# Competitive strategies of Asian high-tech firms: the challenge of late-industrialisation

## Poh-Kam Wong\*

Business School, National University of Singapore E-mail: Pohkam@nus.edu.sg \*Corresponding author

## John Mathews

Macquarie Graduate School of Management Macquarie University, Australia E-mail: john.mathews@gsm.muq.edu.au

**Biographical notes:** Poh Kam Wong is currently Associate Professor, Business School and Director, Entrepreneurship Centre, National University of Singapore. He obtained two BS degrees, an MS and a PhD from MIT. He has published in numerous international journals on innovation strategy/policy and technology entrepreneurship, including *Organization Science, Journal of Business Venturing, Information Systems Research,* and *IEEE Trans. Eng. Management.* He has also consulted widely for international agencies such as the World Bank and Asian Development Bank, various government agencies in Singapore, and many high-tech firms in Asia.

John A. Mathews is Professor of Management at Macquarie Graduate School of Management, Macquarie University, Sydney, where he teaches strategic management, and competition and strategy (in programs at Sydney, Singapore and Hong Kong). He has a long-standing interest in industry dynamics and Schumpeterian processes, particularly with respect to latecomer development, publishing two books on the topic (*Tiger Technology* and *Dragon Multinational*) and several papers in the refereed literature. His PhD was in systems science at Imperial College, London. In September 2004 he was a Rocketfellar Foundation scholar at the Bellagio Center, Italy. His website can be found at: http://www.gsm.mq.edu.au/facultyhome/john.mathews.

### **1** Introduction

Over the last two decades, indigenous firms from several non-Japanese East Asian economies, especially Korea, Taiwan, Singapore, China, and India, have become increasingly competitive in a growing range of global high-tech industries from semiconductor, computer, wireless and software. Companies like TSMC, UMC and Hong Hai from Taiwan, Samsung, LG and NCSoft from Korea, Huawei, TCL and Lenovo from China, Creative Technology and Singapore Technologies from Singapore, and Infosys and Satyam from India have become major global high-tech firms competing aggressively for market dominance and technological leadership against their more

Copyright © 2005 Inderscience Enterprises Ltd.

#### 2 P.K. Wong and J. Mathews

established rivals from the USA, Europe, and Japan. Despite the growing importance of indigenous high-tech firms from these Asian Newly Industrialised Economies (NIEs) in the global market today, there is still a lack of comprehensive research on why and how these late-entrant firms from 'latecomer' economies succeeded in 'catching up' with the global high-tech leaders. Did these indigenous high-tech leaders from the Asian NIEs pursue competitive strategies similar to those adopted by the Japanese firms in an earlier period? Or did they have to fashion new ways to compete, not only to differentiate from the Japanese, but also to navigate the much more competitive and globalised markets since the 1980s? Were there great similarities in the approaches to catching up by these firms, or were there significant and systematic differences in the competitive strategic approaches adopted, as shaped by the different home environments as well as by the specific industries and technologies that they chose to compete in?

This special issue brings together a collection of eight new contributions that provide fresh theoretical insights or new empirical observations into the strategic behaviour and performance of this rapidly growing cluster of indigenous high-tech firms from these increasingly competitive Asian NIEs. While the different paper contributors adopt very different methodological approaches and address different issues, together they contribute to a more comprehensive and more nuanced understanding of the complex dynamics of latecomer industrial catch-up.

#### 2 The challenge of late-industrialisation

As highlighted in prior literature (see e.g. [1–2]), new entrant firms from late-industrialising economies suffer various disadvantages in trying to compete in global high-tech industries pioneered by firms from the advanced economies. In addition to the various disadvantages inherent in being a latecomer, firms from the NIEs face several additional hurdles. Firstly, they are distant from the lead-user markets, which are typically located in the advanced economies of the USA, Europe, and Japan. Without sophisticated homegrown customers, it is more difficult for the NIE firms to learn about the latest changes in user requirements through arms-length export. Secondly, competitiveness in a wide range of high-tech industries requires not just the existence of individual firms with strong internal capabilities, but also the availability of specialised resources, component suppliers, and enabling infrastructures - a complete 'ecosystem' or industrial cluster. Such dense networks of interrelated industries typically take a long time to evolve; such that despite globalisation and the rapid spread of information-communication networks, they tend to be highly localised in specific regional clusters [3-4]. Advanced economies have the advantages of first-movers in evolving such industrial clusters, and once they have attained critical mass, it is difficult for late-developing regions to dislodge them.

