

High-Tech Industries in China by Chien-Hsun Chen and Hui-Tzu Shih, Edward Elgar Publishing, Cheltenham UK, Northampton, MA, USA, 2005, pages 155, price £ 45

This book gives the readers a wealth of information on R&D in China. It is said that the rise of India and China as centres of innovation will radically change the technology industry existing today which is based mainly in western countries. This study is exclusively on Chinese high-tech industry but very relevant to India, as India is gradually picking up in technology intensive industries. The book reveals the secrets behind the success of China in developing high-tech industries. China has been good at persuading the MNCs for setting up their operations to train locals. The huge population and scientific manpower gives both India and China the ability to keep doing the low-tech work and at the same time develop more high-tech activities. The Economist magazine (2005) quote Bruce Lehman (former commissioner of America's patent office) ".....in 20 years time India and China will both be responsible for more patents than the US". Furthermore, World Investment Report 2005, indicates that, of the 885 R&D oriented greenfield FDI project announced in the region in 2002-04, 723 were concentrated in China and India.

The book is organized into five chapters. The key issues addressed by the authors' is regarding the growth of high-tech industry in China. The book discusses policy transformation in science and technology, spatial distribution and regional disparities in China's High-tech sector, the role of multinational corporations, emerging trend of commercialisation of research results, *etc.*

In the first chapter, authors mention that, while the Chinese government is continuing to encourage technology-intensive industries in east China by leveraging this region's existing ability to attract foreign investment, it is also adopting measures to encourage foreign investment in central and west China by giving some extra concessions like relaxed rules for bank loans, tax concessions, *etc.* Foreign R&D institutions are permitted to undertake various forms of collaboration with research institutes, universities, colleges, *etc.* Apart from R&D centres, the Chinese government is now encouraging foreign companies to establish operational headquarters, logistic centres, *etc.* with the aim of absorbing

MNC's management experience. However, foreign companies still face entry barriers in terms of restrictions on capitalisation and personnel which includes; clauses like, the persons directly involved in R&D activity must account for at least 80 per cent of the R&D center's total staff *etc.*

The second chapter of book under review points out that, Chinese government initiated reform in science and technology sector in 1985, which includes, autonomy to research institutes, allowing employees to move from one institution to another, establishment of national award *etc.* China also allowed transformation of science and technology research institutes into business enterprises (from non-profit-making research institutes into business enterprises). Mainly as a result of these reforms, in 2001, spending on R&D in China increased by 16.4 per cent. As a percentage of GDP, R&D spending stood at 1.1 per cent. Due to the reforms, China now has become successful in commercialisation of research results. In 2001, China ranked twelfth in the world in terms of the number of patents applied for. In the same year, China's high-tech exports accounted for 17.5 per cent share of total exports. However, the book pointed out that due to, streamlining of operations of R&D institutes, the development of new areas of work, *etc.*, the number of technical personnel working for R&D institutes has continued to fall since 1995. The study gives region-wise expenditure on R&D and other details. It gives very micro level details which is not easily available elsewhere.

The third chapter of the book, while pointing out the regional disparity in China indicates that, seven regions account for 70.6 per cent of China's total R&D resources and 53 per cent of its GDP. There is a heavy concentration of R&D resources in the Beijing-Tianjin region. This study points out that, the ratio of R&D spending to GDP provides a good measure of the level of progress in terms of economic and technological development and mentions that, if the ratio of R&D spending to GDP is less than 0.5 per cent, it represents a low level of economic development; if the ratio is in the range of 0.5 per cent to 1.0 per cent, the country in question is a developing nation; if the ratio is between 1.0 per cent to 1.5 per cent, the country is just starting to be transformed into a developed nation; if the ratio is higher than 2.0 per cent, the country is a full-fledged developed nation. The book mentions,

to facilitate the commercialization of R&D results, China has made extensive use of the industrial parks concept. Even though the nomenclature for these parks/zones varies, the overall concept is the same: to provide infrastructure, tax breaks *etc* to stimulate development. However, the book admits that even after more than a decade of development significant disparities have developed between the high-tech zones and in some zones there been no real development.

Regarding electronics sector, the book mentions that, due to the protectionist measures adopted by the Chinese government in the electronics and semi conductor industries, foreign companies that invest in assembly plants in China tend to insist that their upstream component suppliers establish production facilities in China. Investment in the electronics sector has thus gradually expanded from the downstream assembly firms to include upstream component and materials suppliers (where the high technology content is usually significantly higher). Owing to a need to protect intellectual property rights, these business are usually set up as wholly-owned subsidiaries of the foreign company concerned. The book points out that development of the high-tech sector in China has been heavily dependent on the introduction of technology from overseas. The R&D facilities established by MNCs often outsource a substantial part of their research work to local research institutes, thereby helping to raise the overall standard of R&D work in the region. However, the authors' points out that China's innovation capability still are unsatisfactory due to the factors like low funding, restrictions on scientists to engage in commercial activity, legal system which does not give sufficient protection to intellectual property, *etc*.

