges Chinese Renminbi into foreign currency. They act as coordinators between enterprises which have an excess of foreign currency reserves and those which need foreign currency.

As this chapter has discussed above, conclusions were given focusing on six

factors. The first two can be considered as the factors influencing the establishment of JVs while the other four relate to the performance of JVs. In summary, it can be argued that the case evidence provides some support for the following hypotheses.

1. Investment incentives are a necessary prerequisite for direct foreign investment in China.

2. Local government support is more important than that of central government.

3. The operating performance of a JV is more dependent on the rate of technology transfer than the level of technology transferred.

4. The type of relationship between local managers and expatriates has an effect on the performance of a joint venture.

5. Motivational and awareness aspects of quality are more important than the implementation of formal standards.

Therefore five of the original six have some support and constitute key factors influencing the establishment and the operating performance of joint ventures.

The hypothesis that the evidence suggests should be rejected is that **"Long periods of on-the-job training are more important to a successful JV's operating performance than short intensive training during the setting-up phase"**. Originally, the researcher formulated this hypothesis from a preliminary investigation that a Sino-US glass making joint venture in

Shenzhen was less successful in its short intensive training. This JV's training was conducted only for a period of two weeks in the US parent company. As a result, the test operation for glass making did not pass until the third attempt [Yang 1991].

Several parts of the investigation and more detailed evidence have suggested that this hypothesis should not be accepted. In fact either " a short period intensive training" or " a long-term on-the-job training" can be the choice for a joint venture. However the training method should be chosen according to the feature of technology transferred and the type of transfer rate. It is then important to give a careful consideration to the design of the training method including the numbers of instructors, appropriate period of training, different type and level of courses and different training locations. In addition, it is necessary to have "guided practice" accompanying the technical training.

The researcher hopes that these findings concerning the key factors influencing the performance of Sino-Foreign high-technology joint ventures may be acceptable, and that it is possible to provide some guidance for the future cooperation of direct foreign investment in China.

This research has limitations which could be addressed by further study. The first is the limited scope of the case study companies, the research only chose eight companies as typical examples. A preferred approach would be the combination of both case study analysis and survey data. This would take

advantage of both depth and breadth. The second limitation is the restricted background of the JVs. The research was conducted mainly on high technology JVs, which is an area of priority within the Chinese government's policy for DFI. However, among currently operating Sino-Foreign joint ventures only a few are involved with high-technology. Therefore, the factors influencing performance of non-high-technology joint ventures is also an important question which needs further investigation in any future study.

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LIST OF INTERVIEWS

1. Shanghai Volkswagen Santana Automobile Ltd. July.1990. Shanghai. Visited Chinese and German managers, and observed the workshops. Although this visit was not for the specific purpose of this research the objective was the issue of local innovation which is related to this research.

2. Zhouny Yi Technology Development Company (Sino-Houng Koung) 15 & 16 July. 1991. Beijing. Visited Chinese General Manager Mr.Lu and Project Manager Mr.Zhang to gather information on the JV.

3. Xinhuan Technology Development Ltd. (Sino-Singapore). 22.July.1991. Beijing. Chinese General Manager Mr,Zhao was interviewed to gather information on the JV.

4. The Enterprises of Chinese Academy of Sciences. 27 July. 1991. Beijing. This is an authority in charge of the joint ventures under the Academy. The head of office was interviewed about the general situation of joint ventures.

5. The Ministry of Foreign Economic Relations and Trade. 1,3 & 5 Aug. 1991. Beijing. The head of the office and three officers were interviewed about the general situation of JVs, the policy of DFI and provided important data on JVs.

6. Shanghai Nicera Sensor Co.Ltd. (Sino-Japanese) 28 & 29 Oct. 1991. Shanghai. Visited Chinese Deputy General Manager Mr. Lo and a Project Manager to gather information on this JV.

7. Shanghai Yoahua Pilkinton Glass Ltd. (Sino-UK) 30 & 31. Oct.1991. Shanghai. Assistant General Manager Mr.Yang and a Chinese Project Manager were interviewed to gather information on the JV.

8. Fosec-Foundary Services Co. (Sino-UK). 30 of Jan.1992. Birmingham, UK. Visited Mr. T. Wint who is now a president of the China-Britain Trade Group. He introduced the general situation of Sino-UK joint ventures and his experience of doing business with china.

9. China-Britain Trade Group. 1 March.1992 London. Visited Mrs Ming, Information Office to gather some data and obtain a list of Sino-UK joint ventures.

10 G.P.T. Ltd. from 2th to 29th of April. 1992 Nottingham.
During this period:
(i) Acted as an interpreter in the technical training held by UK GPT parent company for the JV's customers. Two teachers were interviewed about training information for the JV.
(ii) Quality Executive Dr.Rimington was interviewed two times for the information of quality management of the JV.

(iii) Project Manager Mr.George was interviewed about product testing.

(iv) Visited Regional Sales Manager Mr. Robert Parries to gather information on the background, the technology transfer procedure and the JV's markets.

(v) Visited Technical Support Manager Mr.Nerl Walk two times. First time (20 Apr.1992) for general information about technical transfer, management in JV site.(he had been in China for two years). Second time, (Dec, 1992.) This interview was for gathering more detailed information about long-term on the job technical training and technology management.

(vi) Visited two Chinese Engineers. One is sales and technical support Engineer and the other is Project engineer. At that time they were being trained in UK GPT Ltd. This interview gave the basic information of the JV from Chinese viewpoints such as the organization, technical training and the relationship between the local managers and the expatriates.

