



RECAPTURING THE TAIWAN MIRACLE

Diversifying the Economy Through Innovation and Collaboration

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Introduction

Big changes are underway in Taiwan. Its first female elected president, Tsai Ing-Wen, was inaugurated in May, heralding a break with the past in politics and public administration. In addition to the thorny entanglements between Taiwan and China, the island's economic growth and competitiveness will be important issues for the new government to tackle in the coming years.

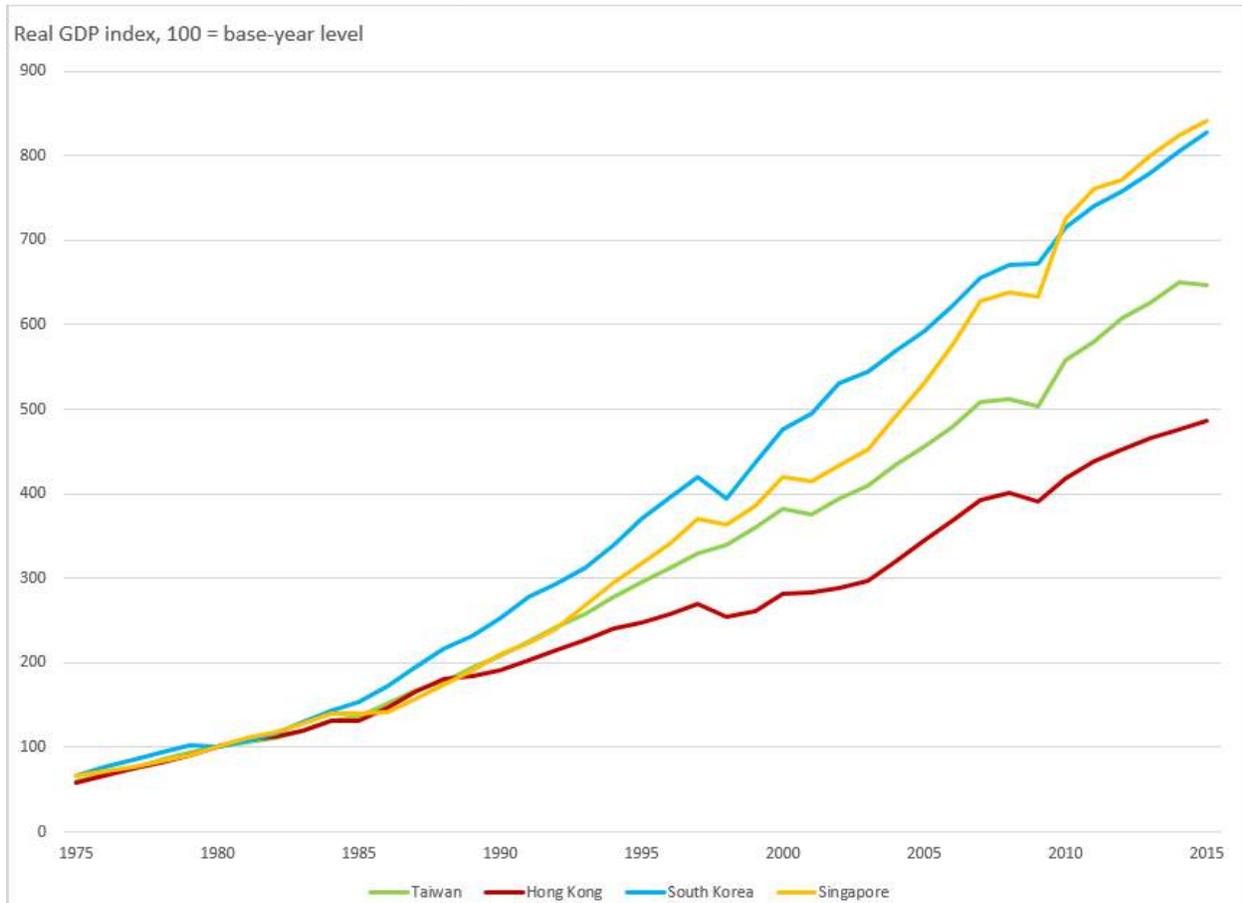
Taiwan was once an entrepreneurial, technology-driven economy. Together with Hong Kong, Singapore, and South Korea, it was part of the Asian Four Tigers. Indeed, prior to the early 1990s, the Tigers' real GDP growth often surpassed 10 percent,¹ and Taiwan often ranked among the fastest-growing economies in Asia. That dynamic pace eased in the 1990s, but Taiwan still averaged 6.6 percent growth during the decade and gained a commanding position in building high-tech industries and promoting entrepreneurship. As the 20th century came to a close, the island had achieved the Taiwan Miracle — its authoritarian political system evolved into a democracy while its economy boomed.