There are, of course, possible countervailing forces that may confer latecomer advantages [5], *e.g.* late-entrants can learn from the early movers through an imitative strategy, avoid incurring the 'exploration' costs of the first-movers, and focusing resources instead on 'exploitation' of proven markets/product configurations discovered by the early movers (see *e.g.* [6] on the trade-off between exploration vs. exploitation in organisational learning). Late-entrant firms can also move up the learning curve faster than the early movers by recruiting the experienced talents and trained manpower from the early mover firms. Finally, while many NIEs may suffer from the lack of certain

key resources like sophisticated users and universities with advanced R&D capabilities, latecomer firms in these NIEs may be better placed to exploit certain home-based resource advantages such as abundant engineering talents at substantially lower cost, and low-cost manufacturing infrastructure. They may thus be able to develop distinctive global competitive advantages by pursuing a competitive strategy that focuses on developing their low-cost manufacturing process capabilities, rather than to acquire new product innovation capabilities. However, the choice of a competitive strategy for a latecomer firm is not a static one – they may need to evolve new strategies over time in order to narrow the gap between their capabilities and those of the leading firms in the advanced economies.

The choice of a learning strategy *embedded* within a competitive strategy – priority on what capabilities to develop in the process of competing at different growth stages – is thus central to the industrial catch-up process of latecomer firms from the NIEs vs. established leaders from the advanced economies [7]. The competitive strategies of high-tech firms from the East Asian NIEs must thus be interpreted as playing a dual role – how the pursued strategies enable them to compete at any one point in time, but also how the same strategies can facilitate their acquisition of new capabilities that enable them to better compete in the future.

Prior literature on the industrial catch-up experience of firms from East Asian NIEs in a wide range of industries has shown clearly that there is no single capability development strategy being universally adopted; instead, we find distinctive generic strategies being pursued [1,7], often reflecting the distinctive context of the home-based economy. In particular, public policies, particularly industrial policies, have a strong influence on the tendency of firms to pursue particular competitive cum capability-development strategies.

#### **3** Diversity of strategies and contexts

This diversity of strategies among firms from East Asian NIEs is clearly evident from the eight contributions to this special issue, which covers firms from several different NIEs – Taiwan, Korea, Hong Kong and China. In addition, several of the contributions also highlighted the influence of the state, whether directly or indirectly, on the strategic behaviour of the firms.

The contribution by Dieter Ernst serves as a useful introductory overview of the broad contexts within which the other contributions can be better understood, by highlighting the emerging 'pathways' to innovative capability development among the leading Asian firms in the electronics manufacturing industry. Ernst argued in particular that while many Asian electronic firms have succeeded through the pursuit of a 'fast-follower' strategy in the past, they may need to consider transitioning into a 'technology diversification' strategy in the future to stay competitive.

Rather than using the 'fast-follower' vs. 'innovator' typology of Ernst, the contribution by Tony Yu examines the technological capability development strategies of manufacturing firms in Hong Kong in recent years by using the technological capability development strategy typology of [1]. His analysis indicates that Hong Kong manufacturing firms have largely pursued the three major forms of imitative strategies, 'reverse product life cycle', 'reverse value chain' and 'process specialist' strategies.

#### 4 P.K. Wong and J. Mathews

While Yu's analysis of Hong Kong highlights the lack of government intervention, the paper by Lee, Lim and Song on the successful technological catch-up by Korean firms in the global digital TV industry provided strong evidence that the role of the state was critical to the ability of the latecomer Korean firms to 'leapfrog' the early leaders from Japan.

The paper by Yang *et al.* similarly highlights the influence of the state on the development of high-tech industrial capabilities in another NIE – the People's Republic of China (PRC). Using Porter's 'diamond' framework for analysing the competitive advantages of industrial clusters, they show that public policies have a pervasive influence on the structure and growth dynamics of the indigenous software industry in PRC by affecting each of the five underlying component elements for competitiveness.