11. Took part in a meeting with Mr. Rong Yiren's delegation held by China-Britain Trade Group in Birmingham for exchanging opinions on doing business in China with UK business people.

12. Pilkington Glass Ltd. Visited Dr.T Ginty two times. He was a former General Manager in the JV.

First visit, with Dr. David Bennett. 11th of May 1991. This interview gathered the general information about the JV's background, the market, local government's support and its management.

Second interview (15th December.1992) focused on the JV's technology

transfer, training and the relationship between local managers and expatriates.

13. Participation in setting up a new Sino-UK joint venture named "SIM-CEL Technical Service entre". The activities started from June 1992, now (in Feb 1993) it is operating continually. Visited the UK CEL Ltd six times, had several telephone conversations and fax correspondence between the Chinese and the UK partners. The involvement included how to choose an appropriate Chinese partner and the choice of the JV type.

QUESTIONNAIRE

1. The Basic Situation of the J.V.in China

1) partners, name of the J.V.;

2) location of the J.V.;

3) commence date of the J.V.;

4) total investment, the share of the investment, and the contract duration;

5) the background of setting up the joint venture.

2. Operation Situation of the J.V.

1) what about the J.V's market?

* local market in China;

* international market (export market);

* how do you exploit your markets successfully?

2) when do you start to get dividend for shareholder?

3. Why Do You Choose to Invest in China?

1) What do you think Chinese environment for J.V.?

* Chinese Government's incentive policies for J.V.

A) attitude;

B) tax free export (import); the tax preference on income profit;

C) the right for export and import;

* costs of the labour, row materials, and electric power supply;

2) How do you think the local government's support compared with that of central government.

3) could you compare some experience of setting up J.V. in China and other countries;

4. How Did You Conduct Technology Transfer and its Management?

1). What factors did you consider when you choose the investment project?

(1) How did both of Chinese and foreign partners think appropriate technology?

(2) How did you evaluate the partner's technology base and choose an appropriate partner?

2). How did you do your technical training?

(1) How many hours were there for training?

(2) What types training did you hold ?

-- engineers; managers; skilled workers.

-- intensive course; guided practice (workshop)

(3) When and where did you hold these training?

(4) Who undertake these training task?

(5) What about your long-term strategic technical training?

3). How did you choose your transfer rate and what is the results?

4). How did you construct the organisation and procedures for maintaining technology and equipment?

(1) How many engineers and technicians did you have for maintenance? Were they permanent or temporary?

(2) Is your maintenance procedure introduced from foreign parent company or developed in China?

5) What about the innovation capability in your JV?

(1) How many engineers do you have in Charge of innovation?

(2) Have you met any problems of the innovation?

-- meet the needs of development and local environment.

(3) Do you have any award policy for encouraging the innovation?

6) What about the relationship between the local management team and expatriates?

(1) How many expatriates have you send to JV in China, and when did you begin to reduce the number of expatriates? (in terms of the time and the number dependence)

-- total; beginning; on-going; current.

(2) What type of relationship do you have between the local managers and expatriates?

---Guided; guide local managers and put them into decision-making.

---Dominated; expatriates take most responsibility.

---Equally shared; share equal responsibility.

7) How did you implement your quality management?

(1) How do you think the significance of quality management?

(2) What lever standards of the quality did you adopt?

(3) Do you have any organization for quality management, and who is in charge of quality management? ---foreign or Chinese manager?

Appendices

Appendices

Appendix I Current Operating Joint Ventures

-- Companies Studied in Detail

(1) Shanghai Nicera Sensor Co Ltd.

(2) Shanghai Yaohua Pilkington Glass Ltd.

(3) Shanghai International Digital Telephone Equipment Co Ltd.

Appendix II Current Operating Joint Ventures

-- Companies Providing Supplementary information

(4) Xinhuan Technology Development Ltd.

(5) SEM-CEL Technical Service Centre

Appendix III Natural Resources and Industrial Foundation

Appendix IV Tables

(1) Regional Distribution of Foreign Investment

(2) Distribution of Foreign Investment in Trade

(3) Foreign Investment Sources

Appendix I

Current Operating Joint Ventures

-- Companies Studied in Detail

Shanghai Nicera Sensor Co L.T.D

Background

The Chinese Partner is Shanghai Institute of Technical Physics of Chinese Academy of Sciences, the foreign partner is a Japanese Sensor Company. The total investment is 3.2 million Yuan (US$ 0.6 million). Each side has a half share. The Chinese Institute provides the research achievement and technology of infrared filter materials and the right of using land for building the factory. The Japan side provides the technology of sensor devices, advanced equipment, management methods and sales channel.

The company has 110 employees, of which 20 are technicians and engineers, 7 are senior engineers. Most of the workers have an educational level of high school. Three expatriates are always kept in the JV, including the general manager, assistant manager and a project manager. The Japanese general manager is manly responsible for manufacturing, operations and quality control while the Chinese deputy general manager is in charge of administration, personnel and market.

The company produces thermoelectric sensors and various infrared filter lenses for the use of guards against theft, auto-doors and other auto-devices.

The main reason for two partners to invest in these products is that it takes the advantages of both partners. The Japanese partner had advanced technology and more experience of producing the sensor devices but lacked the technology of sensor materials. They purchased the raw materials at high cost from the United State. In contrast, the Chinese partner offered the research achievement of low cost and advanced features of the sensor materials, but they were lacking of the process technology and experience. Under these circumstances, the two partners derived the advantages for each other by setting up a joint venture.

