Proprietary Technology: The Next Challenge for the NICs

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The future economic success of the Asia Pacific region is predicated on developing and sustaining a successful manufacturing sector. This must include not only primary processing and secondary manufacturing, in which the region has considerable experience, but the development of proprietary products and technologies. This latter endeavor is proving a challenging undertaking for the newly industrialised countries (NICs) of the region, Hong Kong, South Korea, Singapore, and Taiwan.

The NICs are not only newly industrialised but also new in a larger sense, their modern development having started as recently as the late 1940s to 1960s. Hong Kong, South Korea, Singapore, and Taiwan have had to rebuild themselves phoenix-like from the effects of, variously, Japanese occupation, the Second World War, civil war, secession, the fleeing Kuomingtang, and refugees from the People's Republic of China (PRC).

In rebuilding, the NICs chose the path of industrial development, with spectacular success. Their combined current account surplus reached almost $30 billion, in 1987, compared to a surplus for the entire European Community of $39 billion. In contrast to both Europe and the United States, where manufacturing output as a proportion of GDP is on a long-term decline, the Asia Pacific region is experiencing the opposite trend. Furthermore, intraregional trade in manufactured goods is increasing, as are investments in manufacturing capacity – principally by Japan, and, to a lesser but growing extent, by South Korea and Taiwan. The genuinely integrated regional market now emerging contains more than 1.5 billion people (including the People's Republic of China) and offers tremendous growth opportunities. Projections are that by the year 2000 the Asia Pacific economies will have a combined GNP greater than Europe's and comparable to North America's.

The NICs are ideally positioned, both geographically and culturally, to serve this market and flourish in its growth. However, to fulfill this potential they will have to make the crucial transition from relying on other countries' technology to developing and manufacturing their own. For a variety of reasons, they are finding this transition particularly challenging.

The Price of Success

The NICs have built their success on a number of factors. Perhaps most important has been a labour force that is not only cheap (in part because of early currency devaluations by South Korea and Taiwan), but skillful, disciplined, industrious, and – in South Korea and Taiwan – highly educated. They have also enjoyed political stability (through strong autocratic governments, except in Hong Kong) and active government participation in industrialisation (again, apart from Hong Kong). Furthermore, they have benefited from an open U.S. market and from considerable U.S. aid to South Korea and Taiwan. But success has its price, as these countries are discovering. One of the consequences of rapid development is the erosion of cost-competitiveness caused by rapid wage increases and currency revaluations.

There are also fundamental internal changes under way, such as ongoing labour unrest; demands for greater political freedom; changes in the education system along the lines of Western liberalism, with creativity replacing learning by rote; and the promotion of individual excellence in preference to group performance.

Externally, the NICs face growing trade friction with the United States, whose market is another key to their success. They have concerns about a possible Fortress Europe. Their Western business associates are increasingly sensitive to violation of copyright and patent laws, and nervous about transferring know-how or providing access to research that may yield future technologies for Asian competitors. The playing field is changing, and so are the rules.

Current Technology Positions

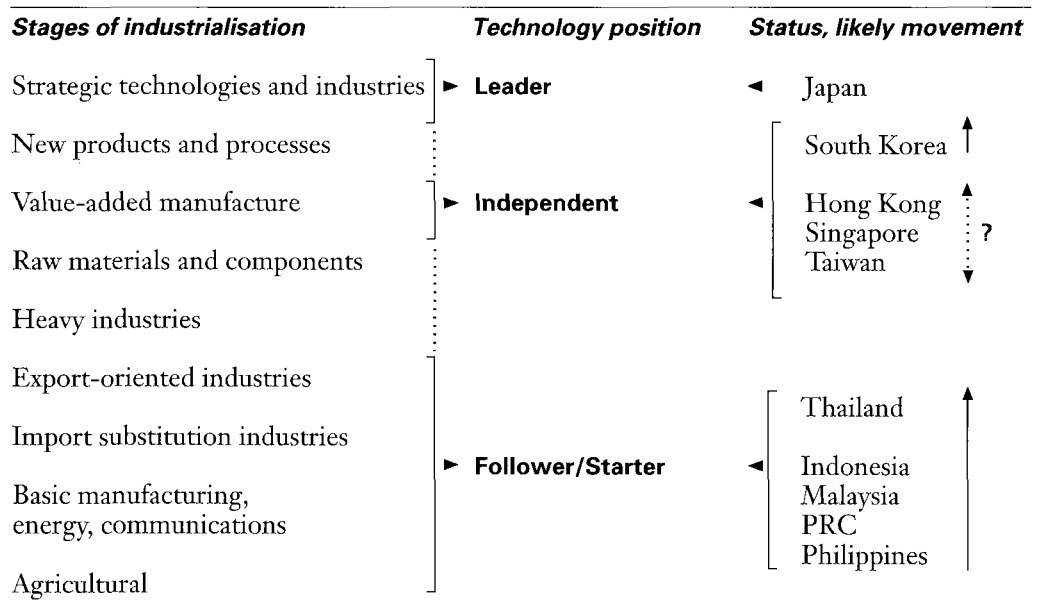
The ability of the NICs to confront these challenges and remain industrially competitive is a function of both their current technology positions and the efforts they are prepared to make over the next few years. Figure 1 looks at the relationship between a nation's stage of industrialisation and its technology position and indicates the likely movements of selected countries. By „technology position" we mean not current performance, but the potential to be technologically competitive in the next decade or so.

