

CHAPTER 3

The Rise of Research Universities: The Hong Kong University of Science and Technology

Gerard A. Postiglione

“Rome wasn’t built in a day.”

Before the end of the 19th century, the president of Harvard University, Charles Eliot, counseled John D. Rockefeller that US\$50 million (about US\$5 billion in today’s currency) and 200 years would be required to create a research university (Altbach 2003). After the turn of the century, and with Rockefeller’s more than US\$50 million, the University of Chicago needed only 20 years to attain top standing. In Asia just before the turn of this century, the newly established Hong Kong University of Science and Technology (HKUST) took only 10 years and less than a tenth of Eliot’s figure to become one of Asia’s top 10 research universities.¹

Globalization has quickened the establishment of a research university and shortened the time that nations with rapidly rising economies are willing to wait for such an achievement. For this reason, the current models of world-class research universities have in part shifted away from those institutions that took a century or more to mature toward those that accomplished the feat in a shorter period and within the new rough-and-tumble era of competitive knowledge economics. Even in the “post-American”

world with the rise of the rest—notably India and China, where ancient civilizations and extensive national histories are treasured—it seems that a century is far too long to wait for a new research university to ripen (Zakaria 2009). Thus, nations have come to consider establishing new research universities while at the same time strengthening the research capacity of traditional national flagship universities. As this chapter will show, a two-pronged strategy is more sensible for an economy on the move rather than a conventional approach that concentrates resources in already established flagship institutions (Ding 2004; Altbach and Balán 2007; Salmi 2009).

This chapter examines a case in Hong Kong SAR, China, in higher education—the establishment and development of HKUST and its unprecedented achievement of becoming an internationally ranked research university within a decade of its establishment in 1991. This university’s rapid rise hinges on a number of factors. Although impossible to duplicate elsewhere, such an array of factors is worthy of detailed consideration. These examples illustrate how a successful research university can be established if the institution is accurate in its perception of opportunity within a rapidly changing economic and political environment; proactive in its approach to capitalizing on potential support and overcoming potential hurdles in society; and skillful in planning first-tier faculty recruitment, highlighting its uniqueness, and devising a way to settle into the existing system of higher education. Selected patterns in this case study will resonate with conditions in other emerging economies. Nevertheless, the complex and interwoven nature and process within a changing environment will make any effort to set out specific conditions for establishing world-class research universities a fruitless endeavor. After identifying the main factors surrounding the establishment and development of HKUST, the chapter provides further discussion about the larger issue of establishing research universities.

Key Factors for HKUST

HKUST took advantage of the sunset years of a colonial administration to nest a U.S. research university culture within the British colonial system of higher education. As Hong Kong’s other universities remained wedded to their institutional ethos and heritage, this university distinguished itself from the status quo with foresight about the potential role of a science and technology university in the forthcoming Hong Kong SAR, China. It launched several measures that would eventually be seen

in other universities. These measures include putting research on an equal footing with teaching, relying on an entrepreneurial approach to development, appointing rather than electing deans, and requiring students to enroll in social science and humanities courses outside their science and technology specialization.² In fact, this policy occurred as part of the general trend of globalization in higher education.

The university's establishment coincided with the founding of the Hong Kong Research Grants Council, which provided funds to strengthen research capacity at colleges and universities in Hong Kong (UGC 2000). Today, the Research Grants Council remains the primary source of research funds, which has nudged the traditionally teaching-focused universities of Hong Kong SAR, China, toward more research. Yet, HKUST had a faster launch. The amount of funding it received gradually rose to award levels comparable with other universities and today remains ahead in the proportion of successful grant applications. For example, in 2009 its application success rate was 47 percent, ahead of 36 percent for the other two top research universities. The amount awarded per faculty member is almost twice as much as that at any other university. Thus, with the establishment of the Research Grants Council, the timing of HKUST's establishment as a research university was ideal.