However, since 2000, growth has been erratic and often compared poorly with other Asian Tigers. From 2000 through 2009, the real GDP sank to an average 3.8 percent. Although Taiwan appeared to regain the lead among its counterparts in 2014 with 3.9 percent growth, a weakened domestic industrial base and a struggling economy put it at the bottom of the Tiger rankings for several years: 2000, 2001, 2008, 2013, and 2015. Taiwan's economy has long been heavily reliant on exports, especially computer hardware products. However, data released by the Ministry of Finance in June show that overall exports have declined 16 months in a row.

This problem has much to do with weakness in high-tech exports, which is extremely sensitive to external demand fluctuations. The plunging profits of onetime star Taiwan Semiconductor Manufacturing Co. (TSMC) in the first quarter of 2016 was a clear warning sign for Taiwan's future prosperity. Overall, the performance gap between Taiwan and the other Asian Tigers has widened in recent years, as the chart below illustrates. All four have been export driven and reliant on global markets, and technology products have accounted for particularly large shares of South Korea and Taiwan's commerce. As the disparity between the two increased, it became clear that technological innovation and branding success caused the divergence.

1. GDP growth rates in this section are calculated from Bloomberg data.

Indexed Real GDP Growth of Asian Tigers (1975-2015; Base Year = 1980)



Source: Drawing based on data from Federal Reserve Bank of St. Louis and Bloomberg.

Where is the Taiwanese economy heading? Will Taiwan's industries, particularly its renowned consumer electronics sector, reinvent themselves to share the upside of the increasingly technology-driven service space? More pointedly, can Taiwan's public and private sectors work together to reignite the entrepreneurial spirit that put the Taiwan brand on the global stage in the 1970s, 1980s, and 1990s?

In this paper, we briefly review the trajectory of Taiwan's economic development and offer our thoughts about how it can facilitate the resurgence of the Taiwan Miracle.

A Review of Recent History

1. The Government's Economic Strategies

In the 1960s, a plentiful and cheap labor force helped enable Taiwan to develop labor-intensive industries. During this period, Taiwan was the world's primary exporter of such consumer goods as shoes, toys, and umbrellas. To augment the export-oriented development strategy, the government enacted the Statute for the Encouragement of Investment in 1960 to encourage businesses to engage in international trade by providing tax incentives. In addition, since 1966 Taiwan has established several Export Processing Zones (EPZs), which provided investors with infrastructure, streamlined the

administrative process for business operations, and offered tax incentives. EPZs also provided the rural populace with job opportunities and attracted foreign investment and technological knowhow (Yu and Wang, 2012:22). Essentially, light industry coupled with international trade was the growth engine for Taiwan's economy in the 1960s.

In the 1970s, Taiwan also started nurturing heavy industries, particularly petrochemicals and steel. The exports from both the maturing light industry and the emerging heavy industry kept expanding during this period and carried Taiwan's economy forward. Despite this, the rise of many other developing countries with abundant and cheaper labor forces eroded Taiwan's comparative advantage in labor-intensive manufacturing. Recognizing the waning momentum of the labor-intensive, export-oriented model, the government refocused its industrial policy on science and technology development.

To facilitate this policy, officials initiated two important programs. In 1973, the nonprofit Industrial Technology Research Institute was founded to conduct applied research and nurture companies by providing technical services and transferring its research to them. In 1980, Hsinchu Science Park was established to encourage the nascent development of high-tech industries. These two initiatives attracted overseas talent to Taiwan and spawned a number of giant tech firms such as United Microelectronics Corp. and TSMC, which are among the world's leading semiconductor foundries.

