

**ADAPTIVE ENTREPRENEURSHIP AND TAIWAN'S ECONOMIC  
DYNAMICS**



**Fu-Lai Tony Yu, Ho-Don Yan & Shan-Yu Chen**

Department of Economics  
Feng Chia University  
Taichung, Taiwan  
Tel: (04) 24517250 ext: 4471  
Fax: (04) 24518737  
Email: flyu@fcu.edu.tw

Paper to be presented at International Symposium on “Entrepreneurship, Innovation and Economic Development”, May 28, 2005 (Saturday), organized by Department of Economics, Feng Chia University, Taichung, Taiwan

## ADAPTIVE ENTREPRENEURSHIP AND TAIWAN'S ECONOMIC DYNAMICS

### Abstract:

Taiwan's economic success is well documented in mainstream neoclassical economic literatures. Since the end of the Second World War, Taiwan has transformed in around 60 years time from a farmland to a high tech industrial economy. This 'miraculous' performance has intrigued scholars to search for an explanation of Taiwan's success and more importantly, a development model for latecomer economies. It is generally admitted by scholars (including those from the neoclassical school) that Taiwan's economic success is, to a large extent, attributed to its dynamic entrepreneurs. However, economic studies on the role of entrepreneurship in the economic development of Taiwan are few. This paper attempts to throw light on this issue. It will argue that Taiwan is an entrepreneurial society. A unique feature of Taiwan's style of entrepreneurship lies in its ability to adapt to the rapid changing world markets. Alertness to opportunities, and through the use of guerrilla entrepreneurial strategies, imitation, subcontracting and regional arbitrageurship, manufacturing firms in Taiwan are able to exploit profit margins and survive in the global competition. This paper concludes that, though the Taiwan's style of entrepreneurship emerges out of its unique environments, Taiwan's experience can be useful to other developing economies. The critical issue is whether latecomer countries can successfully incubate adaptive entrepreneurship compatible with their backgrounds so as to exploit international market opportunities.

**Keywords:** entrepreneurship, strategy, imitation, learning, small business, Taiwan, electronics industries

## INTRODUCTION

The economic success of Taiwan during the post Second World War period is well known. Taiwan has been referred by the World Bank in 1993 to as one of the economies which contributes to “East Asian Miracles”. Explanations on economic success of Taiwan are not lacking.<sup>1</sup> However, most of them utilize neoclassical Cobb-Douglas production function to explain Taiwan’s economic growth. Specifically, these studies, ignoring structural uncertainty and knowledge problems, never consider the role of entrepreneurship in economic development. Hence, these orthodox neoclassical studies have failed to provide us with a satisfactory explanation of the economic development of Taiwan. Entrepreneurship is often regarded as a locomotive of economic growth. A systematic investigation of the role of entrepreneurship in economic development is of utmost importance. Moreover, in explaining economic development of Asian developing economies, scholars largely refer to Schumpeter’s concept of entrepreneurship. Schumpeterian mode of entrepreneurship has been a rare phenomenon in most developing countries, and even in many industrialised economies. The emergence of individuals with ‘heroic entrepreneurial’ character was not an essential condition for the development of dynamic Asian capitalist economies, since rapid growth in developing economies took place even without such entrepreneurs. Therefore, when examining the economic dynamism of Asian developing economies, no undue emphasis should be put on the Schumpeterian mode of entrepreneurship. Owing to this reason, this paper attempts to develop a theory of entrepreneurship which can explain the economic development of Asian latecomer economies. This theory of entrepreneurship should encompass elements such as adaptive to change, alertness to opportunities, incremental innovation and imitation which are the major characteristics of entrepreneurship in Asian learning economies.

---

<sup>1</sup> For example, Kuo (1997) argues that the economic success of Taiwan is attributed to government policies including curbing hyperinflation of the early 1950s, utilization of US aid, land reform, trade strategies, creation of job opportunities, foreign direct investment, and policies on infrastructure. Shih (1994) argues that major factors contributing to Taiwan's economic development include the external environment, the colonial legacy, the role of the state and ethnic cleavage.

Against the backgrounds mentioned above, this paper has two objectives: Firstly, it will develop a theory of entrepreneurship which is able to explain economic dynamism of Asian latecomer economies in general and Taiwan in particular. Secondly, this paper will apply the theory of entrepreneurship developed in this paper to explain the economic dynamics of Taiwan. In particular, this research will examine the kinds of entrepreneurial strategies adopted by business people in Taiwan. Such strategies enable Taiwan's firms to successfully compete and survive in the global markets. By using electronics industries as illustration, this study will shed light on the role of entrepreneurship plays in the economic transformation of Taiwan.

### **STUDIES ON TAIWAN'S ENTREPRENEURSHIP**

The significance of entrepreneurship in economic dynamics of Taiwan is largely investigated by scholars in management or social science rather than by mainstream neoclassical economists. Numazaki (1997) describes six basic characteristics of "Laoban" (entrepreneur-owner) in Taiwan and analyzes the structural features of the Chinese family and Taiwan society that incubate entrepreneurship. In Numazaki's view, the majority of Taiwan's entrepreneurs were independent owner-managers of small-and-medium-scale firms. These entrepreneurs skillfully used personal networks for business purposes. Furthermore, Numazaki argues that it was the Chinese family and Taiwan society that gave birth to and cultivated entrepreneurship in Taiwan. The Taiwan society as a complex network of personal networks provided entrepreneurs a social context that suited their partnership-oriented and *guanxi*-oriented business activities. Shieh (1992) argues that the export-oriented industrialization of Taiwan is sustained through a network of contracting systems and a micro-entrepreneurial mechanism. The subcontracting system generates opportunities for workers in Taiwan to set up their own manufacturing firms. Taiwan's electronics industry and its technological catching-up have been the interests of scholars from management of technology (Hobday 1995; Ernst 1998; Chang and Tsai 2002; Matthews 2001; 2002; 2004). In particular, Ernst (1998) tells the story of how

small computer firms in Taiwan competed in international market for computer-related products. In Ernst's view, inter-organizational knowledge creation for small firms was facilitated by (1) active and continuously adjusted industrial development policies and (2) learning and capability formation through linkages with large foreign firms. In a comparative study of Asian Newly Industrialized Economies and using electronics industry as an illustration, Hobday (1995) explores how small Taiwanese firms acquired technology, overcame the disadvantages of small scale and managed their way into international markets. Matthews (1997; 2001; 2002; 2004), using Acer and other electronics firms in Taiwan as case studies, are able to show that latecomer firms "can utilize the existing and latent interfirm connections of the global economy to accelerate their global growth. By drawing themselves into such linkages, they can leverage entry into new markets far more rapidly than by following the stolid entry strategies of their multinational predecessors".

