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台商電子組裝業於中國大陸設廠之區位選擇

Site Selection of Taiwanese Electronics Assembly Firms in China

研 究 生：羅偉.

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中 華 民 國 九 十 七 年 十一 月

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摘　　要

1980 年代以勞力密集產業為主的亞洲國家或經濟體如日本，台灣，香港，南韓等因國內勞工工資成本的上漲，使得競爭力遭受到嚴峻的挑戰，必須向外尋求新的生產基地。中國這個鄰近亞洲各國的人口大國，以其優異的地理位置，充沛且便宜的勞動力，又具備了潛在的龐大市場商機，吸引了世界包含了亞洲在內的各國前往投資設廠。如何選用適當的方法做投資設廠地點的評估對於企業而言至關重要。階層分析法(AHP)能夠針對多準則或多目標等問題提供決策方案。但是當 AHP 排序分數 (Ranking Score)非常靠近時，容易產生不可靠之決策結果；同時使用於階層分析法的數據(Samples)皆來自於專家意見(又稱: 專家問卷)，使得數據隱含專家的主觀偏好而致影響結論。我們提出混合型階層分析法 (Hybrid AHP)，建構 95%的 AHP 排序值(Ranking Score)誤差帶之信賴區間以增加決策可靠性；同時運用統計拔靴法(Statistical Bootstrapping Approach)針對有限專家問卷進行抽樣計算(取出不放回)，儘可能消弭專家主觀偏好對結論的影響。依據我們的方法，決策原則是極大化 AHP 值，極小化誤差帶。為驗證混合型階層分析法，本論文以台商電子組裝業在中國大陸地區(分為北、中、南、東四區)設廠評估資料做為實證研究。研究結果顯示選擇中國東部 (江蘇，浙江，上海)作為設廠地點具有最高共識度以及最佳決策可靠性。

Site Selection of Taiwanese Electronics Assembly Firms in China

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ABSTRACT

An upswing in labor costs and currency appreciation during the 1980s caused Asian countries and economic entities such as Hong Kong, Japan, and Taiwan to search for new manufacturing sites in order to obtain lower manufacturing costs. China, with its huge, rapidly growing market, was one of the main options for these Asian economic dynamos. How to find an appropriate method to evaluate an optimum place for a factory set up in China is essential to an enterprise.

Analytical Hierarchy Processing (AHP) is a method to solve complex multi-criteria decision problems. However, to make decisions only based on AHP results is not sufficiently reliable, especially when the results are too close to be precisely determined. To strengthen AHP analysis, we propose a “hybrid AHP” method. This method computes an error band (EB) of final AHP-scores using its 95% confidence interval to estimate AHP score error, and calculates EB combined with a “Bootstrap” to mitigate expert pectoral bias. Based on our methods, our decision rule is to “maximize AHP score and minimize EB”. To verify our methods, we took Taiwanese electronic assembly manufacturers selecting manufacturing sites in China as a case study. Our research found that Eastern China has a relatively higher consensus of preference for establishing manufacturing sites.

誌　　謝

跟隨恩師 楊千教授已有十年，在這十年的時間當中，楊教授開明地讓我們獨立作研究，讓我們從實踐中、挫折中修正自己，並從中訓練自己找答案檢驗答案的能力。透過不斷的實踐，不斷的修正，累積做中學的經驗，這種訓練對於我的學習及工作有著莫大的助益。論文撰寫期間，承蒙恩師 楊千教授以及博士指導委員 黃仁宏教授、王耀德教授的細心指導，方能順利完成。謹致以最深的感謝。

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在過去一邊工作一邊修習博士課業的七年間，有一個亦師亦友的朋友-陳泰賓必須被提出來特別感謝。陳泰賓博士，交大應用統計所畢業，目前在義守大學醫學院任職。他是 我在博士班就讀時所認識的朋友，當時他也是博士生，我因為研究方法的問題向他請教，因而變成好朋友。雖然他的研究工作非常繁忙，他仍然撥冗與我分享他在研究方法上的經驗，透過與他的討論，我從中獲益匪淺。

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家人無悔的支持不敢忘記，在博士班修業的過程中，家父因病辭世，我因悲傷過度無法專心學業，後又因學術期刊投稿不順幾度想要放棄。後來在新竹喜樂教會的教友-徐保羅教授、王小璠教授的鼓勵下，我才打起精神努力以赴。能夠完成學業，除了完成對父母的承諾，更完成了對自己的挑戰！感謝 主的恩典！

羅 偉.

民國九十七年十二月

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Chapter 1 Introduction

Once China began significant reforms of its economic policy in 1979, its economy showed remarkable achievements over the subsequent three decades. Through economic reforms, the Chinese economic system has been moving away from a planned to a free economy. China has a population of over 1.3 billion people and promises to, one day, be the largest market in the world. When economic reforms were announced in 1979, a growing flow of foreign capital entered this market. With plentiful, inexpensive land and a large pool of low-cost labor combined with foreign capital and able entrepreneurs, four major elements successfully integrated to enable China to achieve high economic growth rates for the last twenty years.

Since the 1980s, labor wages in Hong Kong have surged upwards. To search for lower labor costs, some Hong Kong enterprises were forced to move to Guangdong province, especially to the Shenzhen Special Economic Zone (SEZ). To welcome Hong Kong businesses moving to the Shenzhen SEZ, the local government provided tax incentives such as business income being exempt from income tax in the first and second years, and a 50% reduction in the third to fifth years. Followed by Hong Kong businesses, Japanese enterprises also suffered huge Japanese yen appreciation losses since the Plaza Agreement was entered into in 1985 by the G-5. As a result, Japanese companies also entered Guangdong province. Originally, Japanese enterprises were limited to the textile and grocery sectors. In the 1990s, however, their investment scope greatly changed to focus on the consumer and electronics component business. In the following years, to reduce costs, Taiwanese enterprises also moved into Guangdong province, especially the Shenzhen SEZ, and then later migrated to the city of Dongguan (located northwest of Shenzhen). In fact, many view Guangdong as

Hong Kong's hinterland.

To attract foreign investors, especially for Hong Kong enterprises, Guangdong's local government provides very flexible business models for foreign investor selection, such as consignment contract manufacturing. In the past three decades, China's economic structure has gradually shifted from labor-intensive to capital- and technology-intensive industries, the type of industry that first appeared in the special coastal districts. As a result of intra-district economic competition, many of the most successful economic players are now moving from the south (Pearl River delta) to the east (Yangtze River delta) of China. This is a fairly new trend as the southern region of China, especially Guangdong province, which is geographically right next to Hong Kong, had always enjoyed special favor.

In summary, there are two advantages to investigating in China: first, China has been going through major economic and political changes since 1979, and due to the huge size of the domestic market and the low wages of its workers, it has become one of the most important manufacturing sites in the world. Second, China has been successful in attracting foreign investment, so that by 1995 it had become the second largest recipient of foreign direct investment in the world (Tse, Pan & Au, 1997).

While China is an obvious choice as an offshore manufacturing site, there is still the decision of where within China to locate. Obviously, many complex criteria must be considered in order to make such a critical decision. The Analytic Hierarchy Process (AHP), developed by Thomas L. Saaty, is designed to solve just such complex multicriteria decision problems. The AHP can be used to rank alternatives, allocate resources, conduct cost and benefit comparisons, etc. To use AHP, experts who have relevant experience are invited to fill out professional questionnaires. A single

score is computed from the questionnaire. Then, these AHP scores are added up and their sample mean, sample standard deviation, and sample coefficient of variation (CV) are computed. These three indicators are then used to make a decision. AHP is an effective way to rank all alternatives. However, it is not reliable when AHP scores are too close or even equivalent to each other. To improve AHP sensitivity, reliability, and accuracy, many modified versions of AHP have been proposed, such as revised AHP, fuzzy AHP, fuzzy revised AHP, linear programming joined AHP, goal programming with AHP, and so on (Mamat & Daniel, 2003). To enhance decision-making by AHP, we propose a "hybrid AHP" method. This method computes an error band (EB) of final AHP-scores using its 95% confidence interval to estimate AHP score error, and calculates EB combined with "Bootstrap" to mitigate expert pectoral bias. Based on our methods, our decision rule is to "maximize AHP score and minimize EB". We wish to prove that hybrid AHP is more reliable/specific (choose one) for practical decision use.

Our research not only offers insights into how firms from different regions evaluate the establishment of a new manufacturing site, but also casts new light on Chinese regional economies by focusing on the way in which Taiwan's firms choose particular regions when opening their plants in China. We use "hybrid AHP" to identify what factors foreign direct investors consider when selecting out-of-country locations, and what specific factors are making certain Chinese regions more attractive to companies seeking to establish assembly-type electronics manufacturing bases in China.

Chapter 2 Literature Review

2.1 Factors influencing the decision to establish a manufacturing base abroad

The decision to undertake foreign direct investment (FDI) in a particular country is the outcome of a decision process in which projected revenues and costs are evaluated. Increased knowledge of a foreign country reduces both the cost and the uncertainty of operating in a foreign market, and should increase the probability of an investment being made in that country. Experience creates—and is sometimes the only way to achieve—increased market knowledge and uncertainty reduction, and experience is therefore considered an owner-specific advantage in the so-called eclectic theory of international production (Dunning, 1988). It is generally recognized in the literature that experience acts as a determinant of location decisions concerning FDIs; however, there has been no investigation of assembly-type electronics manufacturing enterprises to date.

The economic theory of the multinational enterprise focuses on two fundamental aspects of international production activities: the ownership of assets employed in different countries and the location pattern (Benito, 1991). The theory predicts that a company investing in production facilities will choose the location that minimizes total costs, given the distribution of demand in markets. Labor cost differentials, transportation costs, the existence of tariff and non-tariff barriers, as well as government policy are generally held to be important determinants of location choice (see Carlson, 2000; Daniels, 1970; Doeringer, Evans-Klock & Terkla (2004); Friedman, Gerlowski & Silberman (1992); Pelegrin, 2003; Veugelers, 1991).

