

Prolific research on a barren rock

PAUL CHING-WU CHU

is in the office of the President at the Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, and in the Texas Centre for Superconductivity, University of Houston, Houston, Texas 77204, USA.

e-mail: cwchu@ust.hk, cwchu@uh.edu

As economic competition in the region increases, Hong Kong has to reinvent itself as a knowledge-based society.

Hong Kong began as a humble barren rock in British colonial backwaters under the Treaty of Nanking in 1842. By the time it was returned to China in 1997, as the Hong Kong Special Administrative Region (HKSAR), under the Joint Declaration signed by China and the United Kingdom in 1984, Hong Kong was celebrated as Asia's city of pride.

Blessed with a spectacular natural harbour, with a slice of land that has been spared major natural disasters that have wreaked havoc in other places in the region, Hong Kong has a special place in the history of modern China. It was the base from which Sun Yat-Sen, the father of modern China, launched the revolution that toppled the Qing dynasty and established the Republic of China in 1911. Towards the end of the twentieth century, Hong Kong also had a crucial role in China's most magnificent economic transformation in its history. According to most, China owes this latest development to former leader Deng Xiaoping's economic reform policy, and, more importantly, Hong Kong's army of entrepreneurs with buckets of money and business skills, who set the stage to turn China into the 'manufacturing centre of the world'. Russia, lacking such a flood of faithful enterprising returnees, has had a more lacklustre economic make-over. Hong Kong now acts as the gateway for the flow of investment, talent, goods and services between China and the rest of the world, remaining China's most important *entrepôt* and also its largest foreign investment centre.

Throughout its history, Hong Kong has survived numerous ups and downs caused by external changes beyond its control, especially those coming from China. Remarkably, it has managed to transform itself economically and



THE HONG KONG TOURISM BOARD

Hong Kong.

has emerged stronger after each crisis. Today it boasts a higher concentration of billionaires than any other city in the world. In 2006, Hong Kong had 22 names on the Forbes global billionaire list, compared with 8 for the mainland, 5 for Taiwan, 4 for South Korea, and 19 for India — a large country with a population of nearly a billion. In 2008, Hong Kong's membership in this exclusive club has now gone up to 33. This is truly impressive in a population of 7 million within an area of 1,100 square kilometres.

Globalization, the rise of an economically open and resurgent China, and Hong Kong's inevitable economic integration with the mainland have all created a paradigm shift. It is now clear that Hong Kong has to develop a knowledge-based society to remain competitive in the new millennium. To shift from a commerce- to a knowledge-focused city is not without challenges. The HKSAR Government has taken major steps in restructuring the higher education system and boosting the research and development capability in science and technology.

Hong Kong is a city without natural resources. Its economy is driven largely

by external factors. No other city has an economic needle more sensitive to outside changes, especially from the mainland. Its original *entrepôt* trade was hit by the US-inspired embargo during the Korean War. The industrial revolution came late to Hong Kong in the 1950s and 1960s, when its workforce and capital were boosted by refugees and capitalists fleeing the turmoil on the mainland. Hong Kong became a highly efficient industrial centre and global player for manufacturing export-oriented consumer products, ranging from textiles to electronics. The development led to a spike in land prices, which in turn generated more investment capital. But this industrial manufacturing golden era was threatened by the opening up of China and the continued real-estate boom in the 1980s and 1990s. In response, Hong Kong's manufacturing plants quickly migrated across the border to the mainland, where labour supply was plentiful and labour cost was cheap. At the same time, China's thirst for capital to fuel its rapid economic development is strengthening the financial and service sectors in Hong Kong, forging the city into a major world finance and service centre. Indeed, aside from a few

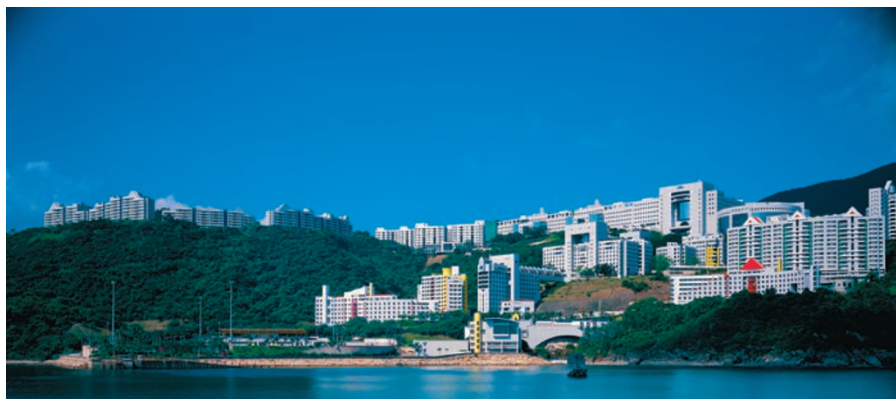
hiccups, Hong Kong has continued to prosper. However, the rising property costs and competition in the region have eroded Hong Kong's competitive edge. The cracks in its economic system were exposed in the Asian financial crisis and the SARS (severe acute respiratory syndrome) epidemic. Compared with other Asian tiger economies, Hong Kong was slow to recover. Its shock-absorbency was severely tested.