Despite contributions from scholars in political sciences, international business, management of technology, the study on the role of entrepreneurship in Taiwan's industrial dynamics is still lacking. This paper attempts to bring entrepreneurship back in understanding the economic development of Taiwan. In what follows, a theory of adaptive entrepreneurship applicable to latecomer economies will be formulated. The theory is illustrated by the Taiwan's electronics industry, with Acer as a case study. Policy implications will be given in the last section.

## **ADAPTIVE ENTREPRENEURSHIP IN LATECOMER ECONOMIES**

This paper utilizes insights from Austrian school of economics to develop a theory of adaptive entrepreneurship. Specifically, Israel M. Kirzner's contribution to the concept of entrepreneurship is the main building block. In a seminal book, Kirzner (1973) argues that the role of entrepreneurs lies "in their alertness to hitherto unnoticed opportunities". Alertness implies that the entrepreneur possesses a superior perception of economic opportunity. It is like an "antennae that permits recognition of gaps in the market that give little outward sign" (Gilad et al. 1988:483). With their alertness, entrepreneurs can

discover and exploit narrow profit margins. Adaptive entrepreneurship can be observed in many forms, including putting new idea in use; modifying and perfecting original innovations, adding some product attributes and fitting a slightly different market; supplying something which is still lacking in the market; and serving the markets which pioneers have created but have not yet adequately serviced.

Adaptive entrepreneurship is significant in the economic development of many Asian learning economies and therefore deserves a systematic scrutiny. A profound theory of entrepreneurship will not only help us to understand economic progress of many developing economies, but also allow us to understand international development in the era of globalization. The notion of adaptive entrepreneurship in Austrian economics is associated with the subjectivist theory of knowledge. According to Kirzner (1985), knowledge can be classified into two types: (1) technical knowledge involving skills in utilising given physical resources. This type of knowledge can be obtained by deliberate search or via R&D. (2) knowledge of opportunities which cannot be obtained by deliberate search but manifested in entrepreneurial capabilities. Economic growth can thus occur in two ways: (1) improvement in technical knowledge (neoclassical studies largely focus on this aspect of research) and/or (2) increased awareness of the availability of opportunities. Hence, economic growth occurs not only “because of the availability of new opportunities, but because of expanded awareness of existing opportunities” (Kirzner 1985:74). Therefore, growth requires not only expanded productive possibilities, but also entrepreneurial alertness and discovery. In Kirzner’s view (Kirzner 1985), entrepreneurship consists of the social integration of the innumerable scraps of existing information that are scattered throughout the globe.<sup>2</sup> The same entrepreneurial spirit also tends to stimulate the discovery or creation of entirely new information to satisfy consumers’ preferences. Kirzner argues that the entrepreneurial process at this new level is what drives the capitalist system toward higher standards of achievement.

---

<sup>2</sup> Hayek (1945:519) notes that “the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess”.

In the following sections, the industrial dynamics of Taiwan will be explained and illustrated by the concept of adaptive entrepreneurship manifested in guerrilla strategies, small scale enterprise, subcontracting, product imitation and regional arbitrageurship.

## **TAIWAN AS AN ENTREPRENEURIAL SOCIETY**

For the past six decades since the end of Japanese colonization, Taiwan has created an environment where the entrepreneurial potential of its people can be fully realized. As a result, Taiwan is crowded with entrepreneurs and regarded by a scholar as a “boss” island (Shieh 1992).<sup>3</sup> A Taiwanese joke can reflect this situation: if you throw a stone in the streets of Taipei, you are likely to hit a chairman of the board. With one company for every twenty people in Taiwan (the highest density in the world), the joke could almost be true.<sup>4</sup> To be sure, these “army of ants” have been the major contributors to its economic miracle (*Economist* 1998).

According to Small and Medium Enterprise Administration (SMEA), in 2003, about 97.8 per cent of enterprises in Taiwan are small and medium size enterprises (SMEs), and they make up 75 to 80 per cent of all employment and 47 per cent of the economy’s GDP. Within the SMEs, 9.7 per cent of them last less than one year.<sup>5</sup> According to the Taiwan’s Industry, Commerce and Service Census (2002), between 1995 and 2000, the survival rate of

---

<sup>3</sup> Shieh (1993) asserts that “bosses” were the prime movers for Taiwan’s export-oriented industrialization and the development, which was made possible under the subcontracting network and micro-entrepreneurship.

<sup>4</sup> According to Small and Medium Enterprise Administration (SMEA, 2004), in 2003, there were 1,171,780 enterprises (including large and SMEs) in Taiwan. With a population of 23 million, every 20-person owns a company.

<sup>5</sup> The definition of the SMEs of Taiwan is relatively strict compared to other countries. For three enterprises of manufacturing, construction, mining and quarrying industry, with paid-in capital of NT\$ 80 million or less, or the number of regular employees must be less than 200; plus the rest of industries including the agriculture, forestry and fisheries industry, water, electricity and gas industry, commercial sector, transportation, warehouse and communications industry, finance, insurance and real estate industry, industrial and commercial services industry or social and personal services industry with sales revenue of NT\$100 million or less, or the number of regular employees must be less than 50 (SMEA, 2004).

these enterprises is 69.4 per cent. The ease of firms to establish and shut-down indicates the dynamism of entrepreneurship in Taiwan.

*Business Week* (2004) claims that Taiwan, as a tiny island economy, has triumphed in Information and Technology (IT) field and outsized representation on *Business Week's* IT 100 in 2004. Within the IT 100, fifteen companies are from Taiwan and their founders are genuine entrepreneurs.<sup>6</sup> They create a great fortune almost from nothing. Unlike South Korea, or Japan, most of their successful businesses come from the conglomerates, Taiwan's entrepreneurs typically start as an apprentice, or *heishou* (meaning hands are black due to working in a workshop), and then become a Laoban, or "boss." To name two of the seven billionaires of Taiwanese listed in *Forbes* (2005), Terry Gou and Barry Lam are both founders of the two biggest Taiwan's companies in *Business Week's* IT 100.<sup>7</sup>

Without helps from the government, business people in Taiwan are responsible for their own enterprising projects. Taiwan encourages the founding of new enterprises,<sup>8</sup> which are launched in record numbers — and fail in record numbers too. For instance, in 1997, Taiwanese entrepreneurs launched 1373 electronics companies and 1147 went out of business (*Business Week* 1998:22). Of 14000 electronic firms in Taiwan, a handful of them have become major players such as Acer, United Microelectronics Corp and Taiwan Semiconductor Manufacturing Co. These entrepreneurs rely on

---

<sup>6</sup> The list of companies selected are based on the minimum requirement of having revenues of at least \$300 million, and then using four criteria: return on equity and revenue growth (which were given equal weight), shareholder return and total revenues (which were both weighted), to rank. Within these 100 companies, Taiwan has 15 (number in the parenthesis behind the company name is the ranking) including, Quanta Computer (3), Hon Hai Precision Ind. (4), Compal Electronic (15), Asustek Computer (16), Au Optronics (17), Novatek Microelectronics (20), Lite-On Technology (21), Acer (25), Mediatek (35), Chi Mei Optoelectronics (36), Taiwan Semiconductor Mfg. (55), Synnex Technology Intl. (70), BenQ (77), Adv. Semicond. Engineering (85), and United Microelectronics (96).