In the 1980s, the government undertook more institutional reforms, including trade liberalization and financial deregulation, to better integrate Taiwan into the world economy. As Taiwan was becoming a more open economy and its production costs rose, many manufacturers from both the labor-intensive and high-tech industries began to relocate production facilities to low-cost Southeast Asian countries and China. The opening of China in the late 1970s in particular attracted many Taiwanese manufacturers, who set up production there as a way to mitigate rising costs at home, despite the government's efforts to limit the migration of firms and the transfer of technological and managerial know-how. Some argue that this offshoring has "hollowed out" Taiwan's industrial base, whereas others believe this strategy helped restore the strength of Taiwanese manufacturers (Berger and Lester, 2005; Wang and Mai, 2001).

The high-tech sector has been the mainstay of Taiwan's economy in the recent three decades. Although the government has advanced various policies and initiatives to sustain its economic and industrial development starting in the 1990s, they've been less effective than the program backing high-tech. The recent lackluster performance signals Taiwan's need to recraft its strategies, which it recognizes. In addition to the effort to strike more trade agreements, President Tsai announced that the government will nurture five pillar industries to spur the economy: green technology, national defense, the Internet of Things, biomedicine, and advanced machinery. Yet the details of the plan, and its effectiveness, remain to be seen.

2. The Private Sector's Models

Despite the debate about whether the relocation of production hurts Taiwan's economic development, the cost reductions achieved by relocation did benefit many of its companies. This strategy allows Taiwanese firms in various industries, high-tech in particular, to assume the role of original equipment

manufacturer (OEM). Under the OEM model, Taiwanese companies mainly focus on manufacturing products for multinational corporations that specialize in product design and research and development (R&D). In the 1990s, a substantial number of Taiwanese firms began to engage in product design and even branding, known as the original design manufacturer (ODM) and original brand manufacturer (OBM) models.

This OEM/ODM model adopted by Taiwanese manufacturers (especially in the electronics and technology sector) has been driving Taiwan's economy since the 1980s. However, many observers have pointed out that the strategy has lost its luster. An increasing number of high-tech, low-cost firms from developing economies now compete in the marketplaces Taiwan's firms once dominated.

The cutthroat competition has severely compressed profit margins. In addition, Taiwan has lost much of its technological edge over developing countries while its firms' longstanding specialization in manufacturing has held it back in design and R&D capacity compared with their counterparts in other advanced economies. Taiwanese high-tech firms now find themselves challenged to compete on price with rivals in developing economies and no match for the innovation prowess of tech firms in advanced nations (Berger and Lester, 2005). Overall, the island's excessive reliance on a weakening manufacturing sector has put it in a difficult economic position.

In addition to the OEM/ODM model, the other key force propelling the Taiwanese economy is small and medium-sized enterprises, or SMEs. Although there are a few large Taiwanese firms such as Hon Hai/Foxconn Technology Group, most companies fit into the SME stratum. They are known for being entrepreneurial and flexible, and they are credited with insulating Taiwan against the 1997 Asian financial crisis. However, their relatively smaller size disadvantages Taiwanese firms in the global competitive arena.

Public and Private Sectors: Cultivate Innovation

Facing stiffer competition and the intertwining of high-tech products and services in the consumer market, Taiwan needs to reignite technology-led growth and recapture its competitive edge. To initiate change and remake the Taiwan Miracle, a public-private partnership is needed. For the private sector, we believe that cultivating innovation, establishing and strengthening the "Taiwan brand," and enhancing service offerings would make Taiwanese businesses more competitive, sustainable, and resilient. We suggest that the public sector, on the other hand, should serve as a facilitator, creating a regulatory and institutional environment that promotes innovation and entrepreneurship and expands and diversifies industries and the talent pool.

1. For Government

To foster an environment that enables Taiwanese industry to upgrade and expand, we believe the government should focus its efforts on the following four areas.² An agency or task force should be

2. We recognize the importance of Taiwan being better integrated into the global and regional economies. In this paper, however, we focus on economic and industrial policy.

dedicated to tracking global economic developments and helping the private sector turn them into opportunities.

SPUR RESEARCH AND DEVELOPMENT

Government can take the lead in encouraging innovation in various industries. However, the relatively small scale of most Taiwanese firms presents an obstacle. SMEs typically lack the funding and capabilities necessary to set up innovative R&D departments. Although officials have presented such initiatives as the Statute for Industrial Innovation, their effectiveness remains unclear.