The decision to establish a manufacturing base in a country other than one's own is a difficult one. Daniels (1970) surveyed 40 foreign firms that established their first U.S. manufacturing operations after 1954 (see Franko, 1975). He showed that, like domestic firms, foreign firms also consider cost, market, and non-economic factors. However, the results of the considerations may differ due to certain conditions. Daniels found that the two major impetuses for base selection were closeness to home operations and closeness to markets (see Franko, 1975). Tong (1978) surveyed 254 foreign firms in the U.S. and analyzed 32 site variables. His results showed that the most influential site selection factors were: availability of transport services, labor attitudes, ample space for future expansion, nearness to U.S. markets, and the availability of suitable plant bases. In addition, he concluded that the following determinants were considered the least important: cost of local capital; availability of local capital; nearness to home operations; and proximity to export markets.

Most of the foreign direct investment (FDI) literature is connected to direct investment as it pertains to manufacturing. He (2002) identifies several types of regions where information costs are low: economic centers, coastal regions, areas with previous foreign investment, and cities implementing policies. In economic centers, communication infrastructure, administrative institutions, and business services are readily accessible for FDI. Coastal regions are open to international markets. In areas with previous foreign investment, information can be readily transmitted through business relationships to new foreign investors. Cities implementing policies that encourage foreign investment are active in attracting foreign companies (Friedman et al. 1992; Woodward, 1992; Coughlin et al, 1991; Veugelers, 1991; Yu & Ito, 1988; Kim & Lyn, 1988).

According to McConnell (1980), regional labor conditions, industrial agglomeration, and market demand are all factors affecting the site of foreign investment. Kravis and Lipsey (1982) found labor costs to have no effect on FDI (see Seyf, 2001). Culem (1988) examined US foreign direct investments in the European Economic Community and found that market size had no significant effect on capital flows, but that unit labor cost was crucial (see Seyf, 2001). Glickman and Woodward (1988) surveyed foreign companies in the automobile, semiconductor, and computer industries and found that the most important factors in site selection were costs of labor, transportation of goods, access to markets, and quality of life. In their sample, the least important factors were tax incentives and government services.

2.1.1 Labor costs as a factor in site selection

Some researchers (Lansbury, Pain & Smidkova 1995, Hatzius, 1997, Mudambi, 1995, Wheeler & Mody, 1992) stressed that labor costs are the most important factor in site selection. Others stated that (high) labor costs can act as a deterrent to FDI (Bartik, 1985; Luger & Shetty, 1985; Hill & Munday, 1991; Coughlin et al., 1991). When technology levels and product quality are standardized, and cost is the priority, production may be transferred to another area with lower labor costs (Vernon, 1966). Using panel data, Lansbury et al. (1996) studied the flows of FDI in Central Europe and found that low labor costs and trade links between the home and host nations are both statistically significant.

2.1.2 The role of tax rates and tax incentives in site selection

Friedman et al. (1992), Coughlin, et al. (1991), and Wheeler and Mody (1992) found that the corporation tax rate had no effect on capital flows. Veugelers (1991)

found incentives to be ineffective, and Woodward (1992) reported similar results. Friedman et al. (1992) saw promotion as influential in site selection. Coughlin et al. (1991) and Woodward and Rolfe (1993) found the same results. Newman and Sullivan (1988) applied econometric analysis to prove that tax effects are important factors in industrial site selection (see Bartik, 1985). Veugelers' (1991) evidence on the effect of corporation tax rates is mixed, while Mudambi (1995) reported a negative and statistically significant relationship between tax rates and FDI.

2.1.3 Other factors influencing site selection

Kindleberger (1965) suggested that international flows of capital between Japan and Taiwan were determined essentially by differences in the term structure of interest rates. Aliber (1970) stressed the desire to avoid exchange risk as a determinant of direct investment. Brewer (1993) produced a more complex picture of the impact of government policies on FDI, showing that a great deal depends on the types of FDI and on the site. Aristotelous and Fountas (1996) found evidence to support Aliber's hypothesis, whereas Mudambi (1995) showed that country-specific risk (including exchange rate risk) had no significant impact on FDI flows.

Arpan et al. (1981) studied 100 foreign manufacturers, and cited nearness to markets and transportation facilities as the leading factors in foreign site selection. They also found that 34 percent of their respondents derived the information used in site selection from other firms. According to Wakasugi (2005), special site considerations may affect Japanese transplants in particular industries. Japanese auto suppliers, for example, often locate near specific Japanese auto assembly plants (Smith & Florida, 1994; Reid, 1989; Mair, Florida & Kenney, 1988) in order to facilitate the scheduling and delivery requirements of just-in-time supply relationships (Head, et al,

1995). The high-technology industry is also cited as having distinctive site concerns related to the availability of skilled workers or the desire to locate near major high–technology research centers in order to gain access to state-of-the-art research (Kenney & Florida, 1993).

Root (1994), and Mockler and Dologite (1997) compared entry mode decisions between sole venture firms and joint venture firms establishing manufacturing bases in China, and found two groups of significant factors: environmental and market factors (see Jiang, 2004). Among the most influential variables of China's environmental factors are the Chinese government's policies and regulations. Several researchers (Fatehi-sedeh & Safizadeh, 1989; Formica, 1996; Kobrin, 1979; Sethi & Luther, 1986) claimed that there is no single universally accepted definition of political risk. It is most commonly conceived in terms of (usually host) government interference with business operations. "Very simply, political risk refers to the possibility that political decisions or events in a country will affect the business climate in such a way that investors will lose money or not make as much money as they expected when the investment was made" (Hong, Jones & Song, 1991).

2.2 What is an appropriate site in China?

China has a vast territory and large population. Different provinces have varying characteristics relative to climate, people, economic base, and geography. In the literature we can found that China has all of the required advantages of an offshore manufacturing location. In practice, how to choose an appropriate site for a manufacturing base is very important for foreign counterparts. As shown in Table 1, Shenzhen, Zhuhai, Xiamen, and Shantou were the first four coastal cities opened up to foreign

investment in 1979. Shenzhen was originally a small fishing village near Hong Kong while Zhuhai is geographically adjacent to Macau, thus giving both cities geographic advantages. Shenzhen's Special Economic Zone was defined during a field trial to allow Western capital and management practices in a Chinese environment, strategically positioning it as a window between capitalism and socialism.

Table 1 Milestone in the Opening of Chinese Coastal Cities

Period	Major Events
1979-1980	Shenzhen, Zhuhai, Shantou, and Xiamen Special Economic Zones formed.
1984	Fourteen coastal cities: Tianjin, Shanghai, Dalian, Qinhuangdao, Yantai, Qingdao, Guangzhou, Lianyungang, Nantong, Ningbo, Wenzhou, Fuzhou, Zhanjiang, and Beihai open up to FDI. In these cities, business income was exempted from income tax or allowed a 50% deduction.
1985	The State Council approves Shanghai to go a step further in development.
1986	Bohai Economic Development Zone, Shanghai's Minhang and Hongqiao Economic Development Zones created.
1987	The State Council approves "Policy of loan to foreign enterprise offered by Bank of China".
1988	Shenyang, Wuhan, Nanjing, Dalian, and Chongqing city are opened up. Peninsula of Shandong Economic Development Zone formed.
1990	The State Council approves the creation of the Shanghai Pudong Economic Development Zone and establishes the Pudong Economic Development Zone as a bonded zone.
1995	The Zhuhai airport opened.
1997	Import duty greatly reduced.

Summarized by: Woei Lo

Source: http//www.china.org.cn/Chinese/null/582922.htm

At the beginning of the economic reform, the earliest coastal cities to open to foreign capital were the first target for the foreign enterprises to invest in. Tables 2 and 3 show that the amount of investment made by Taiwanese enterprises in southern China, including Guangdong and Fujian provinces, was higher than for eastern China. From the year 2000, investments in the eastern part of China, including Jiangsu and

Zhejiang provinces, showed an uptrend. The trend of investment for southern China slowed down and, by contrast, the trend of investment for eastern China continued to speed up. An average of 48.66 percent of Taiwanese industrial investments in Mainland China from the year 2000 was in the electronics and electrical appliances sectors (Table 4).

Table 2 Approved Taiwanese Investments in Mainland China by Province

(Unit: US$ 100M)

Province	1991~1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Shanghai	10.73	5.88	2.86	1.51	3.21	3.76	9.49	11.04	11.75	10.18	10.42	14.40
Jiangsu	11.48	6.59	4.08	3.24	9.31	10.46	22.23	26.01	24.87	23.49	28.87	38.42
Zhejiang	2.95	1.95	0.86	0.79	0.69	2.08	5.12	6.08	6.89	4.85	5.91	6.91
Fujian	8.89	4.72	1.51	0.59	0.99	1.20	7.50	4.92	4.53	3.98	5.20	3.88
Guangdong	20.72	17.24	8.25	5.00	10.20	7.88	16.35	20.54	14.04	12.20	14.15	19.78
Hebei	0.84	0.30	0.07	0.07	0.01	0.01	0.42	0.20	0.12	0.14	0.24	1.36
Liaoning	1.34	0.53	0.08	0.04	0.14	0.18	0.59	0.56	0.25	0.19	0.55	1.04
Shandong	1.91	1.09	0.66	0.04	0.12	0.28	0.64	1.08	1.38	1.09	1.09	2.82
Hubei	0.73	0.51	0.32	0.18	0.01	0.28	0.15	0.98	1.16	0.39	0.31	1.61
Hunan	0.81	0.30	0.05	0.01	0.00	0.09	0.13	0.11	0.19	0.12	0.02	0.53
Sichuan	0.98	0.22	0.14	0.13	0.07	0.11	0.50	0.26	0.92	0.31	1.01	0.70
Other summary	2.56	1.89	0.55	0.37	0.37	0.22	1.72	2.23	1.60	1.22	5.70	4.63

Source: Investment Commission, MOEA, Republic of China http://www.moeaic.gov.tw/

Table 3 Approved Taiwanese Investments in Mainland China by Industry

(Unit: 100M USD)