<sup>7</sup> Terry Gou is the CEO of Hon Hai Precision Ind., a typical black-hand apprentice-turned industrialist of the wealthiest in Taiwan. Barry Lam, born in Shanghai, brought up in Hong Kong, and went on to study electrical engineering at the National Taiwan University, is the founder and chairman of Taiwan Notebook PC manufacturer Quanta Computer.

<sup>8</sup> Lee and Low (1990) argues that the greater the number of entrepreneurs in an economy, the higher the number of businesses.



networks of contacts that stretch from local engineering universities such as National Chiao Tung University to Silicon Valley giants such as Hewlett Packard Co. and Intel Corp (*Business Week* 1998:22).

## **ENTREPRENEURIAL STRATEGIES IN TAIWAN**

We identify four major entrepreneurial strategies commonly observed in the economy of Taiwan, namely (1) Alertness to opportunities, adaptability and guerrilla entrepreneurship, (2) Original equipment manufacture (OEM), imitation, and entrepreneurial learning, (3) Small businesses, flexibility and production networks, and (4) Regional arbitrageurship.

### **(1) Alertness, adaptability and guerrilla entrepreneurship**

The large scale mass market approach adopted by Korean Chaebols is not the only path to export success for developing economies. The Taiwanese case shows how hundreds of tiny latecomer firms have clustered together behind the electronics frontier in exploiting market opportunities (Hobday 1995:95).<sup>9</sup> In South Korea, European countries and Japan, new products are manufactured by old and big conglomerates, but in Taiwan, they are developed and promoted by new companies.<sup>10</sup>

Young entrepreneurs in Taiwan understand that success can only be built upon learning and experience. This spirit can be seen by a statement highlighted by Jessy Chen, a Taiwan University trained engineer in IT industry: "I thought if I didn't succeed, I'd have another opportunity later" (*Business Week* 1998:12).

The PC industry in Taiwan achieves great success through its quick response to innovations from leading competitors. Once a dominant design or a radical innovation is introduced into the global markets, manufacturing companies in Taiwan are able to respond immediately to this change. Their relatively weak R&D base and limited budget prevent them to become an innovator, but they are effective followers. It is generally agreed that computer firms in Taiwan can meet the challenge of the innovations in the international

---

<sup>9</sup> For a discussion of phases of electronics development in Taiwan, see Matthews (2004); Hobday (1995:103-108).

<sup>10</sup> See Shih (2004).

markets earlier than their international rivals. They also impress their global competitors by providing improved modified products at much lower prices (Chang 1992: 210).

Jamie Bai, a former employee of IBM and now a manufacturer in Taiwan, was able to combine American technology with local know-how. Bai earned his first profit by producing electronic point of sale devices as credit-card reader. However, he saw a better future in the systems that could send data over wireless networks. He learned, through connections, that IBM had developed a handheld two-way wireless device but the product was not put into market. So Bai teamed up with a local software whiz, founded Pacific Star Technologies, bought the technology from IBM, and devised a networking system that could send and receive data. This business opportunity enabled Bai's Pacific Star to earn big money. The company went public listing in 2000 (*Business Week* 1998:22).

Compared to the advantages possessed by western advanced nations in system/application specification and the advantages pursued by Japan in material technology and fabrication processes, Taiwan's competitiveness originates from the design speed, quality, cost and flexibility (Chang and Tsai 2002:103). As Chang and Tsai (2002:104) notes:

The key competitiveness lies in the speed to implement, the quality of the design output, flexibility in response to changes in specification and market demand, and the overall cost level. Taiwan enjoys a core competence of an inexpensive but outstanding local design capability pool, as well as a superior supporting foundry system. By leveraging these factors, Taiwan adopts the strategy of being a rapid follower to provide flexible and quick IC design that is less expensive than what can be provided by most advanced countries, with quality much better than that delivered by other developing countries.... This unique strategy therefore helps to establish Taiwan as a significant foothold in the global market.

Taiwan entered the electronics market neither at the early stage of technology development nor at the initial growth stage of the market, but at the rapid

expanding stage that was confirmed by the booming multimedia PC market pushed by Intel and Microsoft. It was shown in the 1990s that Taiwanese manufacturers quickly responded to market demand with flexibility that was evidenced by the emergence of many new companies to this field (Chang and Tsai 2002:104).

Taiwanese entrepreneurial firms constantly tested the market response and identified the demand growth stage in which they prepared to take over the market with cost and flexibility advantages (Chang and Tsai 2002:105). Despite neither being an inventor of advanced technologies nor a leader of market specification, Taiwan's firms tried to establish its niche position via acute alertness of market opportunities from foreign alliances. They quickly entered the market by clever leveraging of superior manpower and governmental R&D sponsorship in technology acquisition, flexible business operation sustained by entrepreneurship, and cost advantage made possible by specialized vertical disintegration and industrial clusters (Chang and Tsai 2002:105).

The great advantage of Taiwan's computer industry has been the speed with which it has been able to respond to changes in markets and technology. This is particularly true in Integrated Circuit design where competitiveness of Taiwan's firms manifest in speed, quality and cost (Chang and Tsai 2002:105).

Taiwan, as a technology follower and as a latecomer economy, being unable to catch up with technology leaders in the fundamental scientific research, can still establish its core competence through appropriate industrial development strategies, and position itself in global niche markets. Taiwan does not attempt to develop its own advanced technology from fundamental research. Instead, it utilizes its limited resources by assimilating leaders' technologies and acts as a superior rapid follower. Maintaining the advantage of speed, quality, cost and flexibility in the application of existing technology, Taiwan has found its own competing position and a growing space for its industry (Chang and Tsai 2002:110).