Leaders are industrially strong. They have major domestic markets and exert considerable influence on the global competitive strategies of corporations and nations. They enjoy strong bargaining powers.

Independents have well-developed manufacturing industries and infrastructures, strong financial positions, and growing global investments. They are in a position to shape future industrial directions. They have increasing bargaining power and attendant responsibilities in international trade. The NICs fall into this category in varying degrees.

Figure 1

Stages of Industrialisation and Technology Position, Selected Countries



Followers/Starters are engaged in low-value-added activities, offering cheap-labour operations to richer nations. Their bargaining power is low. Their strategies are vulnerable to a number of factors beyond their control, including even-lower-wage competition from around the world; decreases in labour content in manufacturing processes, brought about by increased mechanisation and automation; and revisions in the strategies of the richer nations they serve. Many of the latter are now questioning the wisdom of manufacturing offshore for the sake of cheaper labour alone, rather than to serve export markets and overcome trade barriers (the postwar Japanese strategy). Followers should consider themselves Starters on the complex road to industrialisation. After all, the NICs began this way, as did Japan after the war.

According to this classification, Follower/Starter nations include Indonesia, Malaysia, the Philippines, the PRC, and Thailand. These countries are challengers to the NICs, wanting to emulate their growth. They are developing national industrial strategies, policies, and master plans, and inviting foreign investment in manufacturing. Thailand could be showing the way: manufactured goods overtook commodities as the country's main export in 1987.

The NICs, as Independents, are at critical transition phases. Their roots remain in cheap-labour manufacturing, and their experience and management methods are limited primarily to this area. It is by no means certain that they will successfully enter and sustain leadership positions. Each is at a unique crossroad where important choices must be made.

South Korea. South Korean companies are now increasingly successful in the development of proprietary products. They are also investing heavily in R&D, both internally and collaboratively. In our view, the distinguishing features of leadership are the ability to identify new products and processes of world market potential, and the ability to take R&D to the marketplace effectively, from the initial concept through development, manufacture, marketing, distribution, sales, and customer support. South Korea is determined to attain leadership status, and all signs indicate that it will succeed.

Taiwan. Taiwan is also committed to manufacturing industries, but must address a number of issues. These include developing larger and more international companies, developing its human resource base in both technical and managerial skills, and establishing its own marketing capabilities. Taiwan also needs to balance a Confucian culture – with its emphasis on respect for family, hierarchy, and authority – with Western attitudes that value innovation, questioning, delegation, and meritocracy. Furthermore, as holder of the world's second-largest foreign exchange reserve (after Japan), it must convert its savings mentality to one of investing for long-term benefit.

Singapore. Singapore has successfully implemented the new high-wage policies introduced by the government in 1979. However, it faces challenges from the labour market and is constrained by its limited domestic market of just 3 million people. Broadening its interests from manufacturing, Singapore aspires to become the business centre in the Asia Pacific region. It is actively wooing multinationals to establish regional headquarters on the

island. Among its lures are significant financial incentives, as well as a fine infrastructure for manufacturing, finance, telecommunications, and international communications. It also offers a well-educated work force, a sophisticated cosmopolitan culture, and the promotion of a venture capital industry. Singapore's new niche may be to emphasise financial services, and services in general. However, high technology and R&D remain important elements in its economic policy.