The company's main market is exported-oriented. 90% of its products have been sold world wide to over 20 countries. Its sales ranks the company fourth in the world among its business competitors.

The company went into operation in September 1987 and so far it has proved to be a very sound operation. In the first year, 1988, it gained a profit of 3 million Yuan, in the second year, it reached 4 million Yuan,and by the end of 1990, the company's profit increased to 6 million Yuan. Each member of staff generated 70,000 Yuan.

Technology Transfer and Management

At the establishment stage, since the technology of producing the sensor devices was mature with more operational experience this part of the

technology being transferred from the Japanese parent company was conducted smoothly. The engineers and managers received their technical training in the Japanese's parent company for two months, mainly in the workshop, with more practice guided by the Japanese engineers. The aim for training these personnel is that they could be put in charge of each key position of manufacturing the sensor devices. In fact, these Chinese engineers came from the Chinese Academy institute and had good knowledge of the project area so that they could quickly master the skill of how to produce the sensors.

However, this joint venture met a specific problem in its technology transfer. As mentioned earlier, the technologies supplied from both sides, particularly, the technology of materials was a research achievement from a Chinese institute. It had advanced features but the institute lacked the capability for production, it therefore raised a serious issue of how to match the two parts of the technologies.

It was difficult for the venture to produce the commercial product without adequate process technology so, in this case the leadership of the venture concentrated its attention on extending the innovation capability. It needed engineers with more experience of process technology to undertake the innovation task, but the company was lacking of qualified engineers. Usually the company selected engineers from the Chinese parent institute or graduate students without working experience from universities who are assigned by a related authority. The company thought that the engineers from the institute

or university students were not competent enough to develop the process technology. In this case, the local authority allowed a special personnel policy for the company so it could employ the qualified engineers from other enterprises. With a strong engineering team and skilled work force, the venture also introduced an award system to encourage the innovation. This greatly increased the innovation progress so within six months the process technology problem was solved satisfactorily.

During the earlier stage when the contribution of Japanese technology was being transferred and the innovation of the Chinese technology under development the company had six foreign engineers and managers for a half year, of which three were kept permanently in China.

The relationship between expatriates and local managers can be considered as a shared relationship. The positions of general manager, technical engineering manager and quality control manager were held by expatriates while the Chinese managers held the positions of deputy general manager, administration, personnel and sales manager.

Although the managers from both sides held different positions and took different responsibilities they had good communication when making important decisions, and they showed mutual respect for each other. So far both sides are well on the way to establishing a good working relationship. When people asked why this was so, they said: " First of all, we try our best to get a good

understanding of each other based on the mutual benefits".

As earlier mentioned, this joint venture is now running and has a good performance. Apart from above the aspects of advanced technology, innovation capacity and good work relationship between the local managers and the expatriates, good quality management is also an important reason.

From the establishment stage, the JV began to pay more attention to the significance of quality control. It has now introduced the "total quality management" system from its Japanese parent company. From the top managers and engineers to the production workers, each person has his or her own responsibility for quality management. The Japanese general manager is in charge of total quality management. He trained all the staff to have a good awareness about how the quality management will seriously affect the JV's business reputation. He is very strict in the quality management. On one occasion a worker dropped a product onto the floor, although the product still subsequently passed the quality tests. The Japanese general manager did not allow this product to be sold. He said to the staff: "We should avoid any quality problem, even one out of ten thousand, because this will affect our future business".

In each key step of the production line there was a technician or engineer in charge of inspecting the quality of the product. At the final step the total features are carefully inspected. In addition, the JV also repeat tested a certain

percentage when the products were sold.

As a result of its sound operating performance a high business reputation and satisfactory profit has been achieved for the JV. and its annual profit has increasing year by year.

Shanhai Yaohua

Pilkington Glass Ltd

Background

This is a Chinese-British Joint Venture. It has become a model business for foreign investment, having it has won the title of" Excellent Foreign-Investment Enterprise" of 1990 and 1991 for its outstanding economic and export performance. (awarded by Ministry of Foreign Economic Relations and Trade)

The main foreign partner is British Pilkington Glass Company with some shareholding by an Austrian company; The Chinese partner is Shanghai Yaohua Glass Making Factory. The total investment is 4.8 billion Yuan (US$ 1 billion). The Chinese have 75% of the total share.

The company has 930 employees. It was initially set up in November 1983 and it took 4 years to build up the plant. The company was successful in the test operation in December 1987.

The company has introduced the well-known Pilkington's glass making technology. It produces float glass to high quality, which has enabled the

Chinese Glass Industry to enter the advanced business trade.

The background for setting up this joint venture is that in 1983 the Chinese Building Materials Commission had a desire to introduce advanced glass making technology from abroad in order to improve the backward state of Chinese glass making industry. The Commission chose the well-known Pilkington's technology, and had an idea that the Pilkinton company could choose a Chinese partner among several glass making factories. From the view of Pilkington company, it agreed with the opinion of the Commission that the partner should be chosen among Chinese glass making factories which had a history and experience of running local glass making operations so that it would be easier for the Chinese partner to master the transferred technology. The another main consideration was the location of the JV. Pilkington chose Shanghai Yaohua Glass Making Factory rather than others, the main reason being that Shanghai has a good industrial foundation and was convenient for shipment with its advantages of both water and land transportation.