To address this issue, the government should encourage more companies, emerging and high-value-added types in particular, to develop their own R&D departments. It can be very costly to invest in innovation, so the public sector may establish a partnership with the private sector to help provide space, equipment, funding, ancillary services, and network opportunities.³ Although there is little cash to spare in the government budget currently, Taiwanese society has a high savings rate, demonstrating that money is plentiful in the private sector. The government should design policy tools that encourage private enterprises, research institutions, and the general public to invest in R&D, eventually benefiting all stakeholders.

In addition, the public sector can facilitate cooperation between industry and publicly funded universities or foreign research institutions. In particular, the government should facilitate the transfer and application of know-how developed in academia and in the high-tech sector to other industries to develop higher-value-added products and services.⁴ Through this mechanism, each side can learn from the other and may help the private sector nurture its R&D capacity and convert research outcomes into sales.

DIVERSIFY INDUSTRIES AND NURTURE ENTERPRISES

In the last 30 years, tech exports such as cellphones and dynamic random-access memory semiconductors, often called DRAMs, have been the engine of Taiwan's economic development. However, demand for electronics is vulnerable to business cycles. Also, the cutthroat competition in the industry further dampens Taiwan's prospects. To mitigate the risk of overreliance on the tech sector, Taiwan needs to cultivate other industries, as the new government has declared. To diversify the economic base, it will be important to craft an ecosystem that builds more robust supply chains in a range of industries by pulling resources from both the public and private sectors, domestically and globally.

The government can also encourage more entrepreneurs to start businesses with great growth potential. The successful startups will likely generate more permanent, high-paying jobs. In addition to

3. LabCentral (a private, nonprofit institution in Massachusetts) and the Venture Development Center at the University of Massachusetts, Boston, provide affordable shared space and equipment for startups. They can serve as R&D cultivation models for Taiwan's public and private sectors.

4. Currently, faculty members in Taiwanese universities are not allowed to start businesses. We think the government should consider encouraging instructors to convert their research into products, yielding revenue that would expand R&D activities.

nurturing startups, the government may consider facilitating the formation of larger enterprises. Because of SMEs' inherent competitive disadvantages, the government can either support the formation of larger companies or encourage SMEs to enter strategic collaborations with such entities.

CREATE A FAVORABLE REGULATORY AND INSTITUTIONAL ENVIRONMENT

In the past few decades, the Taiwanese government essentially drew the map for economic and industrial development.⁵ This public sector guidance tended to exert a heavy influence on the decisions of business owners. But as Taiwan shifted from an authoritarian to a democratic and free market system, the government's role diminished. In addition, as the world economy becomes more complex and less predictable, the public sector finds itself challenged to obtain sufficient information to make sound decisions for the overall economy.

On the other hand, Taiwan's private enterprises, despite mostly small or medium sized, have been known for their ability to learn and adapt quickly. They tend to identify new market dynamics and make timely adjustments much faster than the public sector does. Hence, the government must reposition itself as a facilitator of economic development and industrial upgrading. To do so, it should interact frequently with businesses to learn about their needs and the dynamics of their markets, and it should create regulatory and institutional regimes that facilitate timely industrial restructuring and streamline private-sector operations.

An important related issue for the government to address is attracting and retaining multinational companies and foreign investments. In recent decades, quite a few globally known firms considered establishing their businesses in Taiwan. However, Taiwan's rigid regulations and long administrative review processes prevented them from setting their feet in Taiwan and instead they invested in other Asian countries. Some international companies such as Barclays recently closed their offices in Taiwan. In addition, foreign investment levels have been near the bottom among Asian nations. Taiwan must make institutional reforms to better accommodate multinational companies and investors.

CULTIVATE AND DIVERSIFY THE TALENT POOL

Taiwan has a large pool of highly educated people — 42.7 percent of the population age 15 years and older have a bachelor's degree and above.⁶ Universities and industries have collaborated in connecting academic research and applied technologies. Despite this, a recent survey using the Taiwan Education Panel Survey and Beyond (TEPS-B) data show that many college graduates have often found it hard to apply their college learning to their jobs (Chang, 2015). Since the government has a large role in guiding Taiwan's higher education, it could facilitate interactions among authorities, businesses, educators, and students to better match students' learned skills with real-world needs.

5. Since the early 1950s, Taiwan's government has implemented economic plans with four- to 10-year time spans. The effectiveness of government-led plans has waned in recent decades.