Moreover, entrepreneurial firms (and electronics firms in particular) in Taiwan are able to mobilize resources efficiently to different battlefields. Their flexibility fits well into the rapidly changing world, particularly in the information

and technology revolution since the 1980s. These firms avoid head-to-head confrontation with their superior competitors.<sup>11</sup> They seek out an opportunity for high profit margins in a particular product, develop a formula, and exploit it by rapidly flooding the market before the established firms can respond. They frequently form temporary partnerships to enable them to engage and diversify in a variety of businesses according to the profit margin signal (Numazaki 1997). Often, these firms only focus on short-term profits and then leave the market for another before competition forces prices down to the point where they are no longer profitable without large-scale investments in technology or infrastructure (Lam and Lee 1992). This process in fact helps to reallocate capital from dying industries to sunrise ones, opens up new markets and secures new suppliers of resources. Through complex subcontracting networks, Taiwan's entrepreneurs have created flexible production systems in Taiwan (see below). Using guerrilla entrepreneurial strategies,<sup>12</sup> manufacturing firms in Taiwan have been able to survive and compete in global competition.<sup>13</sup>

## **(2) Original equipment manufacture (OEM), imitation, and entrepreneurial learning**

Generally speaking, Taiwan's manufacturing firms are not inventors, which define the 'paradigm' of technological progress. Instead, most of them are learners, though a few of them are innovators. Taiwan has adopted an accommodative strategy to incorporate high tech knowledge into their adjustment. The dynamic Taiwan's electronics industry does not opt for a national technology which may lead world technological trends. Rather, it constantly adapts and learns (Wang 1995/1996:551-577).

Taiwan's manufacturing firms learn by engaging in original equipment manufacture (OEM). In OEM business, Taiwan's manufacturers produce goods with design and technology specified by foreign firms. The product sold

---

<sup>11</sup> See Lam and Lee (1992) about the guerrilla capitalism.

<sup>12</sup> Yu (1999) first uses the term guerilla entrepreneurship to describe the dynamics of Hong Kong manufacturing firms. Wang (1995/96) uses the term guerilla capitalists to describe Taiwan's information and technology industry.

<sup>13</sup> Guerrilla entrepreneurial strategies are said to be essential to the industrial development of Hong Kong (Yu 1997).

abroad will bear the brand name of the overseas companies (Hobday 1995). Being an OEM, or “middle-man brand policy” (Chang 1992:203), Taiwan’s PC companies have benefited a lot from implementation. They do not have to spend money on establishing distributional networks or on consumer-oriented promotion to develop brand preference. Nor do they have to maintain a strong internal R&D base to develop new products. In addition, orders from OEM buyers not only guarantee satisfactory utilization of the companies’ capacities, but provide essential financing for their operations.

The growth of Taiwan’s electronics industry has been heavily dependent on this type of international subcontracting. More importantly, electronics firms in Taiwan acquired technology from foreign firms and learned to innovate incrementally by imitation. In a late 1980s survey of 43 Taiwanese OEM suppliers (27 domestic and 16 foreign invested), roughly 70 percent acknowledged that OEM contracts were useful in transferring production technologies and in acquiring product design capabilities (Ernst 1998:42).

For example, Tatung, one of the largest electronics makers in Taiwan learned many of its technological skills under OEM arrangements. By the late 1980s, around half of its color TVs, PCs and hard disk drives were exported under OEM arrangement. Most production embodied little original R&D, though recently, the firm has closed much of the technological gap with leaders in advanced economies. Tatung learned how to absorb and adapt advanced foreign technology and to modify, re-engineer and re-design consumer goods at different types of customers. By 1990, Tatung employed around 500 R&D workers in electronics, most of their works were in re-engineering rather than original research (Hobday 1995:112-113). TECO, a major electronics manufacturer in Taiwan learned under OEM deals with IBM and other companies. TECO advanced from simple customer goods to computers, color display terminals, printers, video graphic adaptors and TV monitors. By the late 1990s, TECO’s electronics sales exceeded US\$300 millions, employment stood at over 3000 (Hobday 1995:114).

Having accumulated technical experiences and capability via internal R&D and OEM, Taiwan’s PC industry was in an excellent position to shorten its technical lag behind the leading firms. For example, two local companies

announced their success in developing the same 32-bit PC in November 1988, only two months after Compaq's introduction of its 32-bit PC (Chang 1992:203).

During the early stage of PC development, entrepreneurs in Taiwan act as opportunists. Most of them act as the agents of the new foreign products for local customers. As the products matured, these Taiwan's firms then took steps to imitate similar products at lower costs. Under the pressure of intellectual property right claimed by the original producers, they engaged in OEM business. As their technological capabilities grow, they offered original design manufacturing (ODM) products by which they designed and produced products for their buyers. Recently, they strove to develop their own brands to achieve full technological independence (Chang 1992:208). In other words, they involved in ODM business, from which more inventive and innovative technologies are developed.

Many manufacturing firms in Taiwan still continue to rely on OEM to some extent, despite their improvement in technological capabilities and involvement in some brand name sales (Hobday 1995:115).<sup>14</sup> Contrary to some earlier views about the dynamics of industry in such economies, the OEM proportion has been rising and that of own-brand manufacture (OBM) falling over time. OEM-based export is still the predominant form of production and sales, even for Taiwan's largest IT business groups (Kim and Tunzelmann 1998).

For example, as a major OEM supplier to ITT, AT&T and other market leaders, Acer consistently showed original innovative capabilities. It designed the first Chinese operating system which later became a standard in Asia. Furthermore, in an attempt to challenge brand leaders and move beyond OEM, Acer began to distribute its own brands directly to customers in the

---

<sup>14</sup> Two buoyant examples of the failed OBM (own brand-name manufacturing) in Taiwan are the tennis racket maker, Kennex in the 1980s and computer producer, Acer in the 1990s. Kennex was the first case that evolving from OEM, to ODM and then bankrupted after trying the OBM. Although with the support of the government, Kennex attempted to diversify its business and get burned when it waded through some unfamiliar businesses, such as construction. Acer's ambitious plan to sell its own named computer in the USA ended unsuccessfully. The lesson is that OBM is one thing, but to affiliate with the distribution system is another, and perhaps more crucial.

USA and Europe. Despite progress in design and branding, Acer still relied on OEM for around 50 per cent of its monitor sales and 20 per cent of PCs in 1992 (Hobday 1995:115-118). The proportion of total exports made up by manufacturer-brand PCs increased from 9 per cent in 1985 to 40 per cent in 1988, whereas that of OEM has continually declined (Chang 1992:205). This change indicated that technological capabilities of most PC firms in Taiwan has improved.

In summary, Taiwan's electronics industry in the early period emphasized and capitalized from hardware manufacturing, thanks to the opportunities created by PC and microelectronics, and the ability to seize these opportunities. Over the years, through entrepreneurial learning, and adaptation of foreign technologies, the industry has gradually moved up the technological ladder. It was not done by closing the borders. Rather, it was done through a dynamic division of labour between the government, multinationals and local firms (Wang 1995/1996: 576).