The UK Pilkington company had set up several factories in other countries before setting up the JV in China. When comparing the JV in China, with operations in other countries the former general manager Dr. T Ginty observed that the Chinese government gave more incentives for foreign investors such as tax incentives. The cost of labour is also significant lower than those in other countries. In addition he thought that China constituted a

huge undeveloped market in the world. All these factors could provide more benefits for foreign business people.

Support from Local Government

This JV has particularly enjoyed significant support from the Shanghai local government. In its early stage this company was in difficulty with its market. At that time the company's only strategy was to sell into the domestic market because in the contrast there was a limitation that this joint venture can not sell its products to 26 countries. Unfortunately, at that time the Chinese government limited the scope of civil engineering building which seriously affected the float glass business. This resulted a large loss of 16 million RMB (U.S$ 3 million) to the company in the first operating year of 1988.

However, from 1989, the company responded by shifting from the domestic market to the international market. It set-up an international sales team with more than 30 sales engineers who were selected from experienced people having a background of both technology and trade. With such a strong sales team, the company has gradually become successful in exploiting the international market.

Meanwhile, the Shanghai local government authority made efforts to solve the company's financial difficulty. The local authorities helped the company in two ways, one by providing bank loans to the company and the other by

exempting the profit tax for two years. When the company's condition improved, it still gave some tax-rate reduction to the company for a period of further two years.

When the company's international market operation met difficulty, due to a lack of containerised transportation, the government gave it special priority, so that the company could build its own berth for international shipping nearby. The company is the only one out of several hundred factories along the Huang Pu River to enjoy its own berth. When the company met difficulty on raw material supply and the problem of foreign exchange, the Shanghai authority also made efforts to help to solve the company's problems. The Shanghai government authority contacted with Jiangxi local related authority to ask for help with raw materials supply for the JV. Fortunately, things seemed to go smoothly between authorities rather than the JV solve this problem itself. To solve the foreign exchange problem the Shanghai government authority tried to find other enterprises which had foreign currency reserves, therefore it could offer this JV foreign currency by changing Renminbi.

The company therefore enjoyed maximum support from the local government. The former General Manager Dr. Ginty still tells people:" Up till now, the local government's support has played a key role in the company's success. Without this strong support, the company couldn't have managed during a very difficult time."

Technology Transfer and Management

How to conducted technology transfer is a key issue facing every joint venture. It includes the choices of " transfer rate" and the type of technical training which can seriously influence whether the transfer of technology will be successful or not.

The JV's project is making "float glass". Its feature is that it is a whole production process, which can not be interrupted after starting its operation. For such a process feature, a "high rate" transfer procedure had to be adopted. It was clear that the whole process technology must be transferred completely in "one step". Only then were the Chinese engineers and work force in a position to master the process technology and set the production line in operation.

In order to complete the transfer of technology, as quickly as possible, the foreign partner adopted intensive training courses programme for managers and engineers. The courses were provide at different levels and different length. The first level was for top managers; they chose eight well qualified managers with a technical background. These top managers were trained in the UK parent company for eight weeks before the joint venture started its operation. The aim of training these managers was to put them in key supervisory positions, and they should also be familiar with the entire manufacturing process.

The second level of training was conducted for managers, engineers and senior operators. This training lasted six weeks; 80 people were divided into several groups with varying size, and they were trained in different ways. For instance, computer engineers were trained mostly in the class room, while manufacturing engineers received practical training in the workshop. After training these personal were competent to take responsibility for each process on the production line.

The most important experience provided by the courses, at both levels, was the accompaniment of "guided practice". Sixty five expatriates instructed the Chinese engineers and senior-operators on site, in each key process, for periods of between six months and two years. This was a convenient way of instructing the Chinese engineers and the good design of technical training with guided practice made it easier for the Chinese partner to understand and assimilate the new advanced glass-making technology transferred from the foreign partner. As a result, the operating test was successfully passed first time.

This JV adopted a high rate transfer procedure with complex technology so, at earlier test-operating stage, the UK parent company sent 65 expatriates to the JV site for six months' intensive guidance of the Chinese personnel. Then, five expatriates stayed there for one and half years.

These expatriates, including the general manager and other middle managers

responsible for manufacturing, quality control and engineering, followed the guiding principle and put the local managers in every important decision-making position. The expatriates only provided them careful guidance when the local managers met difficulty. The general manager held a daily meeting to solve the issues of operating every day. The local managers as well as the expatriates took part in the meeting. When they reported their difficulties the expatriates hinted at solutions rather than giving direct answers. When they had some disagreement with the staff the expatriates tried to support them in their leadership. In this way the decision making capacity and managerial skill of the local managers was developed easily and quickly.

Therefore, in only one and half years a strong Chinese local management team was set up which would manage the company soundly so that all expatriates could withdraw from the venture. This fact has proved that the guided relationship has the advantage that within a short period of time the local managers are capable of managing the venture satisfactorily. Now the management of the joint venture is carried out only by Chinese managers and engineers within a sound business, which has been introduced by foreign partner.

When considering this aspect, the foreign partner still thinks that training a good local management team is as important as the advanced technology for a JV's success.

This JV has also paid more attention to quality management. The UK parent company considered quality control as an important part of the "know how" technology transfer, because good quality can ensure greatest benefit from the advanced features of technology.