6. Department of Statistics, Taiwan Ministry of the Interior (2016). "2016 Week 11 Interior Statistics Summary," http://www.moi.gov.tw/stat/news_content.aspx?sn=10392&page=0, accessed April 12, 2016.

Another challenge is to retain and attract talented workers. According to Oxford Economics' Global Talent 2021 report, Taiwan will face a severe talent deficit within five years. Although it has large pool of highly educated workers, low wage scales have spurred a brain drain from the island. In addition, Taiwan has had restrictive regulations on immigration, yet lacked concrete and consistent immigration policies (Lin, 2012), posing barriers to the entry of foreign professionals. To lift wage levels, long-term structural economic change may be necessary. To attract international talent, the government may need to develop forward-looking policies such as a streamlined green-card program that grants valued foreign workers permanent residence.

2. For Industry

Retracing Taiwan's development in the last few decades, it's clear that robust, flexible industrial production and entrenched global manufacturing supply chains have been the foundations of its prosperity. Reinventing, transforming, and adapting to new marketplaces and product segments in today's global economic and trade environment are critical to bolstering the competitiveness of Taiwan's industrial base. Notably, there are several areas in which Taiwan's private sector can realistically make improvements and adaptations to enhance its position.

DEVELOP HIGH-QUALITY, HIGH-VALUE-ADDED PRODUCTS

As discussed above, many Taiwanese manufacturers in sectors ranging from traditional industries to high-tech have relied on the so-called "low-cost strategy" by relocating their production facilities to China and Southeast Asia. However, production costs in these alternative regions are rising and the low barriers to entering these industries have pressured profit margins.

Although searching for new, cheaper production sites could slightly raise manufacturers' margins, the cost advantage can be only temporary. An extended strategy derived from the OEM/ODM model would be to use more advanced technologies and know-how to produce high-quality products with larger profit margins while raising the threshold for competition. Porite, a world leader in machine parts manufacturing, is an example of a Taiwanese company that uses the OEM/ODM model to sell such advanced products.

INNOVATION AS THE KEY TO COMPETITIVENESS

Most Taiwanese SMEs have adopted the OEM/ODM model and not emphasized costly research and development activities (Yu and Kuo, 2015). But as profit margins get thinner and product cycles shorter, innovation in products and operations has become essential to businesses' long-term survival. Indeed, the most forward-looking strategy is to invest resources in innovation and R&D. This is particularly vital if Taiwan is to reinvent its high-tech sector. Currently, despite the "high-tech" moniker, most engineers in Taiwanese high-tech firms spend the bulk of their working hours monitoring the manufacturing process to ensure product quality. Compared with their counterparts in the United States, only a few are involved in the innovation and R&D that yield high-value-added products and drive long-term growth.

Even though innovation and R&D are expensive and risky investments for private enterprises, the products and services derived from innovation are typically unique and difficult to replace. Hence, the

returns can be abundant and long-lived. For example, Giant, a Taiwanese bicycle manufacturer, set its global operational and R&D headquarters in Taiwan. It once used the OEM model but later decided to engage in R&D and branding. It is now a world leader in its industry.

STRENGTHEN BRANDING AND MARKETING

Another important task for Taiwanese companies to focus on is building and promoting their own brands and expanding their market reach. Since Taiwan has a small domestic market, companies must expand their presence elsewhere. Currently, many Taiwan enterprises rely on just a few markets, China in particular. In addition, the livelihoods of many tech suppliers are closely tied to the performance of a handful of giants such as Apple Inc.

This is a risky strategy, which could be undermined if the business ecosystem changes. For sustainability, Taiwanese enterprises need to expand their client bases. They need to build their own brands and promote their names in more markets. A few Taiwanese companies have been marketing through the OBM model to capture share in other places. However, there is still room to expand operations, particularly in such emerging markets as Brazil, India, and Russia. The marketing effort would boost recognition of Taiwan's industrial capabilities directly with end users.

DEVELOP AFTER-SALE AND HIGH-END SERVICES

There is yet one broader item on the to-do list for major Taiwanese companies: develop better after-sale and high-end services. The Taiwanese brand Asus, for instance, is well-known for its computer hardware and electronics products. It has long been involved in innovation/R&D and is serious about branding its products. However, customers outside Taiwan may encounter difficulty trying to find Asus service posts to support the product they've purchased. That may encourage them to purchase similar products from companies such as Apple or others whose service network is more widespread and accessible.

