

THE LOCATION DETERMINANTS AND TIMING OF FDI: AN EMPIRICAL ANALYSIS OF PHARMACEUTICAL FIRMS' FDI IN CHINA

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ABSTRACT

This study investigated how the location factors at sub-country level affected operation location decisions in the context of international pharmaceutical firms' FDI in China during the period of 1980-1998. It also performed a comparative analysis between early and late entrants on the decision. The results suggested that the stage of a region's economic development in China had the most significant influence on international pharmaceutical firms' decision on the choice of operation location within China. Joint ventures' FDI location decisions were heavily dependent on the region where the Chinese partner was located. Infrastructure and Chinese government's incentive policy in the region also attracted significant attention from international investors. Effectiveness of energy supply, the purchasing power in the region, quality of marketing infrastructure, land cost, local customs, and historical/traditional connections/linkages between the regions and foreign investors had a moderate influence on international pharmaceutical firms' FDI destination within the country. The research also revealed that the incentive policies provided by the Chinese government for a particular region, the stages of economic development in a region, and the availability of infrastructure had a stronger influence on early entrants' decision in selecting an operation location in China.

1. INTRODUCTION

The literature in FDI has covered location determinants of FDI at two levels; i.e. country-level and sub-country level. Most early studies have focused on FDI location determinants at the country level and have revealed comprehensive theories in the field. The sub-country level, location determinants within host country, has recently received considerable attention from researchers. However, most past studies have been concerned about FDI location determinants in general, and have not broken down the nature of the FDI into any specific industry. Factors important to FDI in one industry may not be important to another as a whole (Wheeler and Mody, 1992). There was no published report that reveals the operation location determinants of international pharmaceutical firms' FDI within China in the literature. The Chinese pharmaceutical industry is one of the first groups of industries, which has established enterprises with foreign investment. As early as 1980, an agreement was signed between Chinese and Japanese enterprises for the establishment of China Otsuka Pharmaceutical Company Ltd in China's Tianjin Municipality, the first joint venture in the pharmaceutical industry in China. There are now over 1,500 foreign invested pharmaceutical companies (FIPCs) distributed in almost every part of China, producing a wide range of products including bulk pharmaceutical chemicals, preparations, medical devices, diagnostic reagents, medical dressings, pharmaceutical machinery, health care products, etc. The distribution of the FIPCs in China was highly uneven with over 80% of which concentrated in the east China's three major regions. Those three major regions are South East Region (SER) consisting of Guangdong and Fujian provinces; Middle East Region (MER) covering Shanghai municipality, Jiangsu, Anhui and Zhejiang provinces; and North East Region (NER) comprising of Beijing and Tianjin municipalities, Liaoning, Shandong and Hebei provinces. The rest of the firms were located in China's middle and west areas (CCPIE, 1995; NTDB, 1996; MIMS Asia, 1998; SPGC, 1999). This study was designed to investigate how the location factors at sub-country level impacted on international pharmaceutical firms' location decisions within China during the period of 1980-1998. This study also performed a comparative analysis between early and late entrants on FDI location Choice within China. After China formally opened its door to foreign investors in 1979, the year of 1992 was another turning point in China's political-legal and economic reforms after China's former leader Deng Xiaoping's much publicized tour to the southern provinces of China in early 1992 and his call for accelerating economic reform and opening up of the economy to the outside world. The central government adjusted its economic policy in order to speed up economic reform and to further open the economy to foreign investment. The Chinese government announced the adoption of the 'socialism market economy' strategy and began to build a legal framework to standardize market operation. Regulations covering corporation law, bankruptcy law, individual income law and stock trading law, and some other commercial regulations have been passed since 1993 (Sun, 1998). Since 1992, the Chinese Government has also successively established and opened a series of 'coastal open areas' and has introduced the policy of 'opening cities on rivers and borders.' Consequently, six port cities on the Yangtze River as well as 13 inland border cities and capitals of provinces and

autonomous regions have been opened, and offered preferential policies like tax reduction analogous to those for coastal open cities and/or special economic zones (SEZs) that were defined/created by the Chinese Central Government before 1992 to serve as a special channel for China to use foreign investment and to import advanced technology and enter international markets (DFMFTECPRC, 1995; Li and Li, 1999). The dramatic changes in the Chinese politics and economic policies since 1992 may possess significant impacts on international pharmaceutical firms' FDI location decision within China. Therefore, for selected analyses firms whose FDI into China was prior to 1992 (Early-Entrants) were classified as early entrants and those started their FDIs since 1992 (Late-Entrants) as late entrants. A comparison between FDI location choice decision patterns between early and late entrants should be expedient and meaningful and contribute to a better understanding of FDI location theories and practices in China.