The venture has introduced quality standards of a world level and quality management procedures from the UK parent company. A technical Engineering Department was set up for technical innovation and quality management. Three quality management engineers mostly work in the workshop with each production shift.

Organization and procedures alone are not enough for good quality management. This JV also introduced several advanced equipment, controlled by computers, for testing product quality. From raw material supply to the end of manufacturing the whole process is entirely controlled by precise data measurement.

Although it needed to take time before the quality of the JV's product reached the same level with the UK parent company's, so far the JV has gained a reputation for its quality in both domestic and international markets. It has resulted in the increasing profit for the JV. In 1989 it started making profits. From 1990, the partners began to receive a dividend. Now, its domestic and international markets both takes a half share of the total sales.

Shanghai International

Digital Telephone Equipment

Background

This is a Sino-UK joint venture, the UK partner is GPT Ltd. the Chinese partner contains two organizations: Shanghai 520 factory (Post and Communication Ministry) and CITIC technology (China International Trust and Investment Co). The total investment is US$ 4 million. The Chinese partner has 56% of the share, and the UK GPT has 44% of the share.

The company has 150 employees, of which 100 are university graduates , some of them holding masters degrees. Most of them have recently graduated from universities without further experiences.

In 1985, the partners started their negotiations. In 1988 they signed the JV's contracts including: Goods & Services; Equipment for Products; and Technology Transfer Contract. In March 1989 the joint venture was approved for operation.

The purpose of setting up this joint venture differed for each partner. The Chinese partner wanted to gain advanced technology of telephone equipment,

and the foreign partner wished to set up a joint venture in China as an important part of its global market strategy. China has a large market, so a joint venture can take advantage of combining the manufacture, shipment and sale as a whole,providing mutual benefits to both sides.

Technical Transfer and Management

In 1985, when the joint venture was in the negotiating stage, and the level of technology for the project was being considered, the Chinese wanted the latest telephone equipment, but the U.K government would not permit the transfer of this level of technology to China. The UK parent company also thought that this advanced level telephone equipment was too complex for Chinese engineers to master in so short a time. Finally, the project chosen was ISDX telephone equipment with the second level- world standard.

The ISDX is a series of telephone exchange equipment. ISDXM (minimum) can exchange several decades of telephones; ISDXS (small) has the capacity to exchange 200-270 telephones; and ISDXL (large) can exchange 2000-2500 telephones. This series equipment meets the different demands of various sizes of Chinese organizations. and the company's successful business has proved that its choice for the project was acceptable and practical.

The joint venture chose the project ISDX series digital telephone equipment products with the world standard level. Its market mainly focuses on the

domestic market, because currently in China there is a high demand for digital telephone equipment. In 1991 the JV sold 20,000 sets of telephone equipment and in 1992 its sales increased to 100,000 sets. All the sales were in the domestic market, but they could receive foreign currency from domestic customers as approved by appropriate authority.

This joint venture adopted the "low rate" approach for its technology transfer. The project was concerned with high-technology digital telephone equipment. The reasons why this joint venture chose a "low rate" for its transfer procedure were that the technology was much more complex and sophisticated, and the technical base of the Chinese partner was not sufficiently strong, so advantage was taken of the fact that its process could be done in separate steps.

In this case, by choosing a "low rate" procedure for the venture's technology transfer two problems were avoided. First, the difficulty that the Chinese staff would have had to master so complex a technology in so short a time. Secondly, the loss of profits that would have occurred if the delivery of the equipment had not been completed by the first stage of the joint venture's establishment.

This "low rate" transfer procedure was conducted in four steps. Step one: during the first year, before the venture's manufacturing equipment had arrived completely, the product parts were manufactured at the UK company,

the product assembly and test was then carried out in China. Step two: during year two, the venture began to manufacture some less important parts for the telephone equipment. Step three: in year three, the venture manufactured important parts of the product. Finally, the fourth step, the venture could produce the whole product in China when the Chinese engineers and work force had more experience.

The success of the "low rate" transfer procedure for such a venture's characteristics has been proved. The venture achieved its profit in the first operational year. In addition, it gradually set up a strong technical team through long-term training and the guidance of UK expatriates.

As determined by to the characteristics of "low rate" transfer procedure and the particular features of the complex digital telephone equipment technology this joint venture has mainly provided two types of technical training: one is basic training; the other is on-the-job training. All the training courses have been conducted by the UK partner at different places and different times. Both of these two types of technology training focused on the long-term on-the-job training.

For the majority of staff, including engineers and skilled workers, the basic technical training was held at the Chinese site for one month. The training was designed as an intensive course by instructors from the UK company's Training Centre. From this basic training the local engineers and workers

learnt the complex principles of the digital telephone equipment.

The venture has adopted various ways of conducting on-the job training. One way is to send Chinese engineers to the UK parent company at each phase of the transfer since the venture has adopted the step-by-step approach and low rate of transfer procedure. For instance, in year one, only assembly and test technology were transferred to the venture, therefore only two test engineers were sent to the UK company for two months training. During years two and three, more complex technology was transferred to the venture, and computer hardware, software and maintenance engineers were trained in the UK company. In most cases this kind of training was carried out in the laboratory, supervised by UK engineers. With careful guidance from experienced UK engineers, and the advantages of computer simulation, the Chinese engineers were able to understand the complex technology. So for about 10 Chinese engineers have been trained in this way. On each occasion two Chinese engineers were sent to the UK for a period of two months.