Hong Kong. In Hong Kong, unlike the other NICs, economic and industrial developments have been determined solely by market forces, rather than by government policy and participation. But things are changing. The lack of industrial or technology policies, and particularly the lack of R&D investments, has been one reason that Hong Kong has fallen behind the other NICs, perhaps irreversibly. Two other factors contributing to Hong Kong's lesser status among the NICs are its easy access to cheap-labour operations in southern China, which has obviated any need in the short term to seek higher-value-added and higher-risk R&D-based manufacturing activities; and the uncertainties of 1997, which have resulted in the flight of capital and people, particularly professionals and managers. In a reversal of past policy, the Hong Kong government is at last investing in industrial technology programmes and examining possible technology-related initiatives.

The Development of Proprietary Technologies

Technology arises from many sources (Figure 2). Each of the sources listed in this figure plays a valuable role in, variously, training people, furthering knowledge, and imparting technical skills and know-how. However, only in-house R&D, some collaborative programmes, and specialist R&D firms focus on developing competitive commercial products and processes. Generally speaking, these latter activities are weak in the NICs. Even in South Korea, only the very large companies, such as Samsung, Daewoo, Hyundai, and Lucky-Goldstar, engage in significant product R&D.

Some companies in Taiwan, notably Acer, have begun to develop their own products in consumer and industrial electronics, PCs, and semiconductors. Singapore and Hong Kong are still behind. However, Singapore has established, within the Singapore Institute of Standards and Industrial Research, the Design and Development Centre to help develop new products and processes. This is an imaginative step that neighbouring countries are watching with interest.

Although government programmes have played a major role in the industrialisation of the NICs – and will continue to play a key role in their cornpetitiveness – the NICs are now at a point where infrastructure, strategies, and plans are not enough. The imperative has shifted from manufacturing someone else's designs to manufacturing their own.

Figure 2

Sources of Technology and Their Roles

Sources of technology	*Roles*
Universities and technical institutes	Education, basic and applied research
Government research laboratories	Specialised research, generic problem-solving
Industrial research institutes	Study of generic, industry-related problems
Science and technology programmes	Public awareness and education
Defence and space programmes	National needs, technology generators
National and international collaborative research	Basic research, pre-competitive technology developments
Contract manufacturing, licensing, joint ventures	Commercial activities, limited technology transfer
In-house R&D:	Development of new products and processes
Contract R&D consultants	Specialists in developing commercial products and processes

This is a crucial step. It is also extremely difficult. It involves the understanding and management of complex behavioural and organisational issues related to innovation by individuals, by teams, and by corporations. It requires questioning of traditional corporate cultures and values in areas such as investment risk, tolerance of failure, delegation of responsibility, and encouragement of critical, independent thought.

It also requires a variety of highly skilled activities, such as identifying new market-driven (as opposed to technology-driven) opportunities; executing the R&D phase on time and within budget; designing for quality, cost, and manufacturability; manufacturing efficiently; managing distribution and sales; and then starting all over again, and again, with product renewal.

Clearly, product creation is a far more complex business than contract manufacturing. Accordingly, experience in product R&D is limited, and people capable of undertaking it are in short supply. Unfortunately, universities, technical institutes, and government and industrial laboratories cannot carry out this task. Generally speaking, their staffs are recruited to conduct research, which is quite different from developing commercial products. These distinctions are often not appreciated by government planners, who may be unfamiliar with the strategic importance of new product development.

As a first step toward the development of proprietary products, companies should make use of the services provided by the government-backed contract design and development organisations such as SISIR's Design and Development Centre in Singapore, the Industrial Technology Research Institute in Taiwan, and the recently announced technology centre in Hong Kong. With the exception of the latter, these organisations have access to government subsidies, which are used as an incentive for companies to enter into proprietary product development. This approach minimises the risk to companies wishing to start developing their own products, while giving them the opportunity to learn about the product-creation process before they set up their own R&D facilities.

For those companies without access to locally based design and development organisations, alternative steps include engaging the services of an overseas contract design and development company or setting up an R&D facility in the United States, Europe, or Japan. A number of the larger Hong Kong companies have been adopting this approach. The advantage they see is access to state-of-the-art technology, as well as greater awareness of international markets and business. A disadvantage is the distance between the R&D and manufacturing facilities.

For the NICs, the transition to the development of proprietary products and technologies represents the critical next step in their industrialisation process. Unfortunately, it is not an automatic, natural progression from earlier stages, but a major, quantum leap. It begins with the attitudes, values, and creativity of an individual, and then is either nurtured or destroyed by that individual's corporate and national habitat. It will be fascinating to see how the NICs tackle it.

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