2. CONCEPTUAL FRAMEWORK

The conceptual framework is presented in FIGURE 1, which was built upon a set of variables that were identified based on existing literature and additional variables that were identified during the process of questionnaire pre-testing by six pre-testing respondents who were senior managers in foreign invested companies in China. Four of them had senior management experience in international pharmaceutical firm invested ventures in China. It suggested that the location choice of international pharmaceutical firms' FDI within China may be influenced by Chinese government's incentive policy in a region (e.g. Special Economic Zone or 'open City') (NRI and ISAS, 1995; Hines, 1996; Zhang and Yuk, 1998; Li and Li, 1999), the population in the region (Bagchi-Sen and Wheeler, 1989), the purchasing power in the region (Bagchi-Sen and Wheeler, 1989), availability of transportation facilities (Coughlin, Terza, and Arromdee, 1991; ODI, 1997; Mody, and Srinivasan, 1998), availability of telecommunication facilities (Xin and Ni, 1995; Loree and Guisinger, 1995; Mody, and Srinivasan, 1998), availability of port facilities (Culem, 1988; Xin and Ni, 1995; Friedman, Gerlowski, and Silberman, 1996; ODI, 1997; Mody, and Srinivasan, 1998), effectiveness of power supply, quality of marketing infrastructure, land and labour costs (Culem, 1988; Bajo-Rubio and Sosvilla-Rivero, 1994; Xin and Ni, 1995; ; Summary and Summary, 1995; Friedman, Gerlowski, and Silberman, 1996), cost of raw materials (Pearce and Satwinder, 1992; Mariotti and Piscitello, 1995). Six additional variables identified by the pre-testing respondents including the region's economic development, size of labour force in the region, local customs, historical/traditional connections/linkages with the region, the region where the Chinese partner is located, and vicinity of the Chinese government to deal with were also incorporated into the conceptual framework for testing.

FIGURE 1: CONCEPTUAL FRAMEWORK ON LOCATIONAL DETERMINANTS OF FDI



3. METHODOLOGY

A total of 117 foreign pharmaceutical firm invested pharmaceutical companies (IPFIPCs) in Mainland China during the period of 1980-1998 were defined as the population for the research based on the following four sources: 1) *Catalogue of Chinese Pharmaceutical Enterprises with Foreign Investment* which was published by the China Centre for Pharmaceutical International Exchange, an agency of State Pharmaceutical Administration of China. It contains necessary information on over 1,310 FIPCs in China. 2) *Market Reports of National Trade Data Bank of the United States of America (1996)*. 3)

MIMS Asia (1998) and the report of *Shanghai Pharmaceutical (Group) Corporation (1999)*. Pharmaceutical companies that had capital investment by non-pharmaceutical firms such as business trading companies, investment development firms, etc. Medical devices or machinery producers were not defined as part of the population for this research. Over 84% of IPFIPCs were located in the east China's 13 provinces and municipalities where the economic development had been reached relatively more advanced level. Less than 16% of IPFIPCs were distributed in China's middle and west areas. A total of 98 IPFIPCs distributed in the three major regions in east China and which accounted for 83.76% of the population were defined as the sample size for this research. These IPFIPCs in the sample include 29 in SER, 38 in MER and 31 in NER.

A questionnaire was designed in both English and Chinese versions and was pre-tested with six pre-testing respondents by means of four personal interviews, one mail questionnaire survey and one telephone survey for the data collection. Of the six pre-testing respondents, four respondents had received their MBA degrees from Australian universities and had worked for foreign invested companies in China for a number of years in senior management positions, and two of them had worked for IPFIPCs in China. The rest were senior managers in a large Chinese-US joint venture pharmaceutical company in China by the time the pre-testing was executed. The fieldwork began in early April 1999, and was conducted over a three-month period of time. The data collection was mainly dependent on personal interviews, and complemented by mail questionnaire surveys. Personal interviews were conducted with senior executives of foreign business partners in IPFIPCs in China, and the posted questionnaires were addressed to foreign general managers/representatives in IPFIPCs in China. In total 44 companies consisting of 17 Early-Entrants and 27 Later-Entrants participated in this research, and 82% of answered questionnaires were obtained through personal interviews. Of the responding IPFIPCs, 39 firms selected a joint venture entry mode, and the rest chose sole venture with 100% share of ownership. 3 companies including 2 in Guangdong and 1 in Jiangsu were found to have ceased operations during the fieldwork. Also 1 company in Guangdong had the foreign partner's share sold to its Chinese partner before this survey conducted. Therefore the real sample size was reduced from an estimated 98 to 94 IPFIPCs, which means that a 46.81% response rate was achieved.