Today, 60% of high-school graduates in Hong Kong are destined for a college education at home or abroad: 16% of youngsters enter the eight publicly supported universities, and the rest attend two private colleges, several smaller institutions, or go abroad. Its oldest university, the University of Hong Kong (HKU), was established in the early years of the twentieth century as a provider of the manpower needed by the then colonial government, such as civil servants, medical doctors, lawyers, accountants and surveyors. The colonial government recognized that the limited enrolment — about 1% of high-school graduates — and the stringent English-language requirements of the students by HKU could not meet the growing needs of the economy.

In 1964, the Chinese University of Hong Kong (CUHK) was created. It was headed by a US-educated economist who blended British and American academic traditions and talents, trying to underline the importance of academic research. Unfortunately, his campaign to develop research in Hong Kong did not get the government's attention until the late 1980s. It is safe to say that before that there was no research culture in the modern sense in Hong Kong.

As mentioned above, the export-driven manufacturing sector was booming in the 1960s and 1970s and generated a great demand for technicians. The Hong Kong Polytechnic was therefore created in 1972. When it was unable to cope with the demand for trained technical personnel, a second polytechnic was established in 1984, namely the City Polytechnic of Hong Kong. Both institutes were upgraded to university status in the 1990s.

After Britain and China signed the Joint Declaration in 1984, the boundary between Hong Kong and Shenzhen in the mainland began to blur. Anxiety about its political future associated with the Joint Declaration led to a serious 'brain drain' problem, with a yearly exodus of about 50,000 of the city's better-educated and wealthier citizens to foreign shores. The then Governor, Sir Edward Youde, also foresaw the migration of labour-intensive manufacturing industries to the mainland



The campus of Hong Kong University of Science and Technology.

that would follow and the subsequent need to replace the existing old industries. His answer to these challenges was to launch a high-tech revolution by establishing a new university. The Hong Kong University of Science and Technology (HKUST) was thus born in 1989 and enrolled its first students in 1991. It was the only tertiary institution created and mandated expressly to contribute to Hong Kong's social and economic development through science and technology. A US-trained physicist administrator, Chia-Wei Woo, was recruited as the founding president of the university. He brought in an American-style system for academic governance and for faculty evaluation and promotion. It is safe to say it was HKUST that brought the research culture to Hong Kong.

Over the past 20 years, Hong Kong's research in all its universities has come of age by attracting world scholars and equipping them with state-of-the-art facilities, taking advantage of the unique strengths of Hong Kong, namely its open society, financial might and rule of law. For instance, a world-renowned geneticist, Lap-Chee Tsui, was recruited from the University of Toronto in 2002 as the President of HKU, and Lawrence Lau, a world-renowned economist, was recruited from Stanford in 2004 as the Vice Chancellor of CUHK. The Hong Kong SuperNet, the first internet service provider in Hong Kong, was developed by Vincent Shen in 1993, and the operational wind-shear warning system that has made Hong Kong's International Airport one of the safest in the world was co-developed by Jay-Chung Chen in the same year; both Shen and Chen are faculty members of HKUST. Mention must also be made of the world's smallest single-walled carbon nanotubes, synthesized and studied by Ping Sheng and his co-workers at HKUST in 2001. A world-class research

community is forming. The Financial Times listed three of the eight universities in Hong Kong among their top 100 global rankings last year, with the joint Kellogg-HKUST EMBA programme rated number one in the world.

The quintessential spirit of capitalism is the individual's rational pursuit of economic gain. In Hong Kong, which enjoys a reputation as the world's freest economy right on the doorstep of the world's largest socialist economy, the practice of the world's purest form of capitalism has resulted in a science and technology culture that both drives and limits its economic and social growth. It is often said that Hong Kong does not have a strong science and technology culture. Indeed, that was true before 1997. In a belated awakening to the promise of a knowledge-based society, Hong Kong has leaped ahead, with the bulk of its science and technology infrastructure being put in place only in the past decade. This includes the restructuring of higher education, the Research Grant Council, the Innovation and Technology Commission, Hong Kong's five Research and Development Centers, the Innovation and Technology Fund, the Applied Research Fund, the Science and Technology Parks, the Applied Science and Technology Research Institute, the Hong Kong Jockey Club Institute of Chinese Medicine, and the Cyberport.