High-end services is another area to cultivate. Taiwanese companies should consider providing higher-value-added services that can attract investment to Taiwan, which already offers the advantages of a democratic political system with a large pool of highly educated workers and a well-established tech sector. For example, with the rise of Big Data and FinTech, Taiwanese businesses should develop reliable, trustworthy, quality offerings in such areas as data storage, data processing, and financial services.

Conclusion

In the second half of the 20th century, Taiwan was a very successful economy. Although its competitiveness and robust technology-driven entrepreneurship have eroded, Taiwan's strong trade links endure and it retains its key position in consumer electronics production. Today, its development path, led by the technology sector, is still a model that many emerging nations emulate. Recently, Taiwan's economic performance has been mediocre at best. The headwinds faced by high-tech manufacturing may suggest that Taiwan needs to find an alternative path to advance the island's economy in the future.

To reclaim the Taiwan Miracle, we believe it is vital for Taiwan to move from the low-cost manufacturing strategy to a high-value-added one through innovation and establishing the Taiwanese brand. Most importantly, Taiwan must recapture its entrepreneurial spirit, which blended industrial development with rapid adoption of new technologies and energetic capital formation. That very spirit, along with smart government policies, gave birth to global ODM/OEM conglomerates such as Hon Hai, Asus, and TSMC, among others.

In addition, Taiwan should diversify its growth engines beyond high-tech manufacturing into the high-tech services area in Asia. Given Taiwan's advantage of being a democratic society with strong intellectual property protection, Taiwan can capture a substantial portion of the rapidly rising demand for technology services such as cloud storage.

To achieve these goals, it is imperative for private and public sectors to collaborate to craft diversified development strategies. Private enterprises typically have the most current and acute insights into business dynamics and are prepared to adapt to leverage opportunities. The public sector, on the other hand, tends to have a broad view of economic prospects, and it can provide regulatory tools and resources to facilitate development.

Given that the Taiwanese government lacks the financial capacity to pour large sums into initiatives it hopes would drive economic development, an accommodating institutional and regulatory environment is the most suitable approach to spurring progress. Officials have the means to encourage private capital to invest in Taiwan's future and make Taiwan a base for managerial and innovation activities. We believe Taiwan's economic resurgence will largely depend on the close collaboration between the private and the public sectors.

References

- Berger, Suzanne and Richard K. Lester (2005). "Globalization and the Future of the Taiwan Miracle," *Global Taiwan: Building Competitive Strengths in a New International Economy* (Berger, Suzanne and Richard K. Lester eds.). New York: M.E. Sharpe.
- Chang, Fengbin (2015). "Educational Resources, Job Match, and Employment Outcomes in Taiwan," TEPS-B Working Paper, No. 2015-02, http://tepsb.nccu.edu.tw/download/TEPS-B_working_paper_201502.pdf, accessed April 12, 2016.
- Department of Statistics, Taiwan Ministry of the Interior (2016). "2016 Week 11 Interior Statistics Summary," http://www.moi.gov.tw/stat/news_content.aspx?sn=10392&page=0, accessed April 12, 2016.
- Lin, Ji-Ping (2012). "Tradition and Progress: Taiwan's Evolving Migration Reality," Washington, DC: Migration Policy Institute, <http://www.migrationpolicy.org/article/tradition-and-progress-taiwans-evolving-migration-reality>, accessed April 12, 2016.
- Oxford Economics (2012). *Global Talent 2021: How the New Geography of Talent Will Transform Human Resource Strategies*. Oxford: Oxford Economics.
- Wang, Jiann-Chyuan and Chao-Cheng Mai (2001). "Industrial Development Strategy and Structural Transformation," *Taiwan's Economic Success Since 1980* (Mai, Chao-Cheng and Chien-Sheng Shih eds.). Northampton: Edward Elgar.
- Yu, Chilik and Yu-Ying Kuo (2015). "Policy Analysis in a Time of Turbulence," *Policy Analysis in Taiwan* (Kuo, Yu-Ying ed.). Bristol: Policy Press.
- Yu, Tzong-Shian and Chin-Li Wang (2012). *What's Next for Taiwan's Industrial Development?* Taipei: Linking Publishing (in Chinese).

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