Industry classification\\ Year	1991~1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Petroleum and Coal Products Manufacturing	0.02	0.01	0.02	0.00	0.03	0.01	0.01	0.04	0.04	0.01	0.02	0.24
Chemical Material Manufacturing	2.82	0.88	0.92	0.86	0.80	1.23	3.73	4.63	3.58	2.99	4.00	1.42
Chemical Products Manufacturing	1.57	1.24	0.40	0.53	0.25	0.31	0.83	1.05	0.77	0.60	1.38	1.08
Medical Goods Manufacturing	0.44	0.18	0.13	0.04	0.02	0.08	0.18	0.23	0.12	0.03	0.09	1.75
Rubber Products Manufacturing	2.01	0.73	0.60	0.09	0.11	0.62	1.31	0.98	1.05	1.07	0.64	0.98
Plastic Products Manufacturing	4.51	3.16	0.63	0.96	1.82	1.52	3.90	3.89	2.60	2.49	2.20	5.84
Non-metallic Mineral Products Manufacturing	3.61	3.84	0.88	0.34	0.84	1.07	2.15	4.51	4.21	1.80	3.87	2.31
Basic Metal Manufacturing	1.22	0.53	0.07	0.08	0.41	0.42	0.79	1.60	0.76	0.92	1.78	5.18
Fabricated Metal Products Manufacturing	4.76	3.36	1.25	0.97	1.38	1.49	5.40	5.49	6.38	5.42	4.42	3.09
Electronic Parts and Components Manufacturing	3.48	2.84	2.81	1.54	4.12	6.01	10.88	8.16	14.82	8.50	16.19	24.26
Computers, Electronic and Optical Products Manufacturing	3.85	3.14	3.42	2.72	6.99	4.93	10.63	9.76	11.40	12.43	14.72	16.88
Electrical Equipment Manufacturing	5.02	3.15	1.61	1.19	4.27	2.65	6.30	7.42	5.93	5.61	6.65	10.47
Machinery and Equipment Manufacturing	2.49	2.03	1.19	0.44	0.73	1.30	2.86	3.28	2.14	3.53	2.15	5.04
Motor Vehicles and Parts Manufacturing	0.89	0.85	0.49	0.10	0.20	0.27	1.16	1.63	1.95	1.50	1.16	1.39
Other Transport Equipment Manufacturing	3.04	0.76	0.35	0.22	0.33	0.31	1.02	1.57	0.64	0.31	0.25	1.18
Furniture Manufacturing	0.95	0.64	0.07	0.04	0.00	0.05	0.84	0.61	0.12	0.04	0.11	0.21
Manufacturing Not Elsewhere Classified	3.62	2.13	0.50	0.21	0.11	0.22	2.72	2.74	1.37	1.15	2.67	1.50
Total	68.74	43.34	20.35	12.53	26.07	27.84	67.23	76.99	69.41	60.07	76.42	76.42
Electronics related investment in total investment (%)	17.97%	21.04%	38.53%	43.45%	59.01%	48.80%	41.35%	32.92%	46.33%	44.19%	49.14%	67.54%

Source: Investment Commission, MOEA, Republic of China http://www.moeaic.gov.tw/

Table 4 Provinces of China Sorted by Region

Region	Province
Eastern	Jiangsu, Shanghai*, Zhejiang
Southern	Fujian, Guangdong, Guangxi, Hainan
Central	Henan, Anhui, Sichuan, Chongqing*, Hubei, Hunan
Northern	Beijing*, Tianjin*, Hebei, Shandong, Liaoning, Jilin, Heilongjiang

* Municipality directly under the jurisdiction of the Central Government
Source: Keng, C.W. Kenneth (2002), p. 411.

* * *

As our review of the literature shows, the decision to establish a manufacturing site abroad involves a number of complex factors. We assume that for those companies planning to invest in China, motives include the need to be closer to a huge Chinese market; the intention to fully utilize cheaper labor and supply costs to retain competitive manufacturing advantages; the possibility to share business risks through geographical diversification; the wish to expand into new markets to gain market share to obtain or improve profits; and the necessity to acquire technological know-how or expertise.

Chapter 3 Methodology

On the basis of the literature review, we established four major criteria influential in site location decision-making: (1) economics, (2) politics, (3) the cluster effect, and (4) government bureaucracy. These are the basis of our AHP expert questionnaire criteria (Table 5). The expert questionnaire uses the Delphi method to collect information from experts, and has proven face validity. Experts judge the relative importance of each criterion, and then specify a preference for each alternative criterion. Our definition of expert is based on companies that have already made manufacturing investments in China and which are already listed on the Taiwan Stock Exchange, or companies whose parent companies are listed on the NASDAQ. According to the Delphi method, small numbers of expert are better than large numbers to reach a consensus. "Witkin and Altschuld (1995) note that the approximate size of a Delphi panel is generally under 50, and Ludwig (1997, p2) documents that the majority of Delphi studies have used between 15 and 20 respondents" (cited by Hsu & Sandford, 2007, p.4; Linstone & Turroff, 1975；Fowles, 1978).

Table 5 Criteria

Major criteria	Economics	Politics	Cluster effect	Government Bureaucracy
Sub-criteria	・market ・land costs ・labor costs ・material costs ・tax incentives ・investment incentives	・policy uncertainty ・information transparency	・position in supply chain ・resource sharing ・transportation costs ・security	・infrastructure readiness ・tax audit fairness ・customs clearance efficiency ・public security ・officer integrity ・government's response ability ・policy comprehension and execution ability

Convenience sampling was utilized in this study. We surveyed 17 Taiwanese electronic assembly-type manufacturers, all listed on the Taiwanese stock exchange and all featured in the list of Taiwan's top 1,000 manufacturers in 2006. These companies had combined sales revenues of NT$2,745 billion (around US$84.46 billion) in 2006. In terms of percentage, these companies comprised 40% of the total assembly manufacturers' sales revenues in the list of Taiwan's top 1,000 manufacturers in 2006. Our sample crossed industry sectors including notebook computers, network equipment, scanners, digital cameras, computer peripherals, optoelectronic products, and electronics manufacturing services (EMS) (Table 6).

Nine of the companies surveyed have manufacturing sites in the eastern China region while eight have manufacturing sites in the southern region. Electronic questionnaires were sent to the top management of these 17 firms by e-mail in the middle of 2006. To the extent that we could, we sought participation from managers representing key functional areas within each firm, with emphasis on investment and manufacturing. We asked all participants to fill out the questionnaire and identify the factors that influenced the entry and location selection decision process their firm used. Most of the returned questionnaires had transitivity problems. Therefore, we followed up with phone calls to each participant, eliciting explanations regarding transitivity issues. This enabled participants to review and revise their questionnaire answers and correct all transitivity problems.

We used corrected questionnaires as our calculation bases. Each questionnaire consisted of 19 questions with four major criteria. Thus, each questionnaire contained 76 observations, giving a total of 1,292 observations.

Table 6 Enterprise Profiles

Stock Market listed code	Company name	Location*			Scope of Business
		Jiangsu	Guangdong	Fujian	
5371	Coretronic Corp	1	2		Projectors
3380	Alpha netwok	2	1		Networking ODM/OEM
2340	OptoTech Corp	1			LED monitors
2391	ZyXEL Communications	1			Telecom equipment
2449	King Yuan Electronics	1			Testing and packing
2352	BENQ	1			Electronics consumer products
6133	Golden Bridge Bectech		1		PC peripherals/consumer electronics
903(HK)	TPV(AOC)	2		1	LCD monitors/TVs/CRTs
2380	Avision Inc	1			Scanners
2386	Ambit Tech	2	1		Broadband products
2345	Accton Tech	2	1		Consumer network products
3059	Altek Corp	1			Digital cammeras
3231	Wistron Corp	2	1		PC/notebook computer
LOGI	Logitech	1			PC peripherals
3290	Donpon Precision		1		Optoelectronics ODM/OEM
2382	Quanta Computer	1			Notebook computers
2317	Hon Hai Precision	2	1		EMS

*1: First plant; 2: Second plant

Analytical Hierarchy Processing (AHP)

The output of AHP is a prioritized ranking of alternatives on the basis of overall preferences expressed by the decision maker. AHP separates the complex decision problems into criteria within a simplified hierarchical system. Through the pairwise comparison of these criteria, a pairwise comparison matrix is established, and the normalized principal eigenvector is then computed for the priority vector, which provides a measure of relative importance for the decision-maker (Davis and William, 1994). To measure the consistency of a decision-maker's entries in a pairwise comparison matrix, the consistency index (CI) is used as defined below:

$$CI = (\lambda \max - n) / (n - 1)$$

where $\lambda \max$ is the largest eigenvalue of an n×n pairwise comparison matrix. Satty

further proposed the consistency ratio CR = (CI)/(RI) to measure the degree of inconsistency, where RI is a reciprocal matrix generated randomly. A value of CR≦ 0.10 can be taken as sufficiently consistent (Shee et al, 2003).

This is the procedure to compute AHP: (http://en.wikipedia.org/wiki/Analytic_Hierarchy_Process)

Step1: The alternatives and the significant attributes are identified.

Step2: For each attribute, and each pair of alternatives, the decision makers specify their preference in the form of a fraction between 1/9 and 9.

Step3: Decision makers similarly indicate the relative significance of the attributes.

Step4: Each matrix of preferences is evaluated by using eigenvalues to check the consistency of the responses. This produces a "consistency coefficient" where a value of "1" means all preferences are internally consistent.

Step5: A score is calculated for each alternative.

Hybrid AHP

A good decision is one with a high AHP score. However, the higher the error band (EB), the greater the risk of the AHP score being inaccurate. Therefore, the best decision is the one with the maximum AHP and minimum EB. Confidence interval is a useful statistic to measure AHP score error. The Bootstrap is a resampling method. Through resampling T times, an expert's bias can be greatly reduced. There are 17 samples in this case. Based on each AHP score, we calculated a global AHP score and its EB to rank the final alternatives. Then, we used the Bootstrap approach to repeat T times to examine each EB variation. Finally, we used the maximized AHP score and

minimized EB to rank the alternatives. If the AHP score is high and EB is also high, the decision maker needs to consider whether to take more risks by choosing a high AHP score, or to take less risks (lower EB) by choosing a relatively lower AHP score.

The Bootstrap algorithm is used to take n (n<17 in our case) random samples with replacement from the total sample with T replicates. Let $\Omega = \{x_1, \cdots, x_n\}$ be the observed sample space.

The Bootstrap procedure is:

Step 1: Let Θ be the sub sample space that is randomly chosen as *n* elements from Ω.

Step 2: Let $\overline{X}_i$ be the sample average of Θ.

Step 3: Go to step 1 and repeat *T* times.