### **(3) Small enterprises, flexibility and production networks**

Taiwan is a paradise for small and medium-sized enterprises (SMEs) (Choo 2000).<sup>15</sup> Moreover, SMEs have been the prime movers of Taiwan's rapid development and remain significant today. Without government protection, SMEs in Taiwan have developed even faster than the nation's overall rate of economic growth (Liu 1998: 344-345). SMEs in Taiwan boomed during the 1970's, since then they have played a predominant role in Taiwan's export trade. In 1993, SMEs accounted for 96 per cent of the total number of establishments, 69 per cent of total employment and 55 per cent of Taiwan's manufactured exports (Ernst 1998).

Small businesses in Taiwan's electronics industry are able to respond rapidly to change. Their alertness to opportunities and organizational flexibility allow for instance integrated circuit designers to quickly seize key technologies when they are faced with rapidly changing market demand,

---

<sup>15</sup> Choo (2000) alludes to the retrospect of the Kuomintang government not to repeat its past mistakes of losing China due to the corrupted link between government and businesses and strenuously to implement the policy to foster small and medium-sized enterprises (SMEs) in Taiwan.

diverse application trends and new technology specifications (Chang and Tsai 2002:107).

Being small in size, it is very common that the owners of SMEs in Taiwan carry their own sample products and fly all over the world in search of new markets. Since most firms lack financial resources, it is prevalent for them to tap family, friends, relatives, and even the “informal market” for loans (Liu 1998: 344-345). For SMEs, in-house R&D activities are seldom carried out. Small companies in Taiwan avoid committing themselves to costly marketing and R&D investments (Chang 1992:205). Official statistics for 1994 indicated that more than 90 per cent of SMEs hardly conducted any technical research (Liu 1998: 344-345). Instead, they adopted imitative strategies and behaved as strategic follower. Although the profit margin of this strategy might be low but it is less risky.

### **Flexibility as competitive advantage**

The electronics industry is highly volatile, with frequently unexpected changes in demand and technology. Taiwanese firms can succeed in this industry because they are able to respond and adjust quickly to change. By combining incremental product innovation with incredibly fast speed-to-market, they have been able to establish a strong international market position relatively early in the product cycle. As Wang (1995/1996) notes, Taiwan's small firms fit into the IT industry due to their “flexibility, agility and assiduity”. PC firms in Taiwan have maintained close ties with global technological markets and by hooking up with multinational corporation's investment. Tung An-chi, a research fellow in economics at Academia Sinica (Taiwan's leading think-tank), attributes this in part to the "flexibility and keen entrepreneurship of Taiwanese businessmen who learned to find all possible niches, then grow, and compete in the world market without expecting prolonged government help." (Matthews 2002).

The primary source of this flexibility appears to be the specific organization of the domestic supply base in Taiwan, especially for parts and components. Two main features of this domestic supply base have contributed to the flexibility of Taiwanese producers, the first being an



extreme form of specialization. By engaging in single tasks and by producing, purchasing and selling in small lots, subcontractors avoid heavy fixed capital costs. This, in turn, makes it relatively easy to shift production at relatively short notice, and with minimum costs. The second feature is a certain network structure of multiple, volatile and short-term links that involve only limited financial and technology transfers. Spot-market transactions play an important role, but so do "temporary spider web" arrangements that are assembled for the duration of a particular job. The result of these characteristics is a form of open and volatile production networks, arguably even more so than the highly flexible production networks that characterize California's Silicon Valley. These flexible firms maximize the number of jobs in order to compensate for the razor-thin profit margins; as a result, they avoid being locked into a particular production network. Domestic supplier networks thus have been highly flexible and capable of rapid change, but short-lived and foot-loose.

In summary, the competitive edge in the PC firms in Taiwan is sustained through the support of their competent suppliers. Most of the PC components are supplied by small specialized enterprises. On the one hand, the specialization enables small firms to deliver cost-competitive and good quality parts to the larger PC companies. On the other hand, small firms allow for greater flexibility in meeting customized requirements from buyers, such as orders of various sizes and specifications. These small firms are willing to provide constant technical services to large PC firms in solving their production problems. In turn, small firms also improve their technological competence (Chang 1992: 209).

### **Local business network: center-satellite system**

The survival of Taiwan's small enterprises depends predominantly on entrepreneurial activities engaging in business networking. The business linkage scenario that places a large firm at the center and small firms as the surrounding stars is termed a center-satellite system (Liu 1998:344-345). Such networking system is initiated and sustained by the division of labor as well as by competitive niches that generate net benefits over the transaction

costs induced by cooperation and subcontracting among legally independent firms in Taiwan. According to Liu (1998: 344-345), three types of center and satellite systems exist between small and large firms in Taiwan: (a) backward integration pattern, where the SMEs supply key or spare components to large manufacturers; (b) forward integration pattern, such as the China Steel Company which provides processed steel material to the SMEs; (c) forward integration of distribution, where a large central firm mainly conducts trade, marketing and channeling, and where SMEs actually produce.

In this sophisticated networking system, the upstream and downstream manufacturers are each dedicated to specialized technologies in their own areas, without unwanted investment burdens, but responsive to each other with adequate speed (Chang and Tsai 2002:107).

Taiwan's SMEs have always relied heavily on informal social networks for access to resources, capabilities and knowledge that they are unable to mobilize on their own. The guerrilla tactics can be carried out in Taiwan's social and economic environment. With the help of the networks of classmates, friends, or the same family, Taiwan's small manufacturing firms can cooperate with friends quickly and temporarily form a company for a specific project. Without hierarchy, entrepreneurs of SMEs always go to the frontline in person to negotiate a deal. When there is no more profit, the cooperation may dissolve and move on each one's own until next opportunity arise.

Interpersonal and business networks are firmly established. Small businesses form tight networks encompassing personal and business relationships. Traditional Chinese social values, where human relationships are closely linked to families, relatives, friends, classmates, and previous colleagues, all prevail. Such networking not only relates to commercial activities but also the sources of information and financial aids (Liu 1998:344-345). Originally, these networks were restricted to family and kinship relations. They are now rapidly being substituted by professional "peer group" networks. This is especially true for the IT industry where resource and capability requirements are much more demanding than in traditional industries, and where participation in international knowledge networks is of the essence.

## **International production networks<sup>16</sup>**

As the economy becomes more specialized, the pressure for standardization increases. However, standardization may impede innovation. The solution to this dilemma is the establishment of tight linkages between firms along the supply chain that enhance the prospects for inter-organizational knowledge creation, for instance between end product manufacturers and component suppliers.