As the 1990s approached, the four Asian "tigers" (Hong Kong; the Republic of Korea; Singapore; and Taiwan, China) were bleeding manufacturing to nearby Asian countries with lower production costs. With increasingly educated populations, the tigers upgraded their domestic industries toward more value-added production. During this industrial upgrading, the governments of Singapore; Korea; and Taiwan, China set the course for high-technology-intensive industries. Although labor-intensive industries from Hong Kong began moving across the border to the Chinese hinterlands, the government eschewed publicly funded high-technology initiatives, choosing instead to rely on market economics as the driving force. It limited itself to the support of infrastructural investment, including a university of science and technology, which quickly made HKUST a symbolic centerpiece of Hong Kong's high-technology upgrading. Its focus on science and technology in a rising Asia resonated with the popular vision of knowledge transfer for a modern China. That vision was enhanced by HKUST's faculty of business and management in a commercial city like Hong Kong. Unfortunately, the government's reliance on market forces failed to make Hong Kong a high-technology center and thereby limited the potential role of the new university to be a catalyst for Hong Kong's rise in that sector. The powerful property and

real estate sectors as well as the second-tier civil servants who were perched to lead Hong Kong after the handover to China in 1997 did little to support Hong Kong's development as a center of high technology, thereby driving that opportunity northward where Shanghai became the proactive benefactor.³

HKUST's rapid rise was also assisted by the timing of its establishment, shortly after the government's decision in November 1989 to double enrollments in degree-place higher education. This decision occurred in the wake of the Tiananmen Square event when many potential scientists, who would have studied at this university when it opened in 1991, headed instead for overseas universities to further their study. When annual emigration from Hong Kong began to increase during the 1990s, reaching a high in one year of about 65,000, including highly educated residents, the government moved to double university enrollments. This expansion of higher education enrollments would have been more difficult to achieve without the university's establishment in 1991. Return migration rates of these Hong Kong residents increased in the mid- to late 1990s as they felt secure enough to return, with or without overseas residency or passports.⁴

HKUST's most important success factor was the recruitment of outstandingly talented scholars and scientists. All faculty members had doctorates, and 80 percent received doctorates from or were employed at 24 of the top universities in the world. The university recruits this caliber of academic staff from among the senior scholar generation of the Chinese diaspora. The generation of Chinese scholars who left China for Taiwan, China, and then studied overseas, usually in the United States, was riveted on the changes taking place in China during its first decade of economic reform and the opening to the outside world that began in December 1978. The growing number of China's overseas scholars at U.S. universities reached a tipping point. HKUST recruited heavily from this vast pool of talented academics born in Taiwan, China, or mainland China and trained overseas mostly at U.S. universities, something that the other universities in Hong Kong were less inclined to do at that time.

Woo Chia-wei, the university's first president, was a member of this unique generation of Chinese academics. A physicist by training, Woo had also been president of a major research university in the United States. In fact, he was the first ethnic Chinese person to head a major U.S. university. He was also part of an extensive network of Chinese research scientists in the United States. It was highly significant for HKUST that a senior generation of scientists who had attained international reputations in

their fields of expertise felt secure enough in their careers to leave their established posts and move to Hong Kong. This shift indicated a certain faith in President Woo, who not only oversaw the establishment and early development of HKUST, but also was instrumental in assembling an outstanding and internationally renowned academic faculty. As HKUST's first president, Woo set the pace for the next two presidents.

To continue its trajectory toward becoming the premier university of science and technology in Asia, HKUST chose Paul Ching-Wu Chu as its second president. Chu was a pioneer in the field of high-temperature superconductivity. While the T. L. L. Temple Chair of Science at the University of Houston and founding director of the Texas Center for Superconductivity, he also served as a consultant and a visiting staff member at Bell Laboratories, Los Alamos National Laboratory, the Marshall Space Flight Center, Argonne National Laboratory, and DuPont. Chu received the 1988 National Medal of Science, the highest honor for a scientist in the United States, was named Best Researcher in the United States by *U.S. News and World Report* in 1990, and was appointed by the White House to be one of 12 distinguished scientists to evaluate the National Medal of Science nominees. One of his major contributions to HKUST was the establishment of the Institute for Advanced Study. Succeeding Paul Ching-Wu Chu, who retired in late 2009, was Tony Chan, who had been assistant director of the U.S. National Science Foundation in charge of the mathematical and physical sciences directorate. In that position, he guided and managed research funding of almost HK\$10 billion (US\$ 1.29 billion) a year in astronomy, physics, chemistry, mathematical science, material science, and multidisciplinary activities. Although he is just beginning his term as president of HKUST, he is expected to combine his skills as a preeminent scholar and scientist and a world-class administrator.