Step 4: Computing $\overline{X} = \frac{1}{T}\sum_{i=1}^{T} \overline{X}_i$ and $S = \sqrt{\frac{\sum_{i=1}^{T} (\overline{X}_i - \overline{X})^2}{T-1}}$.

Step 5: The 95% confidence level is given as $\left[\overline{X} - S \cdot t_{(n-1,a/2)}, \overline{X} + S \cdot t_{(n-1,a/2)}\right]$

Step 6: The error band (EB) is given as $EB = 2S \cdot t_{(n-1,a/2)}$.

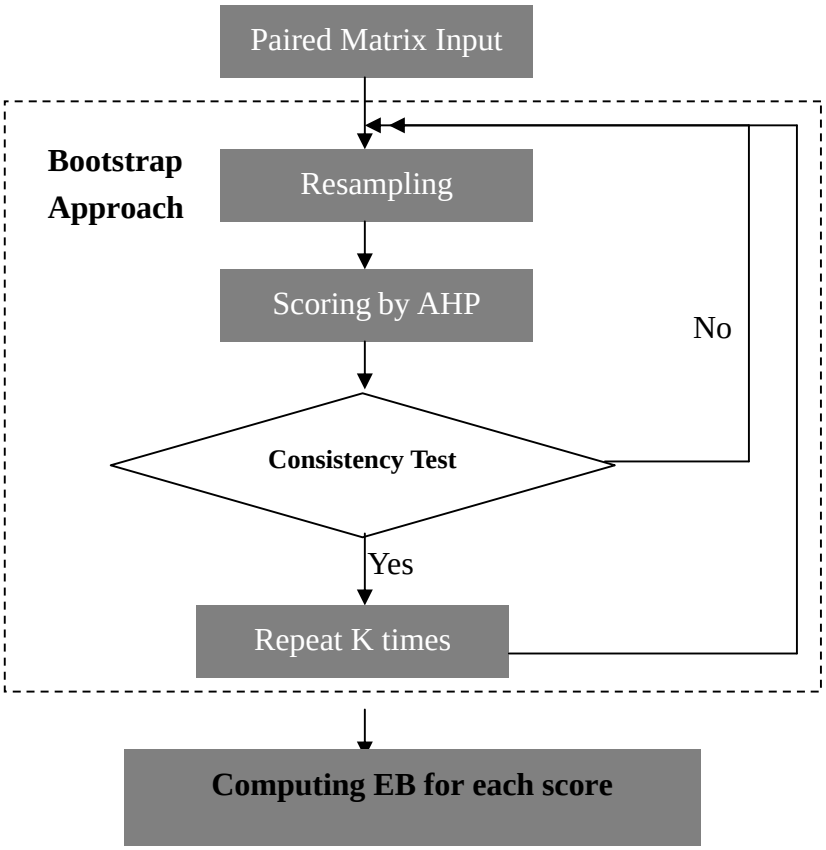
To decrease sampling-with-replacement influence on error band estimation, we used sampling-without-replacement instead of sampling-with-replacement to estimate the error band (EB). The modified Bootstrap is sampling-without-replacement. Moreover, we also needed to replicate T times within certain ranges. The modified Bootstrap takes n random samples (n<17 in our case) without replacement from the total sample with T replicates. We can replicate many times in order to obtain the least error band. However, to limit computation and time, we used a regression model to estimate minimum absolute residuals (MAR) as our optimal replicates. The regression

model is given as (04):

$$Y = a_1 x_1 + a_2 x_2 + \cdots + a_n x_n \tag{04}$$

$$MAR = Min\{|\, y_i - \hat{y}_i \,|, \forall i\} \tag{05}$$

where x_i is number of the ith replicate, $\hat{y}_i$ is the ith predicted response, y_i is error band value at ith replicate, e_i is the error term, and m, b are parameters that need to be estimated. The comparison of results by Bootstrapping, and modified Bootstrapping are described in the empirical findings, and the Bootstrap flowchart is given below (Figure 1).



Chapter 4 Empirical Findings

Figure 1 Bootstrap approach with AHP

4.1 AHP Approach

4.1.1 Site selection:

We used Analytical Hierarchy Processing (AHP) as the analytical method to rank the alternatives in our survey, using four major criteria. We found that the AHP scores of eastern China for each surveyed company for the four major evaluated criteria were the highest (table 7) and the coefficient of variation (CV) of eastern China for the four major evaluated criteria was the lowest. This means that eastern China is the preferred site among the surveyed companies (Table 8). Yet, when analyzed by sector classification, we found that eastern China's AHP score was the highest (0.53610) for each sector and the coefficients of variation of eastern China for peripheral device makers, network equipment makers, and notebook computer makers was also lower than for any other area (Table 9). This means that Eastern China is the preferred site among surveyed companies for all sectors. In Table 6, we also investigate surveyed companies' second plant location which truly reflects Tables 7, 8, and 9.

Table 7 Summary of AHP score for all surveyed companies

Com.Code	SOUTH	EAST	CENTER	NORTH
5371	0.28756	0.46307	0.12913	0.12024
3380	0.23604	0.51807	0.07724	0.16865
2340	0.19568	0.67712	0.05539	0.07181
2391	0.14290	0.51637	0.17926	0.16146
2449	0.10142	0.45931	0.14295	0.29632
2352	0.17019	0.54994	0.10348	0.17638
6133	0.14842	0.65921	0.08990	0.10247
903(HK)	0.14698	0.53746	0.07279	0.24278
2380	0.15576	0.49332	0.25031	0.10061
2386	0.28208	0.61182	0.05305	0.05305
2345	0.27014	0.47631	0.10579	0.14775
3059	0.17348	0.67493	0.10152	0.05007
3231	0.38266	0.50863	0.05435	0.05435
LOGI	0.06704	0.49471	0.15707	0.28117
3290	0.29879	0.43914	0.11313	0.14894
2382	0.23312	0.56192	0.07522	0.12974
2317	0.23532	0.55188	0.08204	0.13076
Gaverage	0.19136	0.53610	0.09880	0.12536
STDEV	0.08094	0.07500	0.05149	0.07444
CV	0.42298	0.13990	0.52117	0.59382

Table 8 Evaluation table of the four major criteria in the area surveyed

Criteria	Evaluation item	SOUTH	EAST	CENTER	NORTH
Economics	AHP average Scores	0.17707	0.59274	0.10375	0.12644
	CV	0.49017	0.11383	0.56033	0.65045
	EB -B	0.04405	0.02433	0.02937	0.04833
	EB-rB	0.02246	0.00490	0.02754	0.02798
Politics	AHP average Scores	0.18415	0.46390	0.12299	0.22895
	CV	0.53158	0.24691	0.67670	0.55670
	EB -B	0.05313	0.01999	0.04056	0.03678
	EB-rB	0.04152	0.01149	0.03628	0.02743
Cluster	AHP average Scores	0.28729	0.48207	0.11208	0.11856
	CV	0.41403	0.25106	0.78428	0.92837
	EB -B	0.03758	0.05206	0.08167	0.08677
	EB-rB	0.01884	0.01720	0.06355	0.06664
Bureaucracy	AHP average Scores	0.22680	0.47549	0.11750	0.18021
	CV	0.53055	0.27540	0.61001	0.58201
	EB -B	0.07326	0.02881	0.02576	0.04231
	EB-rB	0.03128	0.01699	0.02263	0.02716
ALL	AHP average Scores	0.19136	0.53610	0.09880	0.12536
	CV	0.42298	0.13990	0.52117	0.59382
	EB-B	0.05038	0.02923	0.03979	0.05054
	EB-rB	0.02723	0.01132	0.03462	0.03433

Randomly sampling 12 samples out of total samples (N=17) with replacement and replicate 100 times (EB-B).

Randomly sampling 12 samples out of total samples (N=17) without replacement and replicate 100 times (EB-rB).

Table 9 Evaluation table by sector

Criteria	Statistics	SOUTH	EAST	CENTER	NORTH
ALL	AVG:	0.19136	0.53610	0.09880	0.12536
	STDEV:	0.08094	0.07500	0.05149	0.07444
	CV:	0.42298	0.13990	0.52117	0.59382
Peripheral devices	AVG:	0.17453	0.54482	0.12157	0.15908
	STDEV:	0.07255	0.09305	0.05468	0.08742
	CV:	0.41569	0.17079	0.44981	0.54953
Network equipment	AVG:	0.23329	0.53489	0.09948	0.13233
	STDEV:	0.05459	0.05065	0.04837	0.04662
	CV:	0.23399	0.09470	0.48626	0.35227
Notebook computer	AVG:	0.30789	0.53528	0.06478	0.09204
	STDEV:	0.10574	0.03768	0.01475	0.05331
	CV:	0.34343	0.07039	0.22775	0.57914

4.1.2 Economic factors

Analyzing the economic factors of the surveyed companies, we found that the AHP score of the market is the highest (0.25688) and tax incentive is the second highest (0.15726). However, the market CV is the highest (0.67915) and the tax incentive CV (0.43653) is smaller than that of the other five economic subcriteria. This is an interesting finding (Table 10), and is because most foreign manufacturing investments in China are eligible for tax exemption. The most popular tax exemption allows business income to be exempted from corporate income tax in the first and second years, and allows a 50% reduction in the third to fifth years. If a company makes another technology investment during this period, they can enjoy another three years of 50% tax reduction when the fifth year ends. If the enterprise is located in an Economic Processing Zone or Special Economic Zone, and its exports amount to over 80% of total production, it is eligible to enjoy a 10% corporate income tax rate. Any foreign investor or enterprise with foreign investments that reinvests its share of profit obtained from the business directly into that enterprise by increasing its registered capital, or that uses the profit as capital investment to establish other enterprises with foreign investment to operate for a period of not less than five years shall, upon approval by the tax authorities of an application filed by the investor, be refunded 40% of corporate income taxes paid.