4. DATA ANALYSIS

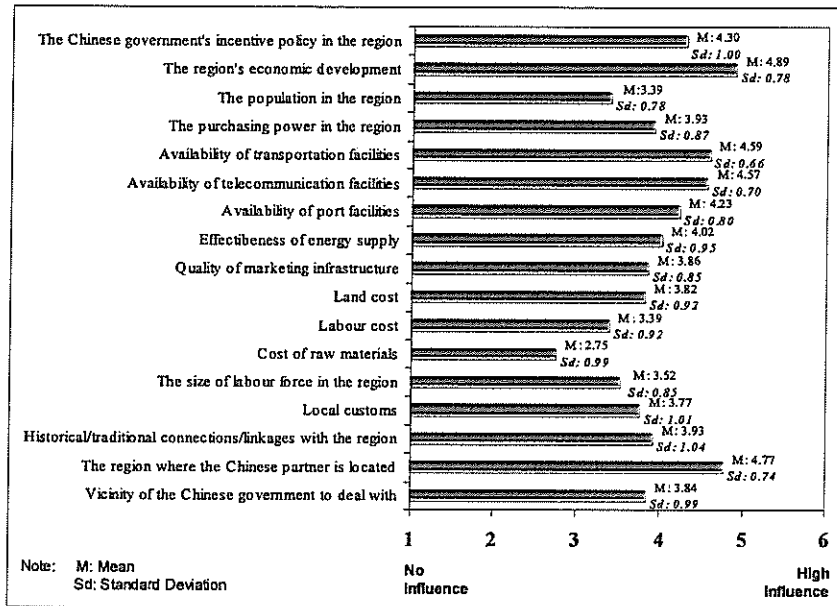
Respondents were requested to indicate their perceptions on the degree of influence of location selection variables in China. Respondents had questions with a six-point Likert scale for each of the variables from "1" no influence to "6" high influence. The scale reliability of the questionnaire was tested. The reliability coefficient (Alpha) was 0.65 (17 items), which means that the internal consistency of the scale value was found to be at an acceptable level. The descriptive analysis was firstly carried out to summarize the mean scores for each variable by foreign firms, and then to compare the responses of senior managers from each group of firms. Due to the nature of small sample size, the bivariate analyses were undertaken by using both the independent sample t-test (parametric test) to compare the mean scores for the two independent groups and Wilcoxon (Mann Whitney) test (non-parametric test) to compare the relative values (ranks) of the observations. If the results from both techniques are fairly similar, the interpretation will than be based on the independent sample t-test as it is more sensible than the Wilcoxon test. For the vast of majority variables, the descriptive and bivariate analyses were based on the data from 44 respondents (17 Early-Entrants and 27 Late-Entrants). The variable of *the region where the Chinese partner is located* was defined by the researcher as an optional variable for respondents to answer, as it was not applicable for firms who chose a sole venture entry mode (SV-Firms), but for firms who chose a joint venture entry mode (JV-Firms). There were no data inputs for the variable by respondents from SV-Firms. Therefore, for this particular variable, the data used for the descriptive analysis and the comparative analysis between Early-Entrants (n=14) and Late-Entrants (n=25) were based on the responses from JV-Firms (n=39) only.

4.1 Descriptive Analysis

The sample mean scores and standard deviations for FDI location selection variables were depicted in FIGURE 2. It suggests that the variable of *the region's economic development in China* was the most important variable which influenced the pharmaceutical firms' decision on the choice of operation location within China. The variables of *the region where the Chinese partner is located*, *availability of transportation facilities*, *availability of telecommunication facilities*, and *availability of port facilities in China* also played an important role, and *the Chinese government's incentive policy in the region*

attracted significant attention from foreign investors. *Effectiveness of energy supply, the purchasing power in the region, quality of marketing infrastructure, land cost, local customs, and historical/traditional connections/linkages with the region* had a moderate influence on foreign pharmaceutical firms' FDI destination in the country. *The population in the region, labour cost and the size of labour force in the region* seemed to have rather limited influence on foreign investors' FDI location choice. *Cost of raw materials* in the region was unlikely to be a significant variable in the case of pharmaceutical investment in China.