The other way to carry out on-the-job training is to send expatriates to the venture in China. In this way a few expatriates can guide more Chinese engineers and easily detect any specific problems while conducting the technology transfer. How have these expatriates carried out the training and how long should they stay there? The answers are varied. The expatriates for basic training, finance and quality control implemented their tasks mainly in the form of courses or seminars for about one or two months. In contrast,

because the training tasks were more complex, manufacturing and maintenance instructors have had to stay in China for about five years. The way of training is this; two local engineers were trained intensively in order to reach the higher level, while guiding the majority at the normal level. These higher level local engineers will take over the responsibilities of the expatriates when they leave China.

Since this joint venture conducted a low rate transfer procedure it needed a long period of time to complete the transfer of technology and its management. Hence, three expatriates will stay in China for periods of five to ten years. These three expatriates are a general manager, project manager and maintenance manager. The general manager can speak Chinese perfectly and he has a reasonable understanding of Chinese culture since he married a Chinese wife, so it is much easier for him to manage the JV with its majority of Chinese staff.

The relationship between the expatriates and the local managers in this JV also can be considered as a "guided relationship". As mentioned earlier the project and maintenance managers gave careful guidance to the Chinese engineers. Their guidance mainly focused on the technology issues without involving the administrative issues. According to the progress of technology transfer these expatriates provide different types of technical instruction to the Chinese engineers. They adopted varied forms for guiding, for instance giving local engineers some short courses in the class room, and also took them to visit

local customers in order to identify specific problems and let them have some more practical experiences.

This JV has introduced the concept of quality management that states "the customer is always right for an enterprise". In order to meet customers' demands the company sent sales engineers to visit their customers in a regular period of time. These sales engineers not only gathered information for their products' quality and features, but also provide technical services for the customers.

Following this concept of quality mngement, the venture introduced the world quality standard from its foreign parent-company. The UK parent company sent a quality executive to the Chinese site several times with quality standard documents that he used to instruct the Chinese engineers, managers and production workers on the meaning of quality management and how it should be implemented. However, the introduction of quality standards is not enough so the joint venture also introduced techniques for ensuring and managing the quality of products. Such techniques included the introduction of product testing equipment. This equipment was more advanced than that normally found in Chinese local enterprises, and although it required skilled operators it ensured that the required level of quality management was maintained.

The introduction of a quality control system has resulted in a high reputation for the joint venture. The author had an opportunity, together with this Sino-

UK telephone equipment venture's customers. They bought 30 sets of digital telephone equipment from the venture. For more than three years, up to now, this equipment has been operating perfectly without any serious quality problem. These customers said: " You can not compare the quality of products from ventures and Chinese local enterprises because the gap is too wide."

Appendix II

Current Operating Joint Ventures

(Companies Providing Supplementary Information)

Appendix II

Xinhuan Technology Development Ltd

This is a Sino-Singapare Joint venture, situated in Beijing with three partners. The foreign partner is a Singapore Yongqing Ltd. with the share of 35%. The Chinese partners are the Physical Institute of Chinese Academy of Sciences with 30% of the share and Three Circle Technology Company with 35% of the share. The total investment is RMB 8 million.

Although the venture is planned to have 150 staff, it currently has only 40. The general manager is a Chinese senior engineer who is responsible for almost all the venture's affairs, as the foreign deputy general manager only occasionally visits the JV for important decision-making. There are no other expatriates in the venture. All JV's management is run by the Chinese managers on Chinese traditional lines. It was approved in August 1988 and commenced its operation in 1990.

The product of the JV is a special magnetic material. It has both domestic and international markets. Since the technology of this special material was

invented in China with advanced features, the aim of its markets would still focus on the international market. Currently its international market has accounted for 70% of its total sales.

At the establishment stage, the JV met difficulties in two respects, one was due to the location choice. The Chinese institute contributed the land just near the city centre where it is seriously short of electric power supply. So it was difficult to get approved from local authority. The other problem was that the Chinese government concentrated on civic building at that time, so the JV was delayed for one yearwhile waiting for its workshop to be built.

Of most importance for this JV is that the Chinese partners have learned the lesson that they should have more legal knowledge related to technology transfer, especially that they should ensure the registration of patent rights and trade mark, which are heavily affect the market challenge of their joint venture.

The Chinese partner was the technology supplier, the technology having been invented there; and the foreign partner only invested the money. Due to partners lacking the legal knowledge of patent rights, they did not apply for patent rights in other countries. This resulted in a serious problem when selling the venture's product in some countries whose markets were important to China but where they had not applied for patent rights. In contrast, the Japanese and the United States applied the patent rights of almost the same

magnetic materials in many countries. In this case, if the venture wants to sell its product in these countries it has to pay a high cost of premium (totalling US$ 5 million). So far the problem of patent right between the countries has not been solved. The Chinese government may provide support to pay this high cost for the venture, because of the importance of the international market.

SEM-CEL Technical Service Centre

This is a new "contractual joint venture". The Chinese partner is the Semiconductor Institute of Chinese Academy of Sciences. The foreign partner is a UK company, Commissioning Engineers Ltd. (C.E.L)

Originally, the partners intended to set up an equality joint venture with share, but there is a minimum amount of investment (US$ 300,000) required for an EJV. Both partners did not want to take the risk of investing the required amount as they did not have adequate financial resources. Therefore they chose the "contractual Joint Venture" type meaning that the partners' contributions are not in relation to the percentage of share, and the dividends are distributed to partners according to their contributions by contract.