Why is the market CV higher than the others? This can be explained as being because most Taiwanese electronic assembly manufacturers are export-oriented, OEM/ODM (Original Equipment/Design Manufacturer) companies. Even though China is a huge market, the current demand of the US and European markets still far exceeds that of the Chinese market. In Table 11, we can see the comparison of corpo-

rate income tax policies in Taiwan and China. China presents an income tax advantage. Most manufacturing enterprises established their manufacturing base in China to enjoy the cheaper labor costs. Lower labor costs mean more profits generated. Tax advantages become an important factor to consider when a host country has significant tax differences. Tax advantage (tax exemption or lower tax rate or tax credit) is also one of the most important factors impacting price competition, especially for OEM/ODM electronic assembly businesses. The formula below allows us to see the relationship between tax rate and price:

$T = (P-C) \times Q \times t$ where T: Tax burden; P: price; C: Cost; Q: Quantity; t: tax rate

$\pi = (P-C) \times Q \times (1-t)$ $t<1$ π: Mother country profit

$t = 1-\pi / (P-C) \times Q$ (06)

$C = a \times P$ $0 < a < 1$, a: Cost ratio

$\pi^* = b \times \pi$ $b \geqq 1$, b: Profit multiplier

The purpose of investment in China is to gain more profit. Let π^* represent the profit in the host country.

Plug $C = a \times P$ and $\pi^* = b \times \pi$ into (06)

$t = 1 - (\pi^*/b) / (1-a) PQ$ (07)

Let: $(\pi^*/b) / (1-a) \times Q = X$ then $t=1-\frac{X}{P}$ or $P=\frac{X}{(1-t)}$

If X is kept constant, P is highly affected by t. If t is smaller, price will be lower. A lower price means that an electronic assembly manufacturer has more opportunity to gain business when facing rigid price competition.

In Table 10, we found that the AHP score of tax incentive, investment incentive, labor cost, and material cost are very close. These scores explain why Taiwanese electronic assembly manufacturers' primary consideration to date is cost related factors, not market size. Market size may be the focal point of the next stage if China can transform from being a world factory to being a world market.

Table 10 Evaluation table for subcriteria

Criteria		AHP-AvG	CV	EB-B	EB-rB
Economic	MKT	0.25688	0.67915	0.08932	0.06627
	LDC	0.12468	0.59517	0.02950	0.02525
	LBC	0.15524	0.52406	0.02793	0.01787
	MLC	0.15587	0.76793	0.05732	0.05242
	TXI	0.15726	0.43653	0.02260	0.01306
	INI	0.15007	0.49067	0.02445	0.01817
Political	POU	0.32108	0.31376	N/A	N/A
	INT	0.17892	0.56304		
Cluster	SCP	0.45878	0.44875	0.05808	0.04881
	RCS	0.14999	0.68088	0.05352	0.03681
	TSC	0.25903	0.68998	0.07734	0.04272
	SEC	0.13221	0.80350	0.05669	0.05264
Gov.eff	IFS	0.21876	0.70260	0.10087	0.05992
	TAF	0.12063	0.74200	0.04779	0.03366
	CLE	0.14069	0.55930	0.03667	0.02350
	PUS	0.11893	0.64996	0.05401	0.03877
	OFI	0.12742	0.73914	0.06379	0.04414
	GQA	0.12598	0.50519	0.03310	0.01607
	PUE	0.14758	0.62001	0.04191	0.03258

MKT: market; LDC: land cost; LBC: labor cost; MLC: material cost; TAI: tax incentives; incentives

INI: investment ;POU: policy uncertainty; INI: information transparency; SCP: position in supply chain;

RCS: resources sharing;TSC: transportation convenience; SEC: security; IFS: infrastructure readiness;

TAF: tax audit fairness; CLE: customs clearence efficiency;PUS: public security; OFI: officer integrity;

GQA: government repaid response ability; PUE: policy comprehension and execution ability.

EB-B: Randomly sampling 12 samples out of total samples (N=17) with replacement and replicate 100 times.

EB-rB: Randomly sampling 12 samples out of total samples (N=17) without replacement and replicate 100 times.

Table 11 Corporate income tax comparison table – Asian countries

Country	Company Income Tax	Dividend withholding tax rate
Taiwan	25%	20%
China	15%	0%
Hong Kong	16%	0%
Indonesia	X<Rp 50,000,000 10% Rp 50,000,000<X<Rp 100,000,000 15% X> Rp100,000,000 20%	*0%
Malaysia	28%	*0%
Philippines	32%	Branch 15%, Subsidiary 32%
Singapore	22%	*0%
Thailand	30%	10%
Vietnam	28%	*0%

* Double Taxation Relief Agreement.Taiwan, ROC. http://www.idic.gov.tw/html/envir_2.htm

Source: Industrial Development $ Investment Center, MOEA, Taiwan, ROC

Apart from market size and tax, we found that material cost is very important to assembly type manufacturers. For electronic products, material cost is over 80% of total product cost, far exceeding labor cost. Local sourcing can greatly reduce product cost. However, the critical component of electronic products such as CPUs or chip sets is still imported from offshore. Currently, some foreign key parts suppliers have bonded warehouses in China and are able to deliver parts to inner China (drop shipment) on the basis of predetermined production schedules (Table 10).

4.1.3 Political factors:

Political sub criteria include policy uncertainty and information transparency. In Table 10, we found that the AHP score of policy uncertainty (0.32108) is higher than information transparency and the CV value of policy uncertainty (0.31376) is smaller than information transparency. As there are only two political factor sub criteria, we cannot conduct multiple comparisons. Therefore, we conducted a t-test to examine the significance of the mean difference. The P value of the two-tailed test is 0.0003 smaller than a/2=0.025 (Table 12). This means policy uncertainty is significantly dif-

ferent from information transparency among the 17 surveyed companies. Why is policy uncertainty more important than information transparency? Policy uncertainty means that there are no clear policies, or that the policies are liable to change. Although China has reformed and liberalized over the last three decades, economic systems and legal systems are still not well established. There are many systems and policies that need to be revised or established. As China often practices collective leadership, policy addition, deletion, and revision must necessarily have the Communist Party committee approval and authorization.

Table 12: t-test of political factors

Descriptions	Policy uncertainty	Information transparency
Mean	0.32108	0.17892
Variance	0.01015	0.01015
N	17	17
df	32	
t statistics	4.11410	
P(T<=t) Single tail	0.00013	
Critical value: Sig. tail	1.69389	
P(T<=t) Two tails	0.00025	
Critical value: two tails	2.03693	

4.1.4 Cluster effect factors:

An industry cluster is defined as a “geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats” (Rosenfeld, 1997, p.10). Cluster effect criteria include position in the supply chain, resource sharing, transportation costs, and security. In Table 10, we found that the AHP score of position in supply chain (0.45878) is the highest compared with the other three subcriteria, and the CV of position in the supply chain (0.44875) is smaller

than the other three subcriteria. From this, we can infer that the multiplicity of complementary business channels is a major factor to consider.

In Table 10, we found that the AHP score of resource sharing (0.14999) is the second last in this category. This is also an interesting finding. Competition could be one of the reasons to explain this phenomenon.

4.1.5 Government bureaucracy (Government service efficiency)

In Table 10, we found that the AHP score of infrastructure readiness (0.21876) is the highest and the CV of customs clearance efficiency (0.55930) and local government rapid response ability (0.50519) are lower than the other five government bureaucratic sub criteria. This may be due to the fact that our surveyed companies are export-oriented. Incoming materials and outgoing end products are very important to these kinds of companies. Hence, the efficiency of customs clearance and local government are regarded as extremely important.

In Table 10, we also notice that the AHP scores of officer integrity, government rapid response ability, and tax audit fairness are very close, as the latter two are highly related with government officer integrity.

4.2 Hybrid AHP Approach

4.2.1 Using error bands (EBs) to supplement AHP

We used coefficient of variations (CV) to examine data dispersion. The CV formula is sample standard deviation (S) divided by sample mean. The CV and S have a

positive variation direction relationship under the same sample mean. Therefore, it is not reliable to use CV as an indicator because it can not be used to measure heterogeneity of expert pectoral preference in our case.

To mitigate experts' pectoral or relative bias, we applied the Bootstrap approach. The Bootstrap uses random sampling replicated T times. By replicating and resampling T times, we can estimate AHP's error band for each criteria. In our case, we randomly selected 12 samples out of the 17 total samples. In Table 13, the error band of the Bootstrap in eastern China was always the smallest in comparison with the other three districts. This result supports our previous choice of the eastern district as the preferred site to establish a manufacturing base.

In Table 14, the error band of sub criteria of tax incentive (TAI) (economic subcriteria) and position in supply chain (SCP) (cluster effect) and infrastructure readiness (IFS) and local government rapid response (GQA) (government bureaucracy) are the smallest. This result supports our previous analysis. The error band of IFS (0.05992) is larger than GQA (0.01607) (refer to Table 14). One explanation for this situation is data dispersion. We can see the CV of IFS is (0.70260) and the CV of GQA is (0.50519) (refer to Table 10). From an analytical perspective, the smaller error band means a smaller decision risk. Therefore, we can infer that government quick response (GQA) is more important than infrastructure readiness as far as Taiwanese electronic assemblers are concerned in the government bureaucracy category.

4.2.2 Judgment the resampling times via MAR

To better estimate the Bootstrap's error band, we replicated it by using random sampling-without-replacement in place of random sampling-with-replacement. Com-

paring random sampling-with-replacement with random sampling- with-out-replacement, we discovered that the error band of the modified method is smaller than that of the original method (refer to Tables 13 and 14). Greater replication can reduce bias. Therefore, we tried to discover the optimal replication times, that is, when the minimum error band occurred, ranging from 100 to 10,000 times. In Tables 15 and 16, we found that minimum absolute residuals (MAR) are located between 7,000 and 8,000 times. Therefore, the EBs of the Bootstrap can be used together with the final AHP scores as a decision rule to enhance decision reliability (refer to Tables 8 and 10).

Table 13: Error band performance comparison table by area

Criteria	Error band	SOUTH	EAST	CENTER	NORTH
Economic	EB-B	0.04405	0.02433	0.02937	0.04833
	ER-rB	0.02246	0.00490	0.02754	0.02798
	Reduce %	-49.00%	-79.87%	-6.22%	-42.11%
Political	EB-B	0.05313	0.01999	0.04056	0.03678
	ER-rB	0.04152	0.01149	0.03628	0.02743
	Reduce %	-21.85%	-42.56%	-10.55%	-25.41%
Cluster	EB-B	0.03758	0.05206	0.08167	0.08677
	ER-rB	0.01884	0.01720	0.06355	0.06664
	Reduce %	-49.88%	-66.97%	-22.19%	-23.20%
Gov.eff	EB-B	0.07326	0.02881	0.02576	0.04231
	ER-rB	0.03128	0.01699	0.02263	0.02716
	Reduce %	-57.30%	-41.02%	-12.17%	-35.81%

EB-B. Randomly sampling 12 samples out of total samples (N=17) with replacement and replicate 100 times.