A key consideration for potential recruits to HKUST in the mid to late 1990s was the surge of prosperity in the economy, as investment from China pushed the economy to record levels. This development helped HKUST gain a fair amount of financial resources from the government, although the amount would still pale in comparison to that of top research universities in the United States. Like other universities in Hong Kong, HKUST received a regular injection of funds on a triennial basis from the University Grants Committee and research funding from the newly established Research Grants Council. However, unlike the other universities, HKUST did not have alumni who could support the university with private donations.

Academic salaries reached levels compatible with those offered in other developed countries, which made the decision of recruited staff to relocate to Hong Kong easier, though salary was not the key factor in the equation for top-rung recruitment. For many distinguished academics, relocation meant moving from a spacious U.S.-style house to smaller apartment-style living quarters in Hong Kong, plus a separation from family studying or working nearby.

The approaching date for sovereignty retrocession represented an important and historical turning point for Chinese academics that intensified their emotional attachment to China. The scientific talent that was stored by Taiwan, China, for three decades and that led the economy's successful drive in high technology production was for the first time being focused on Hong Kong's development, specifically in expanding its higher education system. For Chinese-American academics, this change in focus signified an important opportunity to make a significant contribution to U.S.-China relations.

In short, scholars with a strong emotional attachment to China were elated by the increased openness and economic progress of the country. For them, this progress provided an opportunity to take part in a significant event and play a role in China's modernization. In this sense, timing was crucial for staff recruitment. If HKUST had been established a decade earlier, when it was not yet clear that the colonial status of Hong Kong would end in 1997, then most of that university's Chinese academics would not have chosen to work in Hong Kong. An important factor to these scholars, HKUST ensured a degree of academic freedom as yet unavailable in mainland China.

Thus, HKUST created a valuable niche, which it projected through its institutional vision and supported by recruiting two generations of overseas-based Chinese scholars. It presented a unique historical opportunity to work in a dynamic economy and rapidly expanding university system. It established a robust scholarly climate adjoining a globally emergent and reformist China, coinciding with the systematic upgrading of publicly funded research in Hong Kong's universities.

Although the speed in launching a new research university can be hastened by such key factors, some are not easily duplicated elsewhere. Factors such as a dynamic economy, academic freedom, and proximity to the Chinese mainland contributed to the common development of the entire system of higher education in Hong Kong. Each higher education system has unique conditions, some of which can be turned into opportunities for the establishment of research universities. A world-class

research university cannot be created in a vacuum. HKUST is nested in a system in which it identified a niche, but projects its vision far beyond Hong Kong's academy.

Although universities in Hong Kong SAR, China, currently are financed by the government, their autonomy is protected by law.⁵ In the late 20th century, competition among the top three research universities (the University of Hong Kong, the Chinese University of Hong Kong, and HKUST) for financial support and academic status from the same government coffers also created a new dynamic in higher education in Hong Kong SAR, China. To some extent, this approach contributed to the rise of the economy's entire university system. After HKUST was established, the government's funding allocation pie resource was enlarged. Yet, these funds were still disbursed on a competitive basis. Rather than using a conventional strategy of concentrating resources in one or more already established flagship institutions, Hong Kong used a two-pronged development strategy in which resources were not concentrated in one institution at the expense of others. It uses a strategy for creating research universities in which, at least in theory, the universities complement one another and thereby strengthen the entire system's research capacity. The University Grants Committee asserts a systemwide approach

developing an interlocking system where the whole higher education sector is viewed as one force . . . values a role-driven yet deeply collaborative system of higher education . . . committed to extensive collaboration with other institutions. (UGC 2010b)

The extent to which this approach is realized in practice is certainly open to debate. Still, some observers credit this strategy, at least in part, for the reason that four of the eight universities in Hong Kong SAR, China, are ranked in the top 10 in Asia (Times Higher Education 2008). The rest of this chapter examines the HKUST case in more detail. The factors unique to its establishment and development receive the most attention, and the chapter concludes with a reassertion of the conditions for the establishment of research universities in emergent economies.