The HKSAR Government recognizes that economic reform cannot be achieved without educational reform. A restructuring of higher education was launched in 2004 to initiate a broad-based learning programme to train students in creative and critical thinking for the knowledge-based society, and to align Hong Kong's undergraduate programme with that being adopted by the mainland, the United States, Japan and many others. Under this programme, all those starting

undergraduate studies in 2012 will spend four years in the university after six years in high school, instead of three years in university and seven years in high school as required by the existing UK system. This will result in an increase of about 25% in the annual budget of the university and will provide an unusual opportunity for the universities to further strengthen their teaching and research capabilities. This is certain to bring scientific research and technological development to new heights. It is expected that the eight public universities in Hong Kong will recruit 1,000 new faculty members in the next few years, an unprecedented occurrence in today's world of science and technology apart from a very few countries in Asia, such as China, Taiwan and South Korea.

The outcome of these myriad initiatives has yet to be assessed. However, preliminary results are encouraging. Hong Kong sits alongside the world's most competitive and innovative economies, having been ranked by the World Economic Forum as 12th in the world for competitiveness and 11th for global innovation. Our technological innovation is reflected in our output. Although Hong Kong has no natural resources to speak of, it is the world's 11th largest trading entity, with one-third of our total exports of HK\$2,500 billion a year being classified as 'hi-tech', according to the OECD (Organisation for Economic Co-operation and Development) categorization.

Competing in a globalized world as Hong Kong does, its scientific and technology culture has been shaped by an externally oriented economy that has been flourishing under the government's positive non-intervention policy and in its citizens' relentless pursuit of economic gain, unimpeded by any regulatory constraints other than what is necessary to ensure fair play. This culture is inherently biased towards R&D initiatives offering promise of commercial and industrial applications. This culture is so deep-seated in societal

THE HONG KONG SCIENCE AND TECHNOLOGY PARKS



Hong Kong Science and Technology Parks.

mentality that even the government's innovation and technology strategy has expressly stated that Hong Kong's research focus is on market relevance and industry participation, without realizing that private business generally has only a short-term interest in the bottom line. Truly groundbreaking research breakthroughs very often come from sustained curiosity-driven intellectual enquiry. For long-term strategic vision the stimulus has to come from the government, as it has in China, Taiwan, South Korea and Singapore. Hong Kong has never had an industrial policy, in stark contrast to its neighbouring countries.

The habitual confidence of Hong Kong business people in their ability to weather any storm no longer serves the city well. For one thing, Hong Kong now faces strong competition from other economies in the region with rising levels of affluence. It is no longer competing with regional underdogs. The benefits of its low tax regime are largely cancelled out by its high property or rental prices, which many see as another form of heavy taxation. The old British *laissez faire* attitude of waiting for the market to lead may leave Hong Kong lagging seriously behind other more proactive government leaderships in charting out new economic courses in the ever-changing global economy.

Still, progress is being made. In the latest budget, the Financial Secretary has

allocated HK\$18 billion as an endowment for research funding. For Hong Kong, this is indeed a breakthrough, although in comparison with Singapore its research funding is still quite meagre, representing 0.81% of its GDP in contrast to the 2.39% spent by Singapore. An additional 20% of postgraduate students will also be committed to local research-intensive universities.

Hong Kong's future prosperity will depend on its ability to add value to its products with a high-tech sheen. The spectacular rise of the Chinese economy has posed serious challenges to Hong Kong's economic structure. But it will also offer plenty of opportunities because of Hong Kong's close proximity to the mainland and its superior infrastructure that attracts a large pool of talent. The newly unveiled 11th five-year plan by the mainland offers ample space for Hong Kong's science development. However, this window of opportunity is narrow and getting narrower by the day as the mainland economy evolves and accelerates.

By seizing this fleeting opportunity, HKUST, with the backing of the HKSAR Government and the private sector and endorsed by the mainland government, is hard at work in creating an Institute for Advanced Study (IAS) to become a platform for future science, education and technology development for Hong Kong, Greater China and beyond. It is modelled after the famed Institute for Advanced Study at Princeton, New Jersey. With the goal of becoming a premier intellectual centre in Asia and beyond, the IAS at HKUST will undertake research in experimental and applied areas, in addition to theoretical and basic research activities. It will engage society and other universities, while reserving ample room for freedom in scientific pursuit. The establishment of the IAS is our emphatic statement of belief that Hong Kong's future prosperity resides in excellence, both scientific and technological.