FIGURE 2: SAMPLE MEANS (STANDARD DEVIATION) FOR OPERATION LOCATION CHOICE VARIABLES



4.2 Bivariate Analysis

FIGURE 3 summarises the perception comparisons between Early-Entrants and Late-Entrants in perceiving the degree of influence of operation location choice variables on international pharmaceutical firms' FDI location decisions within China. Both Early-Entrants and Late-Entrants perceived the variable of *the region's economic development* as the most influential variable for their decisions on operation location choice within China. Early-Entrants also paid greater attention to the variables of *availability of transportation facilities, the region where the Chinese partner is located, the Chinese government's incentive policy in the region, availability of telecommunication facilities, effectiveness of energy supply, and the purchasing power in the region*. Late-Entrants also rated the variables of *the region where the Chinese partner is located, availability of transportation facilities, and availability of telecommunication facilities* as influential variables to their location selection decisions. The variable of *cost of raw materials* gained the lowest score from both Early-Entrants and Late-Entrants in the sample.

There were significant differences between the two groups of firms in perceiving the degree of influence on their operation location selection decisions for the variables of *the Chinese government's incentive policy in the region* ($p=0.0042$), *the region's economic development* ($p=0.0173$), *availability of transportation facilities* ($p=0.0001$), *availability of telecommunication facilities* ($p=0.0265$); and Early-Entrants scored higher for all the significant variables than Late-Entrants. A marginally significant difference was found between the two groups of firms for the variable of *the purchasing power in the region* ($p=0.0667$), and Early-Entrants scored higher than Late-Entrants for this variable. The results revealed from both the t-test and Wilcoxon test were fairly consistent (refer to TABLE 1).

FIGURE 3: MEAN COMPARISON ON OPERATION LOCATION CHOICE VARIABLES BETWEEN EARLY AND LATE ENTRANTS

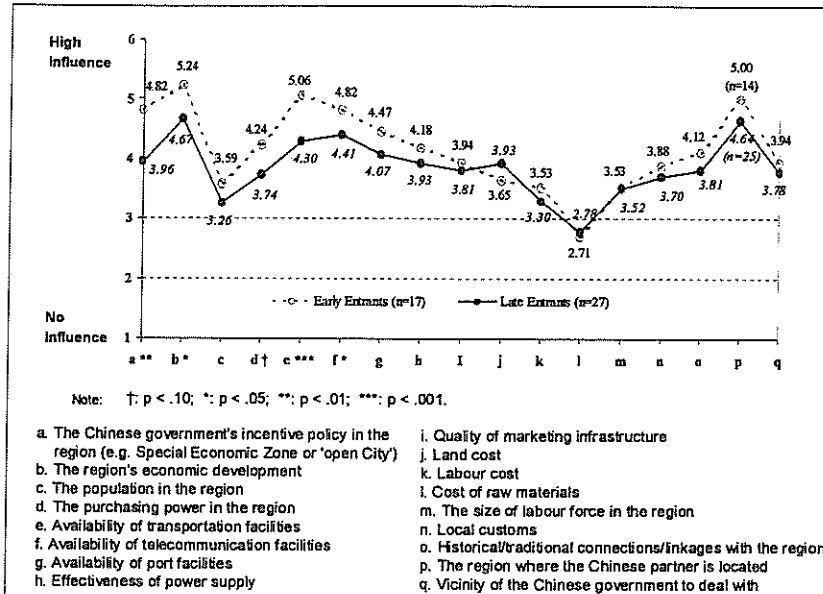


TABLE 1: PARAMETRIC AND NON-PARAMETRIC TESTS RESULTS FOR OPERATION LOCATION CHOICE VARIABLES (EARLY-ENTRANTS VS. LATE-ENTRANTS)