The HKUST Context

New universities, whether public or private, are part of a society and its higher education system. HKUST was established in a highly mobile society, with a system that had not yet made the transition from elite to

mass higher education. Hong Kong SAR, China, remains a relatively small region of 422 square miles with some of the most densely populated areas in the world. The ethos of higher education was shaped by its history as a British colony from 1842 to 1997, after which it returned to China in a one-country–two-system arrangement (So and Chan 2002). Although most research is conducted in English, there are two official languages: Chinese (Cantonese dialect) and English. The University of Hong Kong was established in 1911 and the Chinese University of Hong Kong in 1963.⁶ The proportion of the age cohort that had access to higher education was 2 percent in 1981 and 8 percent by 1989, when an executive decision was made to double enrollment to 16 percent by 1994 (UGC 1996). During that period, four colleges and polytechnics were upgraded to university status, and by end-1997, Hong Kong SAR, China, had seven universities (UGC 1999). The Asian financial crisis that began in 1998 crippled any discussion about further expansion. When expansion finally occurred, it was largely through privately funded two-year associate-degree programs at community colleges (Postiglione 2008, 2009). The universities have since upgraded research capacity, preserved academic freedom, and converted from a three- to a four-year bachelor-degree program, thus bringing the system into line with the two main trading partners of Hong Kong SAR, China—mainland China and the United States (UGC 2002a, 2004a, 2004b). The four-year system permits HKUST to deepen its original initiative, set in 1991, of providing all students with a significant amount of humanities and social sciences, more than had been offered at the other comprehensive universities in Hong Kong SAR, China.

Basic Characteristics of HKUST

The following describes the fundamental attributes of HKUST: its placement in several of the global rankings of universities; and its roles, goals, and objectives.

Global Rankings

Because this book focuses on the establishment of world-class research universities, it is notable that HKUST has achieved an impressive score on several international league tables (HKUST 2010d): (a) number 35 of the world's top 200 universities in 2009; (b) number 26 of the world's top 100 universities in engineering and information technology in 2008 and in technology in 2008 (Times Higher Education 2008); (c) number 2

of the world's top 200 Asian universities in 2010; (d) number 39 of the world's top 100 universities in engineering and technology and computer sciences (number 1 in "Greater China") in 2010; and (e) number 52–75 of the world's top 100 universities in social sciences (number 1 in "Greater China") in 2010.⁷

HKUST's Roles, Goals, and Objectives

The Hong Kong University of Science and Technology (a) provides a range of programs leading to the award of First Degrees and postgraduate qualifications; (b) includes professional schools, particularly in the fields of science, technology, engineering, and business; (c) offers courses in humanities and social sciences only at a level sufficient to provide intellectual breadth, contextual background, and communication skills to an otherwise scientific or technological curriculum and for limited postgraduate work; (d) offers research programs for a significant number of students in every subject area; and (e) provides scope for academic staff members to undertake consultancy and collaborative projects with industry in areas where they have special expertise. (UGC 2008)

HKUST emphasized the importance of being unique at a time when Hong Kong SAR, China still viewed its universities as elite institutions. HKUST professed to become a "leading force in higher education," "a global academic leader," "an agent of change," and "a catalyst for significant progress in science and technology research and education in Hong Kong, and the Mainland" (HKUST 2010e). This focus supports Jamil Salmi's assertion that a world-class research university "should be based on a forward-looking vision that is genuinely innovative" (Salmi 2009, 57). Nevertheless, some of HKUST's goals echo those of research universities around the world:

- Give all students, undergraduate and postgraduate alike, a broadly based university experience that includes superior training in their chosen fields of study; a well-rounded education that enhances the development of their creativity, critical thinking, global outlook, and cultural awareness; and a campus life that prepares them to be community leaders and lifelong learners.
- Provide a dynamic and supportive working environment in which faculty and staff may continually develop intellectually and professionally.
- Provide an open environment and atmosphere conducive to the exchange of knowledge, views, and innovative ideas among students, faculty and staff members, and visiting scholars.