EB-rB. Randomly sampling 12 samples out of total samples (N=17) without replacement and replicate 100 times.

Redure % = (EB-rB- EB-B) / (EB-B)

Table 14: Error band performance comparison table by subcriteria

Criteria		(A)	(B)	(B-A)/(A)
Major criteria	Subcriteria	Error band-B	Error band-rB	Reduce %
Economic	MKT	0.08932	0.06627	-25.81%
	LDC	0.02950	0.02525	-14.40%
	LBC	0.02793	0.01787	-36.00%
	MLC	0.05732	0.05242	-8.55%
	TXI	0.02260	0.01306	-42.21%
	INI	0.02445	0.01817	-25.68%
Cluster	SCP	0.05808	0.04881	-15.96%
	RCS	0.05352	0.03681	-31.22%
	TSC	0.07734	0.04272	-44.77%
	SEC	0.05669	0.05264	-7.15%
Gov.eff	IFS	0.10087	0.05992	-40.60%
	TAF	0.04779	0.03366	-29.56%
	CLE	0.03667	0.02350	-35.92%
	PUS	0.05401	0.03877	-28.21%
	OFI	0.06379	0.04414	-30.80%
	GQA	0.03310	0.01607	-51.45%
	PUE	0.04191	0.03258	-22.27%

Table 15: Summary of MAR for area

Criteria	Area	R2	MAR	replicates
Economic	South	0.76093	0.03850	7000
	East	0.75831	0.05704	7000
	Center	0.75538	0.05030	7000
	North	0.74925	0.07330	7000
Political	South	0.78030	0.05463	7000
	East	0.77220	0.03954	7000
	Center	0.77703	0.04467	7000
	North	0.76687	0.03966	7000
Cluster	South	0.74738	0.04133	7000
	East	0.76016	0.05294	7000
	Center	0.76166	0.04964	7000
	North	0.76093	0.04047	7000
Gov.eff	South	0.76748	0.04767	7000
	East	0.75327	0.03735	7000
	Center	0.74233	0.05642	8000
	North	0.76125	0.04514	7000

Table16: Summary of MAR for each sub criteria

Major	Subcriteria	R^2	MAR	Replicates
Economic	MKT	0.73796	0.08177	8000*
	LDC	0.76587	0.05292	7000
	LBC	0.74995	0.05786	7000
	MLC	0.79060	0.02182	7000
	TXI	0.76725	0.04941	7000
	INI	0.77532	0.04244	7000
Cluster	SCP	0.74736	0.05472	7000
	RCS	0.75845	0.04415	7000
	TSC	0.75193	0.03996	7000
	SEC	0.74278	0.04623	7000
Gov.eff	IFS	0.74621	0.02952	7000
	TAF	0.76076	0.04037	7000
	CLE	0.75583	0.04167	7000
	PUS	0.76012	0.03855	7000
	OFI	0.75573	0.05251	7000
	GQA	0.74958	0.06048	7000
	PUE	0.75289	0.03947	7000

Chapter 5 Conclusion and Discussion

This study makes two main contributions: firstly, it provides an improved Hybrid AHP, which not only improves the reliability of the traditional AHP approach but also mitigates the subjective bias of connotation in expert questionnaires, and secondly, it provides an insight into what criteria are used to evaluate electronics assembly-type manufacturing investments in China, and where, if we take the four major factors into account, the preferred site for such investments is to be found. Our research identified the following key criteria: tax incentives (TAI) (Economic factor), policy uncertainty (POU) (Political factor), position in supply chain (SCP) (Cluster effect factor), and infrastructure readiness (IFS) and local government rapid response ability (GQA) (Government bureaucracy). The preferred site for Taiwanese assembly manufacturers to make manufacturing investments is eastern China, which covers Jiangsu, Zhejiang, and Shanghai. This conclusion is consistent with the 2007 Taiwanese government statistics (see Table 2).

We further made detailed analysis of the list of Taiwan's top 1,000 manufacturers in 2007 and found that there were 179 electronics related manufacturing enterprises located in the south, 197 located in the east, 3 located in the centre, and 13 located in the north of China. This enhances our findings. The Shenzhen Special Economic Zone was the first coastal area in China opened to foreign investors, especially to Hong Kongese, Japanese, and Taiwanese enterprises. With the advantage of geographical proximity to Hong Kong, and the special consignment contract manufacturing business model to rely on, the southern region easily absorbed a large number of foreign manufacturing businesses. Due to hinterland development limitations in the south, the eastern region had a greater opportunity to attract large-scale foreign investors than the south. When large scale manufacturers move, overall supply chain vendors also move. Here, the central government used more resources to attract companies and help them develop.

The eastern region, especially Shanghai, is the focus of the central government. Undoubtedly, foreign enterprises prefer to locate here where they enjoy certain policies and administrative advantages. In addition to enjoying government policies viewed as favorable to business, the eastern region has a vast plain of land that can fully meet any manufacturing enterprise expansion requirements. Having enough territory has facilitated the formation of industry clusters. This is a very important reason for establishing manufacturing sites in the eastern region.

The purpose of Taiwanese electronics assembly manufacturers making investment in China is to fully take advantage of cheaper labor costs and to make profits. The position of most assembly type enterprises in China is factories. Therefore, its major function to the mother company is cost contribution. In Table 17, we can see that most sampled companies' contribution margin to standalone margin is positive, which means that factories in China have a cost advantage. In Table 18, from return on investment (ROI) perspectives, we can see that most sampled companies' ROI is very high. For factories, we defined return as from the margin contribution perspective. In Table 19, we can see sampled companies' investment amount in China is in an uptrend direction, meaning that they do have a margin contribution.

Table 17 Margin Analysis

Stock Market listed code	Company name	2005			2006			2007		
		STD M%	Con M%	(+/-)%	STD M%	Con M%	(+/-)%	STD M%	Con M%	(+/-)%
5371	Coretronic Corp	10.33%	13.19%	27.68%	10.67%	13.56%	27.04%	8.93%	12.75%	42.81%
3380	Alpha netwok	17.54%	18.50%	5.46%	15.60%	16.13%	3.37%	17.83%	18.12%	1.63%
2340	OptoTech Corp	16.43%	16.55%	0.73%	32.31%	31.03%	-3.96%	29.70%	28.93%	-2.61%
2391	ZyXEL Communications	30.36%	34.17%	12.55%	26.13%	29.25%	11.94%	24.52%	31.86%	29.97%
2449	King Yuan Electronics	18.84%	18.59%	-1.34%	30.20%	29.11%	-3.63%	25.47%	23.63%	-7.23%
2352	BENQ	5.31%	8.39%	57.96%	2.72%	8.16%	199.79%	1.75%	9.25%	428.54%
6133	Golden Bridge Bectech	18.96%	28.35%	49.52%	22.61%	30.12%	33.18%	23.61%	25.51%	8.04%
2380	Avision Inc	25.63%	27.21%	6.15%	19.49%	22.75%	16.70%	19.91%	23.84%	19.73%
2345	Accton Tech	16.80%	18.18%	8.18%	13.66%	18.64%	36.44%	12.93%	18.59%	43.73%
3059	Altek Corp	8.32%	14.03%	68.64%	14.21%	17.67%	24.36%	7.40%	12.04%	62.60%
3231	Wistron Corp	5.96%	6.42%	7.80%	6.44%	6.67%	3.57%	5.31%	6.40%	20.57%
3290	Donpon Precision	16.36%	10.79%	-34.04%	19.55%	15.67%	-19.83%	12.18%	24.44%	100.59%
2382	Quanta Computer	5.91%	6.07%	2.62%	4.63%	5.66%	22.23%	3.68%	5.18%	40.90%
2317	Hon Hai Precision	5.72%	10.34%	80.65%	5.47%	9.89%	80.91%	4.78%	9.84%	105.90%

STD M%: Standalone margin; Con M%: Consolidated margin

Table 18 Return on investment

Stock Market listed code	Company name	2005	2006	2007	2006 (+/-)%
5371	Coretronic Corp	104.56%	122.79%	124.44%	1.34%
3380	Alpha netwok	29.07%	27.29%	31.18%	14.26%
2340	OptoTech Corp	12.53%	23.55%	10.68%	-54.67%
2391	ZyXEL Communications	108.87%	135.63%	156.65%	15.49%
2449	King Yuan Electronics	2.99%	0.38%	-1.93%	-613.01%
2352	BENQ	128.62%	196.99%	184.74%	-6.22%
6133	Golden Bridge Bectech	63.46%	99.36%	75.40%	-24.11%
2380	Avision Inc	10.15%	19.32%	24.03%	24.41%
2345	Accton Tech	79.99%	115.62%	70.81%	-38.75%
3059	Altek Corp	100.46%	102.55%	81.57%	-20.45%
3231	Wistron Corp	27.82%	12.43%	60.29%	384.90%
3290	Donpon Precision	5.03%	16.71%	81.22%	386.18%
2382	Quanta Computer	123.31%	127.77%	109.90%	-13.98%
2317	Hon Hai Precision	141.67%	234.92%	314.73%	33.97%

Formula: (consolidated margin - standard margin) / investment

Table 19 Amount investment in China

Unit: NT$ Million

Stock Market listed code	Company name	2005	2006	2007	2006 (+/-)%
5371	Coretronic Corp	3,174	4,035	4,930	22.20%
3380	Alpha netwok	593	827	1,150	39.01%
2340	OptoTech Corp	553	553	1,205	117.85%
2391	ZyXEL Communications	864	868	1,101	26.88%
2449	King Yuan Electronics	1,570	1,885	1,875	-0.51%
2352	BENQ	6,392	7,610	7,227	-5.03%
6133	Golden Bridge Bectech	313	313	313	0.00%
2380	Avision Inc	977	1,026	1,191	16.09%
2345	Accton Tech	1,255	1,284	1,690	31.56%
3059	Altek Corp	1,045	1,653	1,888	14.21%
3231	Wistron Corp	4,848	5,483	6,066	10.62%
3290	Donpon Precision	352	344	350	1.99%
2382	Quanta Computer	4,250	7,089	12,146	71.33%
2317	Hon Hai Precision	42,022	34,469	34,469	0.00%

Based on previous findings, we know that policy uncertainty is more important than information transparency. Policy uncertainty means that there are no clear policies, or that the policies are liable to change. Although China has reformed and liberalized over the last three decades, the economic and legal systems are still not well established. Therefore, these policies sometimes change for rational reasons and sometimes

not. The most difficult issue for enterprises regarding policy change is its unpredictability. Without clear policy guidance, it is very difficult for enterprises to make global strategic arrangements in advance. For instance, initially, the eastern region encouraged heavy industry. However, due to industry policy change, the Shanghai government has already stipulated that certain heavily energy-dependent industries will be banned from the Shanghai area in the future. This rejection will probably end up creating opportunities for other areas, and may further affect investment in such fields as semi-conductors and the packing industry. With a highly developed economy, energy demand is increasing rapidly. Due to demand far exceeding supply, energy shortages are becoming a serious problem. This problem has recently been getting worse in the south and the east. Most manufacturers in both areas have suffered cost increases due to losses resulting from energy shortages.