Variables	Mean		Wilcoxon Test		T-test	
	Early-Entrants	Late-Entrants	W	Asymp.Sig. (2-tailed)	t-value	Sig. (2-tailed)
The Chinese government's incentive policy in the region	4.82	3.96	491.00	.0035 **	3.0261	.0042 **
The region's economic development	5.24	4.67	520.00	.0212 *	2.4786	.0173 *
The population in the region	3.59	3.26	562.50	.2421	1.3689	.1783
The purchasing power in the region	4.24	3.74	537.00	.0727 †	1.8823	.0667 †
Availability of transportation facilities	5.06	4.30	467.00	.0002 ***	4.5017	.0001 ***
Availability of telecommunication facilities	4.82	4.41	538.50	.0545 †	2.3042	.0265 *
Availability of port facilities	4.47	4.07	558.00	.1972	1.6250	.1116
Effectiveness of power supply	4.18	3.93	569.00	.3302	0.8472	.4017
Quality of marketing infrastructure	3.94	3.81	586.00	.5829	0.4749	.6373
Land cost	3.65	3.93	344.00	.3273	-0.9765	.3344
Labour cost	3.63	3.30	560.50	.2293	0.8148	.4198
Cost of raw materials	2.71	2.78	381.00	.9692	-0.2317	.8179
The size of labour force in the region	3.52	3.53	378.00	.9080	0.0410	.9675
Local customs	3.88	3.70	584.50	.5628	0.5677	.5733
Historical/traditional connections/linkages with the region	4.12	3.81	579.50	.4823	0.9362	.3545
The region where the Chinese partner is located	5.00	4.64	454.50	.1471	1.4757	.1485
Vicinity of the Chinese government to deal with	3.94	3.78	592.00	.6959	0.5641	.5758

†: p < .10; *: p < .05; **: p < .01; ***: p < .001.

5. CONCLUSION AND DISCUSSION

This research examined variables that influenced the decisions of international pharmaceutical firms' FDI operation location choice within China, and the perception differences between early and late entrants. The results suggested that the stage of a region's economic development had the most significant influence on international pharmaceutical firms' decision on the choice of operation location within China. The selection of an FDI location was also heavily dependent on the region where the Chinese partner was located for foreign firms who entered into China with a joint venture entry mode. Availability of communication, transportation and port facilities in a region also played important roles, and the Chinese government's incentive policy in the region attracted significant attention from international investors. Effectiveness of energy supply, the purchasing power in the region, quality of

marketing infrastructure, land cost, local customs, and historical/traditional connections/linkages between the regions and foreign investors had a moderate influence on international pharmaceutical firms' FDI destination within the country. The population, labour cost and the size of labour force in the region seemed to have rather limited effects on foreign investors' FDI location choice. Cost of raw materials in the region was unlikely to be a significant variable in the case of pharmaceutical investment in China. The research also revealed that the incentive policies provided by the Chinese government for a particular region did have a stronger influence on foreign firms FDI into the region in early stage of China's economic reform and its open-door policy. One of the strategies the Chinese government adopted for attracting FDI inflows was to set up SEZs in China, and then to introduce incentive policies for foreign investors into the SEZs. The results also indicated that the stages of economic development in a region also had a stronger effect on foreign firms' decision in selecting an operation location in China. This may be due to the fact that the economic development in SEZs was much faster than that of other regions in China before 1992. The availability of transportation and telecommunication facilities was also a more important concern for foreign investors who entered into China in the early stage of China's economic reform, as the infrastructure was rather poor in China at that time. The fast economic growth which started in early 1990's has also had significant positive impacts on the nation's basic infrastructure development. The transportation and telecommunication conditions have also been improving dramatically particularly after 1992. The findings of Zhao and Zhu's (2000) study on FDI into 50 locations within China were consistent with the findings of this study for the variables of infrastructure (transportation, telecommunication, and port facilities), historical/traditional connections/linkages between the regions and foreign investors, stage of a region's economic development, and labour cost.