- Be a leading institution for research and postgraduate study, pursuing knowledge in both fundamental and applied areas and collaborating closely with business and industry in promoting technological innovation and economic development.
- Promote and assist in the economic and social development of Hong Kong SAR, China, and enrich its culture (HKUST 2010b).

Students and Academic Staff Members

The initial student recruitment in 1991 for the newly established university was one of HKUST's most crucial activities, because in the eyes of the public, it had yet to gain a reputation. In this respect, it adopted a proactive approach focused on bringing the university into direct contact with many sectors of the population. It opened itself to the community by taking advantage of its spectacular campus and facilitating access and visits, especially by potential students and their families. Its newly designed campus with impressive architecture and a panoramic view of the surrounding mountains and seaside was a major attraction. About 250 secondary schools were invited to each send two student representatives on the day the new university's foundation stone was laid.

Aside from opening the campus to the public, the university arranged exhibitions throughout Hong Kong. Professors met prospective students on an individual basis to provide general information, though these exhibitions did not include recruitment. Students were formally selected through a Hong Kong-wide recruitment system that came to be known as the Joint University Programmes Admissions System. This main route assisted senior secondary school students with the results of their Hong Kong Advanced Level Examinations to apply for admission to the bachelor's degree programs offered by the seven public universities and the Hong Kong Institute of Education.

Before HKUST opened, it developed a plan for the number of students allocated to the three major faculties: science students would constitute 25 percent, engineering 40 percent, and business administration 35 percent. Also, 20 percent of all students would be postgraduate students (Kung 2002, 5). These proportions remained stable through 2009 (see table 3.1). However, the student body of the university remains below 10,000. Initial impressions suggest that this figure is in keeping with an economy of scale and helps retain a particular institutional ethos. However, faculty numbers can confound the picture (see table 3.2). In 1991, the University Grants Committee resourced HKUST to enroll 7,000 students, even

Table 3.1 Students at Hong Kong University of Science and Technology, 2010

<i>Program or area of study</i>	<i>Undergraduate</i>	<i>Postgraduate</i>	<i>Total</i>
Science	1,431	476	1,907
Engineering	2,310	1,489	3,799
Business and management	2,132	1,189	3,321
Humanities and social sciences	—	280	280
HKUST Fok Ying Tung Graduate School	—	2	2
Interdisciplinary programs	137	69	206
Total (as at January 2010)	6,010	3,505	9,515

Source: Reprinted by permission from Hong Kong University of Science and Technology.

Note: — = not available.

Table 3.2 Faculty of Hong Kong University of Science and Technology, 2009

<i>Program or area of study</i>	<i>Regular</i>	<i>Visiting</i>	<i>Total</i>
Science	100	19	119
Engineering	149	15	164
Business and management	126	12	138
Humanities and social sciences	54	6	60
Division of Environment ^a	7	1	8
Total (as at January 2009)	436	53	489

Source: Reprinted by permission from Hong Kong University of Science and Technology.

a. The Division of Environment is under the Interdisciplinary Programs Office.

while the other two research universities grew to 12,000 students. During the administration of HKUST's second president, student numbers grew toward 10,000 based on a government promise to support a student-faculty ratio of 12 to 1.⁸ The government's promise went unfulfilled while student numbers continued to rise. The unfulfilled promise stifled the planned proportionate rise in the student-faculty ratio, thereby adding to the burden on faculty. Such a disproportionate rise reduced faculty research time and was detrimental to faculty morale.⁹ When the ratio rose to 19 to 1, it had a significantly adverse effect on research productivity. HKUST operated with a relatively high student-faculty ratio and a lean professoriat. However, HKUST's currently diversified student population of full-time undergraduates, full-time research postgraduates, and full-time and part-time postgraduates, requires a significant number of adjunct faculty members. This development, in turn, has moved the student-faculty ratio in the direction of 15 to 1 or even 14 to 1.