In Taiwan, SMEs are integrated into international production networks through international subcontracting and OEM arrangements. Receiving orders from overseas, large Taiwanese PC companies such as Tatung, First International Computer, Mitac and Acer rely on hundreds of loosely affiliated domestic suppliers to which they subcontract small tasks with low profit margin. In this way, typical Taiwanese small computer companies thus often get involved with foreign firms in an indirect way; large Taiwanese business groups dominate the direct interface with foreign customers.

Taiwan's manufacturing firms are integrated into the Turnkey production network<sup>17</sup> via global division of labour. In the so-called Turnkey production network, brand names, product definition, designs, and marketing are being kept in-house, while manufacturing, logistics, distribution, and other support functions are being outsourced. For this purpose, joint venture and strategic alliance are widely adopted in Taiwan. The TSCM is a typical example of an electronics company in Taiwan involving in international production networks.

---

<sup>16</sup> The concept of international production networks (IPNs) is an attempt to capture the spread of broader and more systemic forms of international production that cut across different stages of the value chain and that may or may not involve equity ownership. Such networks constitute an important organizational innovation that enables multinational corporations to cope with the conflicting requirements of specialization and coordination (Sturgeon (1997:38, note 73). For instance, in PC industry, final assembly is most likely dispersed to major growth markets in the US, Europe and Asia; microprocessors are sourced from the US; memory devices from Japan and Korea; motherboards from Taiwan; HDDs from Singapore; monitors from Korea, Taiwan and Japan; keyboards and power switch supplies from Taiwan (ibid, p.36).

<sup>17</sup> Sturgeon (1997) illustrates this new type of industrial organization has been nauseated in the USA. Therefore, the USA keeps the innovative capacity organizationally separate from productive capacity, which is pooled into external economies that can be tapped by the industry as a whole.

Acknowledging that advanced industrial countries are in charge of the core technology of computer, TSCM entered into this industry by creating a computer part OEM, computer chip. Specializing in certain production process, the firm was able to cut down the production cost and achieved quality control.

#### **(4) Regional arbitrageurship: alertness to cost reduction opportunities**

After mainland China opened its door for the world in 1978, Taiwan, with similar cultural backgrounds and using the same language as the mainland, has advantages of tapping affluent labour resources from the mainland. Well before the government announced the legal rules to invest in mainland China, Taiwanese entrepreneurs were already alert to the opportunity, namely, “taking orders in Taiwan; production in mainland China and distribution globally”. Although the Taiwanese government advises “no rush, be patient” when investing in mainland China, private enterprises in Taiwan circumvented many policy barriers by taking a detour through the third economy. As a result, most of the trades across the strait have been conducted indirectly through Hong Kong. Two-way indirect trade totaled US\$2.7 billion in 1988 and about US\$16.23 billion in 1994. From 1991 to February of 1994, the official statistics show that a total investment of US\$371 million, representing around 10000 cases, emanating from Taiwan among business and individuals, were invested in mainland China. Manufacturing industries of electric machinery, plastics, food, metal products, and textiles constitute the majority (94 per cent) of invested capital (Liu 1998: 344-345).

By relocating or subcontracting labour-intensive activities to the other low costs regions such as mainland China, while keeping offices in Taiwan as coordinating centers, manufacturing firms in Taiwan gradually evolved into trading firms. In some extreme cases, firms might have no production site in their hometown at all. They simply maintained an office for administrative purpose and subcontracted all jobs to other factories from the orders they received.<sup>18</sup>

---

<sup>18</sup> Such hollowing-out activities have been observed in Hong Kong too. See Yu (2000).

## A CASE STUDY: STAN SHIH AND HIS ACER

Stan Shih, born in Taiwan in 1944, is recognized around the globe for his achievements in the electronics industry. Graduating from the National Chiao Tung University in Taiwan, Shih began his career at Unitron Industrial Corp. in 1971, where he successfully designed, developed and commercialized Taiwan's first desktop calculator. Later in 1972, he helped establish Qualitron Industrial Corp., and led the team that designed the world's first pen watch. Acer Inc. currently employs 5,500 people supporting dealers and distributors in more than 100 countries. Revenues in 2004 reached US\$7 billion. In 1976, he was awarded one of the "Ten Most Outstanding Young Persons" in Taiwan. In 2004, *Business Week* selected Shih as one of the "25 Stars of Asia".<sup>19</sup> Stan Shih is regarded as the father of Taiwan's PC industry. Not only in design of PC and its parts, but also in brand-building and business management, Shih's Acer plays a precursor in Taiwan's PC industry.

### Perception of Opportunities and the Founding of Acer

Stan Shih is the best incarnation as an entrepreneur. He is an inventor, an ideas man, a quick learner and a relentless corporate operator (*Far Eastern Economic Review* May 24, 2001)

After working in electronics firms for some years, Stan Shih perceived that profit opportunities in IT industry are abundant. In particular, he saw profit opportunity as a distributor of electronic parts and a consultant in the use of microprocessor technologies. At that time, he had been frustrated by poor management decisions in the companies he had worked for (Matthews 2001). In 1976, Stan Shih, his wife, Carolyn Yeh, and a group of Shih's friends founded Multitech International Corporation which has become Acer<sup>20</sup> in 1987.

---

<sup>19</sup> In 1999, the Academy of International Business selected Shih as "International Business Executive of the Year". In 2003, the Taiwan Ministry of Economic Affairs presented Shih with the "Outstanding Contribution to Brand Building in Taiwan" award. Widely featured in industry and business media worldwide, in 1989, Fortune chose Shih as one of 25 People "You Ought to Know for Doing Business in Asia". In 2000 he was selected as one of Asia's "Top 25 Digital Elite" by *Asia Week's* first annual look at the people shaping Asia's high tech future. See <http://global.acer.com/about/index.htm>.

<sup>20</sup> In Latin, the term means active, energetic and incisive, as a reflection of its growing confidence and the beginning of its transition to a global firm.

The company began with only eleven employees and \$25,000 in capital. In 2004, the company has grown into a 5,500-employee multinational enterprise (*Acer's 2004 Corporate Profile*; Dedrick, Kraemer and Tsai 1999).

Acer's early success was based on acting as a Taiwanese agent for U.S. microprocessor firms such as Zilog, whose products were used in the early 1980s by Taiwanese producers of electronic games (Matthews 2001). In 1982 the PC industry worldwide took a momentous turn, when Compaq showed the world's first "IBM-compatible" machine at the trade fair. This provided the young Acer with a new kind of opportunity. Instead of pursuing its own proprietary architecture, as Apple and the entire Japanese PC industry did, Acer chose to become a low-cost producer of IBM-compatible machines, on its own account as well as under contract to other branded producers (Matthews 2001).