The next four contributions examine a diverse range of competitive strategic issues facing high-tech firms in another different NIE – Taiwan. Liu *et al.* provided a very interesting comparative study of the different technology entrepreneurial styles of two highly successful Taiwanese firms in the semiconductor wafer fabrication industry. The contrasts in strategic behaviour between two firms that emerge at almost the same time, in the same economy and within the same industry, show vividly that there are alternative pathways to success – strategic choice by management matters even after controlling for the home-economy environment and industry context. At the same time, the persistent differences in strategic styles also show that competitive strategies are often path-dependent and bear the imprint of the charismatic founders, even in fast changing high-tech industries.

Internationalisation – the extent and pattern of overseas market entry – represents a key dimension in the competitive strategy of high-tech firms. Through an analysis of 170 leading high-tech firms listed on the Taiwanese Stock Exchange, Yu, Chiao, and Chen found an inverted U-shape relationship between the extent of internationalisation and the financial performance of the firms concerned. In addition, they found that investment in R&D had a positive correlation with performance, thus confirming the importance of investment in innovation and technological learning for latecomer firms to improve their competitiveness. However, they found that investment in marketing showed a negative correlation. Rather than dismissing the importance of marketing, they argued that this could be due to the marketing investment intensities being too low to reach the threshold necessary to achieve economies of scale. If true, this finding highlights a major strategic dilemma for the latecomer high-tech firms – without building up their own branding through aggressive investment in marketing, they are unlikely to be able to go beyond their traditional OEM and ODM roles in the long-run, yet the significant scale of investment needed in marketing is likely to result in reduced performance in the medium term. This may perhaps explain why there have been relatively few Taiwanese high-tech firms that have managed to achieve global brand reputation like Acer.

Another key dimension of the competitive strategy of high-tech firms is the formation of external alliance relationships – the extent of such external collaborations, the choice of partners, and the form of relationships all have significant bearing on not only the ability of the firms to compete, but also to acquire technological capability through learning from the external partners. Through a comparative study of Taiwanese firms versus US firms, Chen and Wu found not only significant differences in external alliance strategies between the two groups, but that the impacts of alliance strategies on firm performance also differ between the two groups. Their findings suggest that firms from NIEs may need to pursue alliance strategies differently from firms in advanced economies.

Last, but not least, Chu *et al.* examines the implications of a third key dimension of competitive strategy: the pattern of vertical integration along the value chain. Using the highly technology-intensive integrated circuits industry as the industrial context, they argued that the Taiwanese firms succeeded in becoming competitive in an industry historically dominated by advanced economies like Japan through the introduction of a new business model, that of 'virtual integration', in contrast with the traditional concept of vertical integration. In particular, they showed that the competitive performance of Taiwanese firms pursuing the virtual integration model achieved superior performance compared to the vertically integrated firms, even after taking into consideration the effect of business cycle. Their findings thus suggest the possibility for firms from latecomer economies to innovate new business model as a means to compete better with the incumbent leaders from advanced economies.

Taken together, these contributions enhanced our understanding of the complex process of technological catch-up by high-tech firms in late-industrialising economies in a dynamic region of the world. The different papers offered new insights through a plurality of analytical frameworks and by offering a rich variety of contexts – diverse home-base economic environments, different industrial clusters, and variations in the stages of technological maturity – through which the strategic responses of the firms can be compared and contrasted.

#### References

- 1 Wong, P.K. (1999) 'National innovation systems for rapid technological catch-up: an analytical framework and a comparative analysis of Korea, Taiwan and Singapore', *Proceedings of the DRUID Conference on National Innovation Systems, Industrial Dynamics and Innovation Policy*, Denmark: Rebild, June 9–12.
- 2 Mathews, J.A. and Cho, D.S. (2000) *Tiger Technology: The Creation of a Semiconductor Industry in East Asia*, Cambridge University Press.
- **3** Fagerberg, J. (1995) 'User-producer interaction, learning and comparative advantage', *Cambridge Journal of Economics*, Vol. 19, pp.243–256.
- 4 Freeman, C. (1991) 'Networks of innovators: a synthesis of research issues', *Research Policy*, Vol. 20, pp.499–514.
- 5 Schnaars, S.P. (1994) Managing Imitation Strategies, New York: The Free Press.
- 6 March, J.G. (1991) 'Exploration and exploitation in organizational learning', *Organization Science*, Vol. 2, pp.71–87.
- 7 Kim, L. and Nelson, R.R. (Eds.) (2000) Technology, Learning, & Innovation: Experiences of Newly Industrializing Economies, Cambridge University Press.