In addition to energy shortages, China recently adjusted its export tax refund rate downward which is creating serious damage for those slim margin industries such as the textile and electronics component businesses. Export refund tax rate has been adjusted from 13% to 4%, depending on the industry. Meanwhile, the corporate income tax rate will be raised to 25% which is the same as Taiwan's, and its dividend tax rate will also be raised to 20% from 0%. Even though there is a transition period, most profitable foreign businesses have commenced to restructure their equity holding structure from the British Virgin Islands (B.V.I) to HK or Singapore for tax-saving purposes. The tax rate for HK and Singapore businesses is different because HK is a Special Administrative Region of China.

In the past three decades, China attracted foreign investment successfully with its cheaper labor costs. However, the stage of using cheaper costs to attract foreign direct investment is complete. The Chinese government is now changing its role from world factory to world market. A world market requires that people's incomes increase. In the past three decades, China has successfully earned a huge foreign surplus of around USD 2.0 trillion through capacity investment. However, the annual average income of the large middle-class of workers and farmers' on the basis of purchasing power parity calculations is still below USD5,400. The middle-class population is around four hundred million. If the income of the middle-class can be increased, a world market can be formed through their consumption. To achieve this goal, the Chinese government has released a new labor contract law. In this newly released law, salaries, service period, and service conditions are well protected, which will greatly increase manufacturer's labor costs. To those enterprises which take full advantage of the cheaper labor costs, business operation reaches a critical point when labor contract law is actually being put into practice.

An effective, forward-thinking policy will attract local and foreign investors, and will prompt them to continue investing. An effective policy takes into account the economic, political, industrial, administrative and social ramifications of policy decisions. A state, a region or country that supports continuous investments will stimulate ongoing economic growth. In this research, we did not attempt to compare the regional policies of the southern region with those of the eastern region. Future studies could clarify if they had a role in manufacturing moving from the south to the east.

In order to completely reflect operation environment change, we have raised some critical issues which have already happened, such as corporate income tax rate increases, dividend tax upward adjustments, export tax refund rate downward adjustments, labor service contracts, Chinese currency appreciation, and energy shortages. These issues will seriously damage manufacturing business profits. We need to make an in-depth observation of the influence of these policies. Future studies could clarify whether these issues will impact manufacturing business operation decisions in China and further make operation withdrawal decisions if the whole operating environment is deteriorating. Meanwhile, further research into the influence of policies on investment attitudes could result in a better understanding of this phenomenon.

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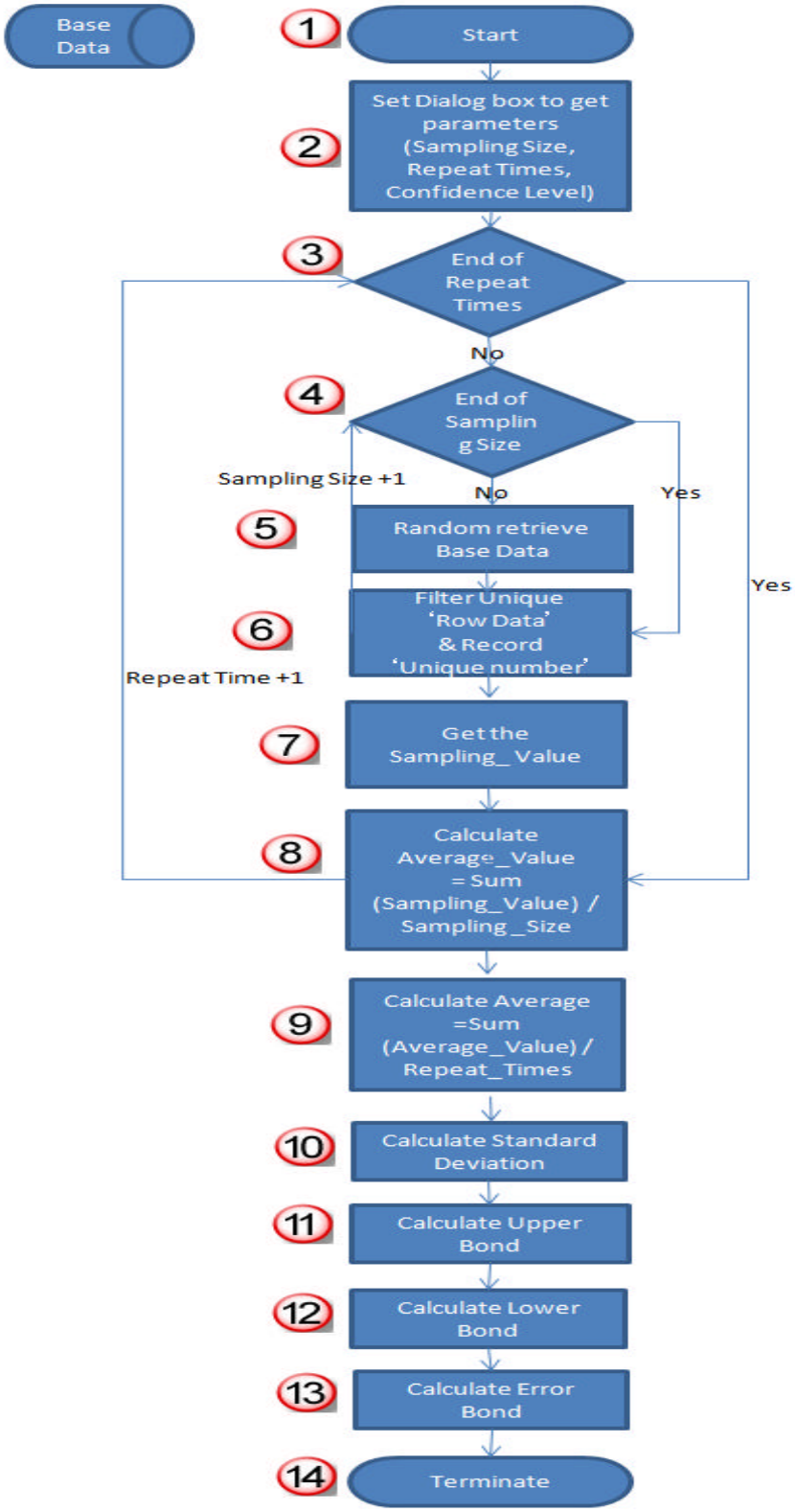
Appendix