In the last few years, with the implementation of the government's policy of 'using technology to stimulate trade', the value of China's high-tech imports and exports has grown rapidly. Furthermore, the study points out that in 2002 high-tech products accounted for 22.8 per cent of China's exports of manufactured goods, compared to just 5.9 per cent in 1992. High-tech products have thus played an important role in helping China to maintain high export growth. Computer and communications products account for the bulk (80.4 per cent) of China's high-tech exports, with next highest share being held by electronics products (13 per cent) in 2002.

The book while mentioning about the form of trade taken in high-tech products indicates that processing trade (including processing with supplied material and imported material) accounts for 89.6 per cent of high-tech product exports in 2002, while regular trade accounts for only 7.4 per cent. The negative aspect of this situation is that China's high-tech industries lack intellectual property and competitive brands. This points out that it will take some more time for China's high-tech companies to strengthen their technology innovation and international competitiveness (Lemoine and Unal- Kesenci, 2004). A table presented in the book on methods for the introduction of technology into China is very informative. It indicates that in 2000, technology transfer constitute 8.45 per cent of total value of method of technology introduction, technology licensing 18.68 per cent, technology consulting 2.38 per cent, technical services 11.60 per cent, full turnkey 19.18 per cent and key items of equipment 38.06 per cent.

Chapter 4, mentions that, in 2002 alone the combined production value of all foreign-invested companies in China accounted for 33.4 per cent of Chinese manufacturing industry's total production value. It also accounts for around 11 per cent of the urban labor force and 21 per cent of the Chinese government's total tax revenue. In 2002, the net amount of foreign exchange brought into the country by foreign-invested enterprises accounted for 72.7 per cent of all foreign exchange obtained by China's banks, and accounting for 63.7 per cent of increase in China's foreign exchange reserves in that year. The study highlights an important point, that while the high-tech exports of foreign invested companies has grown, the share of state-owned enterprises of the same has come down.

Regarding policy support, the book points out that, the Chinese government has formulated regulations to make technology transfer compulsory for multinationals investing in China. It is interesting to know that the Peoples Republic of China Law governing the operations of foreign-invested enterprises stipulated that when a foreign-invested enterprise is established in China, it must adopt advanced technology and equipment, or else the whole of its output must be exported. Furthermore, foreign partner must transfer advanced technology to the joint venture and this is one of the criteria for the granting of approval

for such ventures by the Chinese government. WTO accession has given China a better policy environment for attracting foreign investment, while also helping to reduce transaction costs and risk. Following WTO regulations, China has abolished many requirements relating to technology inputs by MNCs.

US companies account for the largest share of MNCs that have set up R&D facilities in China, with Europe and Japan having the next largest shares. In this context, it may be mentioned that according to US Bureau of Economic Analysis data, royalties and license fee receipt of United States (affiliated enterprises) from China has increased from US \$ 758 million in 2002 to US \$ 842 million in 2003. The need to maintain the secrecy of one's own technology leads MNCs investing in R&D in China to want to keep control over the operation; the more advanced the technology, the more likely it is that the R&D facility will be established as a wholly-owned subsidiary. Regarding the type of R&D activity that MNCs engage in China, statistics indicate that 54.3 per cent of MNC R&D expenditure in China goes on applied research, 31.8 per cent goes on development work and 13.9 per cent goes on basic research. The data indicate that R&D activity of MNC in China is oriented towards pure research rather than development.

Regarding the negative side, the study indicates that, even though China is now a signatory to several of international IPR related treaties, still the level of protection given to IPR in China is significantly lower than in the advanced countries. Violation of IPR are common. China needs to improve its infrastructure also. Furthermore, securing exit visas for technical personnel for overseas travel is still not a smooth process.

Chapter 5, is on commercialisation of High-tech research results in China and points out that, China now has more than 250 venture capital institutions. It is interesting to know that even though initially, venture capital funds were almost run by state-owned enterprises, today funding provided by non-government sources accounts for around 50 per cent of all venture capital funding. Venture capital sector has made a significant contribution towards the commercialisation of research results and thus played an important role in growth of China's high-tech sector. However, venture capital activity suffers from various problems like, lack of exit strategy, poor legal framework, shortage of fund managers, *etc.*

The book is very useful for knowing the technology development strategy followed by China. It is particularly relevant in this age in which ideas and innovations have become the most important resource, replacing land, energy and raw materials. It contains very detailed information about Chinese high-tech enterprises and will be useful for any scholar working in the area of Chinese industrial development. However the book would have been better if the authors gave a comparative picture of development of high-tech industries in other countries. Furthermore, the book uses the currency units RMB and US \$ interchanging, a common unit say US \$ would have been better. Moreover the book does not discuss much on disadvantage of China in English language. A recent edited book on China, Wen Mei (2004) pointed out that many business people in China regard relationships as more important to their business success than the adoption of new technologies. China's future technological progress will be retarded if market competition is not made fairer and business remains dependent on relationships. Lack of entrepreneurship will also be an obstacle in China's quest to become a technology leader. Methodology of data collection, especially the collection of very micro level information on technology is not mentioned. The book also does not give much information on the role played by Chinese diaspora in the development of industries. Apart from these minor shortcomings the book is really a good addition to the existing literature on China's development strategies.

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