### **OEM, Entrepreneurial Learning and Improvement in Technological Capabilities**

When Shih founded Multitech (later renamed as Acer) in 1976, Taiwan was internationally known as a centre for manufacturing low-end products. Acer was no different. It built its reputation as an original equipment manufacturer for other computer makers such as U.S.-based Unisys and Texas Instruments (*Far Eastern Economic Review* May 24, 2001). The key to Acer's success is that it has pursued a gradual market penetration strategy. It avoided direct confrontation with strong rivals. Instead, it engaged in markets where leaders are not present there (Ernst 1998:48).

Acer's export success depended largely on OEM sales. However, the company distinguished itself from other OEM concerns by first improving on PC notebooks, and then on its integrated-circuit products. Acer, for example, was the first Taiwanese company to manufacture complex and powerful Dynamic Random Access Memory (DRAM), chips and was also a pioneer in producing components such as plasma displays and handsets. It was also the first Taiwanese company to market its own-brand PC (*Far Eastern Economic Review* May 24, 2001).

Early success in OEM business led Acer's management to believe it could reduce this dependence and jumped to producing its own brands. In 1988, Acer hired a senior IBM executive to reorganize the company with the explicit goal to transform it into a global competitor. IBM was still considered the industry's role model; by copying key features of IBM, Acer intended to frog-leaping. In particular, the policy was to increase the company's vertical integration and generate a critical mass of proprietary assets that would enable Acer to develop its own brand name image. This effort failed. The entrepreneur learnt from mistakes. Acer pursued a different approach. While continuing to pursue an OBM strategy, it simultaneously consolidated its position as an OEM supplier. Rather than trying to reduce its reliance on OEM contracts, the objective now is to increase the OEM share to 50 percent. This part of the strategy has worked well. For desktop computers, Acer is one of the five Taiwan-based producers that have collectively come to dominate the OEM market: Tatung, Acer, DEC's Taiwan affiliate, FIC and AST's local affiliate. In addition to its strong position in desktop PCs, Acer has also become a major OEM supplier of notebook computers for Apple and Canon. The result has been that, in 1994, the OEM share of Acer's PC sales had risen again to 35 percent (Ernst 1998:45).

### **Cross Strait Opportunities**

To imitate and duplicate electronic products from multinational firms is easy but to produce them at competitive prices is difficult. Taiwan's electronics manufacturers obtained their competitive edge by being alert to cost reducing opportunities. In particular, when they experienced an erosion of cost competitiveness, they moved to lower cost regions. Mainland China started her economic reform in 1978. For Taiwan's firms, this was a golden opportunity. Land is cheaper in the mainland than Taiwan. More importantly, there are abundant supplies of labour and qualified engineers. As mentioned, Taiwan and mainland China share similar culture, which makes mutual understanding easier. In general, people in mainland China during its early days of open door lacked knowledge of world markets and modern managerial skills. On the other hand, Taiwan's producers have suffered from

rising production costs in land rentals and wages. Entrepreneurs in Taiwan thus perform arbitrageurship between two locations.

Its close proximity, shared language and culture give Taiwan an edge over other countries in doing businesses with mainland China. Tung, a scholar from Academia Sinica rightly notes that "Taiwan has the ability to keep the upper end of the industries on the island, and the economy will prosper through the extended division of labour across borders." (Matthews 2002).

In Shih's view, the potential market in mainland China is the key to innovation for his company. Significant innovation requires a large enough market to justify the risk, and the mature Taiwan's economy simply doesn't provide ample incentive. For this reason, Shih intended to use mainland China to establish global position (*Far Eastern Economic Review*, May 24, 2001). Stan Shih believes that adopting Greater China as a home market will bring the economies of scale necessary for the company to introduce innovative and profitable new products - not just in mainland China, but globally. Mainland China is now central to the plans of the new-look Acer. With PC sales expected to grow from about 9 million units in 2001 to more than 22 million in 2005 -approximately 20 per cent of the worldwide total. Mainland China is a key market for products sold under Acer's own brand name, as well as an increasingly important low-cost manufacturing base. As Acer shifts its focus from North America to Asia and Europe, more emphasis will be put on mainland China. Currently, the company faces major challenges in the country, where its brand recognition and sales are low (*Far Eastern Economic Review*, May 24, 2001)

In particular, Acer built a \$50 million factory in Zhongshan, Guangdong in 1999. On top of low labour costs, the mainland provides more cost-effective access to components made there (often by other Taiwanese firms) and, of course, easier access to the local market. Acer will increase investment in the mainland to take advantage of this opportunity, not only considering the China market, but also the global market. Acer own-brand sales chief J.T. Wang remarks that in mainland China, Acer Inc. invests more than 4 per cent of its local sales revenue in marketing, compared to 2 to 3 per cent in most other



regions. Acer reported own-brand revenue of \$187.5 million in China last year, and expects a 70 per cent increase in unit sales this year (*Far Eastern Economic Review* May 24, 2001).

Acer describes its own competitive strength as "...the ability to market affordably-priced products quickly due to innovative production and distribution strategies, a component supply approach, a flexible and independent organization and economies of scale in manufacturing" (Ernst 1998:45).

## **CONCLUSIONS**

Many factors contribute to economic success in Taiwan. The colonial legacy, the US aid, a pool of hardworking manpower and competent government policies are among some of the valuable resources for Taiwan's miraculous growth. However, most scholars in economics have overlooked one very important factor, namely entrepreneurship. This study highlights the role of entrepreneurship in economic dynamics of Taiwan. It argues that Taiwan's economic success is principally attributed to entrepreneurship. More importantly, Taiwan's prosperity has originated in Kirznerian entrepreneurial discoveries, rather than Schumpeterian innovation. By surfing on the tide of technologies advanced overseas, latecomer economies such as Taiwan can develop into one the richest nations in Asia. The arguments in this essay may have significant policy implications to other developing countries.

From Taiwan's case, this study recommends survival and growth strategies for small latecomer firms based on the principle that economic change is evolutionary. During the initial stage of development, small latecomer firms can survive by conducting guerrilla entrepreneurship, imitation and follower strategies, and involve in international subcontracting as Original Equipment Manufacturers. Through learning and imitation, small latecomer firms later can conduct incremental innovation. As capabilities grow, they may move towards specialization or adopting a "one-brand-one-niche-product" strategy. Some of them can also partially move to become an Original Design Manufacturer. Finally, depending on their technological bases, some firms can serve as regional coordinators, by providing managerial, sourcing,

international marketing and outsourcing services in the global market. Taiwan's case fully illustrates that there are many paths for economic development.