The foreign partner's contribution is that it provides instructing engineers to guide the Chinese engineers, and invests about £100,000 for official equipment and test instruments for the business of engineering services . The Chinese partner contributes the offices and provides the staff for administration and engineering services.

The project of this JV is technical engineering service rather than a product.

The scope of its business is commissioning new equipment and systems; and improving existing equipment. The technical service focuses on electrical and computer control.

The U.K C.E.L company finally chose the Semiconductor Institute with an academic background as a Chinese partner from among several organizations. The main consideration is that the Chinese partner has strong electronic engineering resources. This Chinese Institute has more than 1000 employees, 70% are scientists, researchers and engineers, most of them having an electronic or computer background. It will therefore provide sound technical support for the new joint venture's business in the field of technical engineering services.

The partners started their negotiations from June of 1992, (the author having played a key role as coordinator or representative of the Chinese partner). Five months later in November 1992, the centre's contract was signed in Beijing. It will commence operation in April 1993.

Since the centre is a technical service centre and at the establishment stage, to avoid more cost of expatriates and Chinese staff the centre will adopt a flexible policy of hiring staff. The centre currently has less than 10 permanent employees, and can have temporary engineers from the Chinese institute according to the tasks of the centre.

The UK company has planned long-term on-the-job technical training programme. In the early stages the UK company will send three engineers to China to instruct some Chinese engineers. The instruction mainly will focus on the guided practice at customers' site. It also has a plan to send Chinese engineers to the UK or other industrialised countries for intensive course training.

The UK partner has a strong intention to develop its business market in China, because it is a large market. Another reason is that the UK company has identified a business opportunity because China has introduced a lot of equipment from abroad but lacks adequate engineering services to keep this equipment operating efficiently.

Appendix III

Natural Resources and Industrial Foundation

Appendix III

Natural Resources and

Industrial Foundation

[The China Investment Guide 1988]

ENERGY

Coal: China is rich in coal resources of which it has many different varieties. China's coal industry has formed a comprehensive system of exploration, designing, machinery-making and scientific research. In 1987, China produced 925 million tonnes of raw coal, and in 1990, upwards of one billion tonnes of coal.

Power Industry: In 1987, China generated 496 billion kW of electricity (10% more than in 1986). Now the total national generating capacity is 100 million kW, of which, 29.5 % is hydroelectric power and thermal power represents 70.5%.

China's power industry has developed considerably, with its total electricity production rising from twenty -fifth place in the world in 1949 to fifth in 1987. Due to the development of the national economy, the growth rate of

civil power demand is higher than the growth in generating capacity. This has resulted in a severe power shortage and the development of the national economy has, to some extent, been affected. Therefore the Chinese government's policy is to concentrate on developing its energy industry with the electric power industry at the centre.

Petroleum Industry: China's petroleum industry has four strategic exploration and exploitation zones in the eastern , western and southern parts of China as well as certain offshore areas. Eastern China is now the key oil-production area, while the western part has the most important strategic reserves. Southern regions form the long-term reserve area.

In 1987, over 170 oilfields were in production throughout the country. These provided 134 million tonnes of crude oil and 13.54 billion cubic meters of natural gas. Oil and gas accounted for 23.1 % of the country's primary energy supplies.

RAW MATERIALS

Iron and Steel: China has over 1300 iron and steel works, of which 14 have an annual production capacity of more than one million tonnes of steel each. In 1987, China produced 56.27 million tonnes of steel, an increase of 78% over 1986, ranking fourth in the world.It is now able to produce more than 1000 varieties of steel and more than 2000 specifications for rolled steel.

Nonferrous Metals: China has abundant nonferrous metal resources. The proven deposits of materials such as tungsten, rare earth, magnesium, lead, zinc, tin, vanadium, molybdenum and titanium rank prominently in the world. Some of them can not only satisfy domestic needs, but can also be exported on a long-term basis. There is a great potential for the development of China's nonferrous metals. In 1987, the total output of ten nonferrous metals reached 1.869 million tonnes an increase of 61.4% over the 1982 figure.

TRANSPORTATION AND TELECOMMUNICATIONS

Railways: Railways are the backbone of China's transportation and communication's system. The total volume of passenger traffic and freight carried by rail makes up 60% and 70% respectively of the total carried by all means of transport. In 1990 the total length of the track was 55,000 kilometres, of which 23% was double tracked.

Highways: In 1987, highways in China totalled 982,200 kilometres with an annual average increase of 20,000 kilometres. In order to meet the changing needs of an export-oriented economy, in the coast area, China has been making efforts to build transfer stations for international containerised traffic.By the end of 1987, China had built 11 transfer stations. In addition, China had set up more than 30 highway transfer centres.

Coastal Ports: During the Seventh Five-Year Plan period (1986-1990),China

had built 200 berths including 120 deep water berths for 10,000 tonne class ships, bringing the number of total berths in major Chinese ports to 936, including 327 deep water berths.

Inland Rivers: China has a large number of rivers. Inland rivers are open to navigation for a total of 108,900 kilometres, of which 58,000 kilometres are deeper than one metre and boast good navigation conditions. The Yangtze River system is the main inland river navigation. Its navigable river system totals 70,000 kilometres or 70% of the national total.

Civil Aviation: In recent years, China's civil aviation transportation system has developed rapidly. The total air transportation volume for 1987 was over two billion tonnes kilometre; a total of 13.10 million persons and 298,758 tonnes of postal cargo were carried by air.