REFERENCES

- Bagchi-Sen, S. and Wheeler, J.O., "A Spatial and Temporal Model of Foreign Direct Investment in the United States", *Economic Geography*, Vol. 65(2), 1989, 113-129.
- Bajo-Rubio, O. and Sosvilla-Rivero, S., "An Econometric Analysis of Foreign Direct Investment in Spain, 1964-1989", *Southern Economic Journal*, Vol. 61(1), 1994, 104-120.
- Cantwell, J., *Technical Innovations in Multinational Corporations*, Basil Blackwell, Oxford, 1989.
- CCPIE (China Centre for Pharmaceutical International Exchange), *Catalogue of Chinese Enterprises with Foreign Investment*, CCPIE, Beijing, 1995.
- Coughlin, C.C., Terza, J.V. and Arromdee, V., "State Characteristics and the Location of Foreign Direct Investment within the United States", *Review of Economic and Statistics*, Vol. 73(4), 1991, 675-683.
- Culem, C.G., "The Locational Determinants of Direct Investment among Industrialised Countries", *European Economic Review*, Vol. 32, 1988, 885-904.
- DFIMFTECPRC (Department of Foreign Investment Ministry of Foreign Trade and Economic Cooperation People's Republic of China), *The China Investment Guide*, 5th ed., CITIC Publishing House, Hong Kong, 1995
- Friedman, J., Gerlowski, D.A. and Silberman, J., "Foreign Direct Investment: The Factors Affecting the Location of Foreign Branch Plants in the United States", *Global Financial Journal*, Vol. 7(2), 1996, 209-222.
- Hines, J., "Altered States: Taxzes and the Location of Foreign Direct Investment in America", *American Economic Review*, Vol. 86, 1996, 1076-1094.
- Li, F. and Li, J., *Foreign Investment in China*, Macmillan Press Ltd., Houndmills, 1999.
- Loree, D.W. and Guisinger, S.E., "Policy and Non-Policy determinants of U.S. Equity Foreign Direct Investment", *Journal of International Business Studies*, Vol. 26 (4), 1995, 815-841.
- Mariotti, S. and Piscitello, L., "Information Cost and Location of FDI's within the Host Country: Empirical Evidence from Italy", *Journal of International Business Studies*, Vol. 26(4), 1995, 815-842.
- Mody, A. and Srinivasan, K., "Japanese and U.S. Firms as Foreign Investors: Do They Match to the Same Tune?", *The Canadian Journal of Economics*, Vol. 31, 1998, 778-799.
- MIMS Asia, *China Medicines and Chemical Reagents Booklet: Manufacturers, Distributors, Representative Offices*, MIMS Asia, Hong Kong, 1998.
- NRI (Normura Research Institute) and ISAS (Institute of Southeast Asian Studies), *The New Wave of Foreign Direct Investment in Asia*, NRI and ISAS, Singapore, 1995.
- NTDB (National Trade Date Bank), *Market Report*, National Trade Data Bank of United States of America, 1996.
- ODI (Overseas Development Institute), "Foreign Direct Investment Flows to Low-Income Countries: A Review of The Evidence", *Overseas Development Briefing Paper*, No. 3, September, 1997.

- Pearce, R.D. and Satwinder, S., "Internationalization of R&D among the World's Leading Enterprises", in O. Grandstrand, S. Sjolander, and L. Hakanson (eds.), *Internationalisation of R&D and Technology*, Wiley, Chichester (U.K.), 1992.
- Porter, M., *The Competitive Advantage of Nations*, Free Press, New York, 1990.
- Schoenberger, E., "Multinational Corporations and the New International Division of Labor: A Critical Approach", *International Regional Science Review*, Vol. 11(2), 1988, 105-119.
- SPGC (Shanghai Pharmaceutical Group Corporation), *Shanghai Pharmaceutical Group Corporation (Directory)*, SPGC, Shanghai, 1999.
- Summary, R.M. and Summary, L.J., "The Political Economic of United States Foreign Direct Investment in Developing Countries: An Empirical Analysis", *Quarterly Journal of Business and Economics*, Vol. 34(3), 1995, 80-92.
- Sun, H., *Foreign Investment and Economic Development in China, 1979-1996*, Ashgate, Aldershot, 1998.
- Wheeler, D., and Mody, A., "International Investment Location Decisions", *Journal of International Economics*, Vol. 33, 1992, 57-76.
- Xin, X. and Ni, J. (Eds), *Dongxi Lunheng: Tianping Shang De Zhongguo – A Discussion of the East and West: China on the Scale*, China Social Press, Beijing, 1995.
- Zhang, X. and Yuk, H.P., "Determinants of Kong Kong Manufacturing Investment in China: A Survey", *Marketing Intelligence & Planning*, Vol. 16(4), 1998, 260-267.
- Zhao, H. and Zhu, G., "Location Factors and Country-of-origin Differences: An Empirical Analysis of FDI in China", *Multinational Business Review*, Spring, 2000, 60-73.

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