## **Acknowledgments**

We thank Dian Kwan for her proof reading in this paper.

## **References**

- Acer 2004 Corporate Profile*, <http://global.acer.com/about/company.htm>. Access on March 30, 2005.
- Business Week* (1998), May 25<sup>th</sup>, Issue 3579.
- Business Week* (2004), *The Information Technology 100*, June 21<sup>st</sup>.
- Chang, Chung-Chau (1992), "Development of the Personal Computer Industry in Taiwan," in N.T. Wang (ed.) *Taiwan Enterprises in Global Perspective*, New York: M.E. Sharpe, Inc. , 193-214.
- Chang, Pao-long and Chien-Tzu Tsai (2002) "Finding the Niche Position—Competition Strategy of Taiwan's IC Design Industry", *Technovation 22*: 101-111.
- Chen, Hsin, Marinos Themistocleous and Kuang-Hui Chiu (2004), "Approaches to Supply Chain Integration Followed by SMEs: An Exploratory Case Study," *Proceedings of the Tenth Americas Conference on Information Systems*, New York, August.
- Choo, Myung-Gun (2000), *The New Asia in Global Perspective*, St. Martin's Press, Inc.
- Dedrick, Jason, Kenneth Kraemer, and Tony Tsai (1999), "Acer: An IT Company Learning to Use Information Technology to Compete," *Center for Research on Information Technology and Organizations*.
- Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. (2002), *The Report on 2001 Industry, and Commerce and Service Census, Taiwan - Fukien Area, the Republic of China*, Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C.
- Economist* (1998), "Country Survey: Taiwan," Nov. 5<sup>th</sup>, Volume 349, Issue 8093.
- Ernst, Dieter (1998), "What Permits Small Firms to Compete in High-Tech Industries? Inter-Organizational Knowledge Creation in the Taiwanese

- Computer Industry,” *Danish Research Unit for Industrial Dynamics*, Working Paper, No. 98-3.
- Far Eastern Economic Review (2001), May 24<sup>th</sup>.
- Forbes (2005), “Forbes World Richest People,” March 10<sup>th</sup>.
- Gilad, Benkamin, Stanley Kaish, and Joshua Ronen (1988) “The Entrepreneurial Way with Information”, in Shlomo Maital (ed.) *Applied Behavioral Economics*, Somerset: W heatsheaf, Vol. II, 481-503.
- Hayek, F.A. (1945), “The Use of Knowledge in the Society”. *American Economic Review*. 35:519-30.
- Hobday, Mike (1995), *Innovation in East Asia: The Challenge to Japan*, Vermont: Edward Elgar.
- Kim, Seok-Ran and Nick von Tunzelmann (1998), “Aligning internal and external networks: Taiwan’s specialization in IT”, *Electronic Working Papers Series*, Paper No 17, Science Policy Research Unit, University of Sussex.
- Kirzner, Israel M. (1973), *Competition and Entrepreneurship*, Chicago: University of Chicago Press.
- Kirzner, Isreal M. (1985), *Discovery and the Capitalist Process*, Chicago: University of Chicago Press.
- Kuo, Shirley W.Y. (1997), *Economic Policies: The Taiwan Experience 1945-1995*, Taipei: Hwa-Tai Book Company.
- Lam, Danny Kin-Kong and Ian Lee (1992), “Guerrilla Capitalism and the Limits of Statist Theory: Comparing the Chinese Nics’ in C. Clark and S. Chan (eds.), *The Evolving Pacific Basin in the Global Political Economy* (London: Lynne Rienner Publishers), 107-124.
- Lee, Yuan Tsao and Linda Low (1990), *Local Entrepreneurship in Singapore: Private and State*, Singapore: Times Academic Press, Institute of Policy Studies.
- Liu, Shang Jyh (1998), “Industrial Development and Structural Adaptation in Taiwan: Some Issues of Learned Entrepreneurship”. *IEEE Transactions on Engineering Management*, 45(4): 338 – 348.
- Matthews, John A. (1997), “Organizational innovation on a global scale: The case of the Acer Group”, Centre for Corporate Change Paper No. 070, University of New South Wales: Sydney.
- Matthews, John A. (2001), “Taiwan’s Dragon Multinational: The Acer Group”, *MGS Case 2001-3*, Macquarie University.

- Matthews, John A. (2002), *Dragon Multinational: A New Model for Global Growth*. New York, New York: Oxford University Press, Inc.
- Matthews, John A. (2004), "Understanding the "how to" of Technological Change in Fast Growing Economies: The case of Electronics in Taiwan", MGSM WP 2004-21, Macquarie University.
- Numazaki, Ichiro (1997), "The Laoban-Led Development of Business Enterprises in Taiwan: An Analysis of the Chinese Entrepreneurship," *The Developing Economies*, XXXV-4, 440-57.
- Shieh, Gwo-Shyong (1992), *"Boss" Island: The Subcontracting Network and Micro- Entrepreneurship in Taiwan's Development*, Peter Lang Publishing: New York.
- Shih, Cheng Feng (1994), "An Attempt at Understanding Taiwan's Economic Development", *Journal of Law and Politics*, 2:59-82.
- Shih, Stan (2004), *Millennium Transformation-Change Management for New Acer*, Commonwealth Publishing Company. (in Chinese)
- Small and Medium Enterprise Administration (SMEA), (2004), *White Paper on Small and Medium Enterprises in Taiwan, 2003*, Ministry of Economic Affairs, R.O.C.
- Sturgeon, Timothy (1997), "Turnkey Production Networks: A New American Model of Industrial Organization?" *Berkeley Roundtable on the International Economy (BRIE)*, working paper 92A.
- Wang, Vincent Wei-cheng (1995/1996), "Developing the information industry in Taiwan: Entrepreneurial State, Guerrilla Capitalists and Accommodative Technologies", *Pacific Affairs*, Winter, 68(4): 551-577.
- Yu, Tony Fu-Lai (1997), "Entrepreneurial states: the role of government in the economic development of the Asian Newly Industrialising Economies", *Development Policy Review*, 15 (1):47-64, March.
- Yu, Tony Fu-Lai (1999), "Bringing Entrepreneurship Back In: Explaining the Industrial Dynamics of Hong Kong with Special Reference to the Textile and Garment Industry", *International Journal of Entrepreneurial Behaviour and Research*, 5(5):235-250.
- Yu, Tony Fu-Lai (2000), "Hong Kong's Entrepreneurship: Behaviors and Determinants," *Entrepreneurship and Regional Development*, 12(3):179-194.