By the end of 1987, China was operating a total of 327 air routes, of which 280 were domestic routes and 39 were international routes. These routes covered 387,102 kilometres.

Post and Telecommunications: Considerable progress has been made with regard to China's postal and telecommunications services, with Beijing as the centre, the postal, telegraph and telephone services have now been extended national wide.

In 1987, China had 10,000 telegraph lines and 53,000 long-distance telephone lines. Urban switchboards had a total operational capacity of 9.8 million telephones,long-distance calls were switched automatically or semi-automatically through cables, microwaves and satellite communications among 30 provincial capitals and 25 medium -sized cities.

International communications have developed very rapidly. China has so far established direct postal routes to 124 countries and regions, direct air postal routes to 49 countries and regions, direct telecommunications lines to 45 countries and regions, as well as relayed communications routes to other countries. International telegraph services are also in operation between 43 countries and regions.

ENGINEERING

China has a quite considerable foundation of Engineering Industries including Machine Building, Automobiles, Shipbuilding, Aeronautic Engineering, Space Industry,Computers, Special-purpose Electronic Equipment, Electronic Devices and Electronic Power Transmission and Transformation Equipment etc. Here just two are addressed briefly.

Machine Building: China Machine Building industry covers more than 100 branch industries , such as farm machinery, mining equipment, petroleum equipment, electronic appliances, instruments and meters, food processing

machinery and so on. In 1987, the machine-building industry recorded a gross output value of RMB 90,089 billion.15% higher than in the previous year.

Space Industry: China's space industry came into being in 1956. So far the industry has successfully developed five types of launch vehicle, as well as many types of satellites for scientific and technical experimental purposes, for space remote sensing, weather forecasting, and communications purposes. Between 1970 and 1987, a total of 21 earth satellites were successfully launched, ten of which were recoverable, two were communication satellites and three were carried by one-stage rockets. China now has been entering the international market competition of launching satellites.

It can therefore be seen that China has a vast territory with rich natural resources, such as an abundance of raw material for energy and industry use. This low cost supply can be considered an advantage for foreign direct investment. On the other hand, China has fairly good industrial foundation and sizeable scientific research force which provide an appropriate industrial environment for foreign investment.

Appendix IV

Tables

Appendix IV

TABLE1 Region Distribution of Foreign Investment in China

(sources from MOFERT 1979-1990)

Region	Number of Projects	Amount of the Investment (u$ million)	Proportion of Total Foreign Investment(%)
Guang Dong	8817	12680	45.0
Shang Hai	542	2294	8.0
BeiJing	404	1767	6.0
FuJian	1833	1316	4.7
ShanXi	125	976	3.5
LiaoNing	498	626	2.2
JiangSu	451	555	2.0
ShanDong	340	503	1.8
GuangXi	414	498	1.8
TianJin	334	394	1.4
HeBei	192	282	1.0
HaiNan	441	270	1.0
ZheJiang	304	262	0.9
HeNan	118	248	0.9
ShiChuan	105	156	0.6
HeiLongJiang	144	151	0.5
HuBei	124	123	0.4
XinJiang	35	106	0.4
JiangXi	104	94	0.3
HuNan	123	86	0.3
JiLin	69	53	0.2

AnHui	92	45	0.2
YunNan	31	33	0.1
MengGu	29	30	0.1
GuiZhou	38	27	0.1
QingHai	5	24	0.1
ShanXi	42	23	0.1
GanSu	19	22	0.1
NingXia	7	6	
XiZang	1	3	
State Enterprises	168	4459	15.8
Total	15997	28165	100

* Note: MOFERT-- Ministry of Foreign Economic Relations and Trade.

TABLE2 **Distribution of Foreign Investment In Trades**

1978-1989 (sources from MOFERT)

NAME OF TRADES	NUMBER OF PROJECTS	AMOUNT OF FOREIGN INVESTMENT (US$ Million)	PROPORTION OF TOTAL FOREIGN INVESTMENT (%)
Industry	15667	18052	53.47
Architecture	532	549	1.63
Geological Exploration	22	0.2	o.oo06
Food & Drinks; commerce; Goods & Materials	1049	1577	4.67
Science & Technical Service	61	19	0.06
Agriculture; Forest,Animal husbandry; Fish; Hydro	1036	1027	3.04
Culture & Education; Broadcast & TV	80	142	0,42
Finance, Insurance	62	75	0.22
Communication Post & Tele-Communication	520	441	1.31
Real Estate; Consulting Services	1564	8509	25.2
Public Health; Sports;and Welfare	58	123	0.37
Others	1201	3251	9.63
Total	21776	33764	100

TABLE3 **Foreign Investment Source**

(1979--1990) (sources from MOFERT)

country or area	Number of Projects	Amount of the Investment (million US$)	Proportion of Total Investment
HongKong,Macao	17665	21118	74.63
U.S	915	2896	10.23
Japan	943	1752	6.19
Singapore	377	641	2.26
Germany	74	482	1.70
Canada	80	204	0.72
Britain	71	176	0.62
The Netherlands	24	174	0.61
France	61	157	0.55
Australia	78	202	0.71
Switzerland	22	96	0.33
Tailand	101	147	0.50
The Philippines	84	92	0.31
Italy	43	91	0.30
Denmark	12	41	0.14
Malaysia	27	18	0.06
Indonesia	18	7	0.01
Total	19652	28294	100