1. Calculation flowchart -Bootstrapping



2. Program-Bootstrapping

```
Sub Area()

' Area Macro
' 快速鍵: Ctrl+r
'
Dim Message, Title, Default, Sampling_Size, Repeat_Times, Confidence_Level,
Msg_var
        Message = "Enter a Sampling Size between 1 to 17"
        Title = "Sampling Size"
```

```
        Default = "17"

10      Sampling_Size = InputBox(Message, Title, Default, 100, 100)
    If Sampling_Size > 17 Then GoTo 10

        Message = "Enter Repeat times"
        ' 設定提示訊息。

        Title = "Repeat Times"     ' 設定標題。
        Default = "20"       ' 設定預設
值。
   Repeat_Times = InputBox(Message, Title, Default, 100, 100)
        Message = "Enter confidence level"     ' 設定提示訊息。
        Title = "Confidence Level"     ' 設定標題。
        Default = "0.95"       ' 設定預設值。
  Confidence_Level = InputBox(Message, Title, Default, 100, 100)

    Range("F3").Select
    Range(Selection, Selection.End(xlDown)).Select
    Range("F3:F19").Select
    Selection.NumberFormatLocal = "0_);[紅色](0)"
    Range("F3:K19").Select
    Selection.ClearContents

    Range("F23:K60000").Select
    Selection.ClearContents
```

```
    Range("H3:K20").Select
    Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"
```

```
For x = 1 To Repeat_Times

Range("F3:K19").ClearContents
```

```
    For a = 1 To Sampling_Size

    'Random/no Calculation
    Do
```

```
        f = "f" + CStr(2 + a)

        MyRum = "=INT(RAND()*17+1)"
        Range(f).Value = MyRum
        Range("F3:F19").Select
        Selection.Copy
        Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
```

```
            :=False, Transpose:=False
'Check unique
        Set Num_Range = Range("F3:F19")
        Set MyRange = Range(f)
        MyCount = WorksheetFunction.CountIf(Num_Range, MyRange)

        If MyCount < 2 Then Exit Do
        Loop
```

```
'Sample Series
        g = "g" + CStr(2 + a)
        'Range(g).Value = CInt(a)
        Range(g).Value = a
        H = "H" + CStr(2 + a)
        Range(H).Select
        ActiveCell.FormulaR1C1 = "=VLOOKUP(RC6,r3c1:r19c5,R1C,0)"
```

```
        I = "i" + CStr(2 + a)
        Range(I).Select
        ActiveCell.FormulaR1C1 = "=VLOOKUP(RC6,r3c1:r19c5,R1C,0)"

        J = "j" + CStr(2 + a)
        Range(J).Select
        ActiveCell.FormulaR1C1 = "=VLOOKUP(RC6,r3c1:r19c5,R1C,0)"

        K = "k" + CStr(2 + a)
        Range(K).Select
        ActiveCell.FormulaR1C1 = "=VLOOKUP(RC6,r3c1:r19c5,R1C,0)"

    Next a
    Range("g21").Select
    ActiveCell.FormulaR1C1 = "Sampling Size"
    Range("H21").Select
    ActiveCell.FormulaR1C1 = CInt(Sampling_Size)
```

```
    Range("H20").Select

    ActiveCell.FormulaR1C1 = "=sum(r3c:r19c)/r21c8"

    Range("H20:K20").Select
    Selection.FillRight

    Range("H20:K20").Select
    Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"

    Selection.Copy
        B = "h" + CStr(22 + x)
        ActiveWindow.SmallScroll Down:=9
        Range(B).Select

        Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone, SkipBlanks:= _
       False, Transpose:=False
         Selection.NumberFormatLocal = "0.000000_);[紅色](0.00"
         K = "g" + CStr(22 + x)
```

```
Range(K).Select
            ActiveCell.FormulaR1C1 = CInt(x)
            Selection.NumberFormatLocal = "0_);[紅
色](0.000000)"
    With ActiveCell.Characters(Start:=1, Length:=7).Font
        .Name = "Arial"
        .FontStyle = "標準"
        .Size = 10
        .Strikethrough = False
        .Superscript = False
        .Subscript =
False
        .OutlineFont = False
        .Shadow =
False
        .Underline = xlUnderlineStyleNone
        .ColorIndex = xlAutomatic
    End With

Next x
    avg = "G" + CStr(Repeat_Times + 23)
    avgt = "h" + CStr(Repeat_Times + 23)
    avgU = "i" + CStr(Repeat_Times + 23)
    avgV = "j" + CStr(Repeat_Times + 23)
    avgW = "k" + CStr(Repeat_Times + 23)

    Range(avg).Select

    ActiveCell.FormulaR1C1 = "Average"
    With ActiveCell.Characters(Start:=1, Length:=7).Font
        .Name = "Arial"
        .FontStyle = "標準"
        .Size = 9
        .Strikethrough = False
        .Superscript = False
        .Subscript =
False
```

```
            .OutlineFont = False
            .Shadow =
False
            .Underline = xlUnderlineStyleNone
            .ColorIndex = xlAutomatic
        End With

      Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"
```

```
        Range(avgt).Select

        ActiveCell.FormulaR1C1 = "=AVERAGE(R" + CStr(ActiveCell.Row -
CInt(Repeat_Times)) + "C8:R[-1]C8)"
        'C20 表示  column T
      Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"
            Range(avgU).Select
        ActiveCell.FormulaR1C1 = "=AVERAGE(R" + CStr(ActiveCell.Row -
CInt(Repeat_Times)) + "C9:R[-1]C9)"
            Range(avgV).Select
        ActiveCell.FormulaR1C1 = "=AVERAGE(R" + CStr(ActiveCell.Row -
CInt(Repeat_Times)) + "C10:R[-1]C10)"
            Range(avgW).Select
        ActiveCell.FormulaR1C1 = "=AVERAGE(R" + CStr(ActiveCell.Row -
CInt(Repeat_Times)) + "C11:R[-1]C11)"
```

```
'Standard Deviation
        std = "g" + CStr(Repeat_Times + 24)
        stdt = "h" + CStr(Repeat_Times + 24)
        stdU = "i" + CStr(Repeat_Times + 24)
        stdV = "j" + CStr(Repeat_Times + 24)
        stdW = "k" + CStr(Repeat_Times + 24)
        Range(std).Select

        ActiveCell.FormulaR1C1 = "Standard Dev."
        With ActiveCell.Characters(Start:=1, Length:=7).Font
            .Name = "Arial"
            .FontStyle = "標準"
            .Size = 9
```

```
            .Strikethrough = False
            .Superscript = False
            .Subscript =
False
            .OutlineFont = False
            .Shadow =
False
            .Underline = xlUnderlineStyleNone
            .ColorIndex = xlAutomatic
        End With

        Range(stdt).Select
        Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"
        ActiveCell.FormulaR1C1 = "=stdev(R" + CStr(ActiveCell.Row - CInt(Repeat_Times
+ 1)) + "C8:R[-2]C8)"
        'C20 表示  column T
          Range(stdU).Select
        Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"
          ActiveCell.FormulaR1C1 = "=stdev(R" + CStr(ActiveCell.Row -
CInt(Repeat_Times + 1)) + "C9:R[-2]C9)"
          Range(stdV).Select
          Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"
          ActiveCell.FormulaR1C1 = "=stdev(R" + CStr(ActiveCell.Row -
CInt(Repeat_Times + 1)) + "C10:R[-2]C10)"
        Range(stdW).Select
          Selection.NumberFormatLocal = "0.000000_);[紅色](0.000000)"
        ActiveCell.FormulaR1C1 = "=stdev(R" + CStr(ActiveCell.Row - CInt(Repeat_Times
+ 1)) + "C11:R[-2]C11)"

'confidence level

        CONF = "g" + CStr(Repeat_Times + 28)
        CONFU = "h" + CStr(Repeat_Times + 28)

Range(CONF).Select
      ActiveCell.FormulaR1C1 = "Confidence Lvl."
        With ActiveCell.Characters(Start:=1, Length:=7).Font
            .Name = "Arial"
```

```
            .FontStyle = "標準"
            .Size = 9
            .Strikethrough = False
            .Superscript = False
            .Subscript =
False
            .OutlineFont = False
            .Shadow =
False
            .Underline = xlUnderlineStyleNone
            .ColorIndex = xlAutomatic
        End With
      Range(CONFU).Select
         ActiveCell.FormulaR1C1 = Round((1 - Confidence_Level) / 2, 8)
```

```
'Upper Bond
        upb = "g" + CStr(Repeat_Times + 25)
        upbt = "h" + CStr(Repeat_Times + 25)
        upbu = "i" + CStr(Repeat_Times + 25)
        upbv = "j" + CStr(Repeat_Times + 25)
        upbW = "k" + CStr(Repeat_Times + 25)
        Range(upb).Select
        ActiveCell.FormulaR1C1 = "Upper Bond"
        With ActiveCell.Characters(Start:=1, Length:=7).Font
            .Name = "Arial"
            .FontStyle = "標準"
            .Size = 9
            .Strikethrough = False
            .Superscript = False
            .Subscript =
False
            .OutlineFont = False
            .Shadow =
False
            .Underline = xlUnderlineStyleNone
            .ColorIndex = xlAutomatic
        End With
```

```
    Range(upbt).Select
    ActiveCell.FormulaR1C1 = "=confidence(R[3]c,R[-1]c,R[-4]c[-1])+R[-2]c"
  Range(upbu).Select
    ActiveCell.FormulaR1C1 = "=confidence(R[3]c[-1],R[-1]c,R[-4]c[-2])+R[-2]c"
  Range(upbv).Select
    ActiveCell.FormulaR1C1 = "=confidence(R[3]c[-2],R[-1]c,R[-4]c[-3])+R[-2]c"
  Range(upbW).Select
    ActiveCell.FormulaR1C1 = "=confidence(R[3]c[-3],R[-1]c,R[-4]c[-4])+R[-2]c"
```

```
'Lower Bond
    lob = "g" + CStr(Repeat_Times + 26)
    Lobt = "h" + CStr(Repeat_Times + 26)
    lobu = "i" + CStr(Repeat_Times + 26)
    lobv = "j" + CStr(Repeat_Times + 26)
    lobW = "k" + CStr(Repeat_Times + 26)
    Range(lob).Select
    ActiveCell.FormulaR1C1 = "Lower Bond"
    With ActiveCell.Characters(Start:=1, Length:=7).Font
        .Name = "Arial"
        .FontStyle = "標準"
        .Size = 9
        .Strikethrough = False
        .Superscript = False
        .Subscript =
False
        .OutlineFont = False
        .Shadow =
False
        .Underline = xlUnderlineStyleNone
        .ColorIndex = xlAutomatic
    End With

  Range(Lobt).Select
    ActiveCell.FormulaR1C1 = "=-confidence(R[2]c,R[-2]c,r[-5]c[-1])+R[-3]c"
  Range(lobu).Select
    ActiveCell.FormulaR1C1 = "=-confidence(R[2]c[-1],R[-2]c,R[-5]c[-2])+R[-3]c"
```

```
    Range(lobv).Select
      ActiveCell.FormulaR1C1 = "=-confidence(R[2]c[-2],R[-2]c,R[-5]c[-3])+R[-3]c"
    Range(lobW).Select
      ActiveCell.FormulaR1C1 = "=-confidence(R[2]c[-3],R[-2]c,R[-5]c[-4])+R[-3]c"
```

```
'Error Band
      erb = "g" + CStr(Repeat_Times + 27)
      erbt = "h" + CStr(Repeat_Times + 27)
      erbu = "i" + CStr(Repeat_Times + 27)
      erbv = "j" + CStr(Repeat_Times + 27)
      erbW = "k" + CStr(Repeat_Times + 27)
      Range(erb).Select
      ActiveCell.FormulaR1C1 = "Error Band"
      With ActiveCell.Characters(Start:=1, Length:=7).Font
            .Name = "Arial"
            .FontStyle = "標準"
            .Size = 9
            .Strikethrough = False
            .Superscript = False
            .Subscript =
False
            .OutlineFont = False
            .Shadow =
False
            .Underline = xlUnderlineStyleNone
            .ColorIndex = xlAutomatic
       End With

    Range(erbt).Select
      ActiveCell.FormulaR1C1 = "=r[-2]c-r[-1]c"
    Range(erbu).Select
      ActiveCell.FormulaR1C1 = "=r[-2]c-r[-1]c"
    Range(erbv).Select
      ActiveCell.FormulaR1C1 = "=r[-2]c-r[-1]c"
    Range(erbW).Select
      ActiveCell.FormulaR1C1 = "=r[-2]c-r[-1]c"
      ' Format font
```

```
        Rows("2:65500").Select
        With Selection.Font
            .ColorIndex = xlAutomatic
            .TintAndShade = 0
        End With
```

```
End Sub
```