The top three research universities in Hong Kong SAR, China, draw their largest grants from the same public source. Thus, a rapid expansion

in the numbers of faculty members and students at one institution over another would be unlikely. Likewise, faculty-student ratios would be proportionate across research universities. Universities in Hong Kong SAR, China, receive block grants that can be allocated with a degree of flexibility. Although fund allocation formulae within specific institutions may vary, student admission numbers and faculty hiring usually adhere to what was promised in proposals to the University Grants Committee. In short, maintaining stability in the proportionate rise of students and faculty across institutions is seemingly in the best interest of a public system of research universities.

This stability could be considered a strategic factor in the establishment of a research university within a group of public universities. Yet, private research universities generally set their own targets for staff and student recruitment. Rather than block grants, their main sources of income are student tuition, alumni funding, other donations, and research grants from government and corporate sponsorship. In the United States, top public research institutions still draw a significant amount of their main public funding from government budgets. Therefore, such allocations are usually made in the context of preserving the state's system of research universities. Those arrangements could also work in reverse—such as when a state legislature closes a local undergraduate college in its system, but the top research universities in the system usually survive.

The same adverse effects held true for Hong Kong in the early years of HKUST, when an action that seemed equitable in a systemwide context worked against the mission of a research university. In the case of HKUST, its planning committee chair has stated in retrospect:

Regrettably, the University Grants Committee has since strayed from the principle of giving priority to needs and values, but instead, allocated funds “equitably” to all the varsities. Consequently, UST was not able to offer more places at the postgraduate level in past years as its mission stipulated. This, to me, is unfortunate and a retrograde policy that has caused Hong Kong to lag behind the competition in advanced science and technology. (Chung 2001, 54)

HKUST's Inauguration and Commencement

Appreciation of HKUST's ascent into the research university stratosphere rests heavily on understanding its preestablishment plan and takeoff (Woo 2006). In 1984, the Sino-British Joint Declaration¹⁰ on Hong Kong's future was signed, and China established the adjacent Shenzhen Special

Economic Zone. As the border began to blur and Hong Kong's manufacturing and investment flowed into the Shenzhen zone, Sir Edward Youde, governor at the time, saw this new symbiosis with China as leading to an economic and technological transformation that would continue to relocate Hong Kong's manufacturing industries to south China. The governor expressed a new vision in which Hong Kong would become technologically upgraded. In September 1985, he asked the University and Polytechnic Grants Committee to explore the feasibility of a third university that would augment the existing setup of two low enrollment universities, two polytechnics, and two colleges. At a meeting of the governor's Executive Council in March 1986, the committee responded positively, confirming that the new university would focus on science and technology, management, and postgraduate training (Chung 2001, 148–58).

Planning and Construction

A planning committee was established in 1986, chaired by Sir Chung Sze-yuen of the governor's Executive Council. Its terms of reference included building a campus with a funding allocation from the Royal Hong Kong Jockey Club.¹¹ The first enrollments were planned for 1994. However, the new campus opened on October 2, 1991, with 600 students. Nine years later, HKUST was ranked seventh in Asia according to *Asia Week*. In 2001, the HKUST business school was ranked the best in Asia by the *Financial Times* and 48th in the world. By 2010, the *Financial Times* ranked the HKUST master of business administration program ninth in the world, tied with the University of Chicago Booth School of Business. This ranking also becomes significant for understanding HKUST's extensive collaboration with business and industry, as noted later in this chapter.

In 1987, the Royal Hong Kong Jockey Club, a nonprofit community organization, pledged HK\$1.50 billion (US\$192 million) for a project estimated to cost HK\$1.93 billion (US\$247 million), inflation included (Flahavin 1991). The figure was based on unit costs from the then recent building of the urban campus of the City Polytechnic of Hong Kong. Although this estimate was useful, the fact remained that City Polytechnic was advantaged by its urban environment—unlike HKUST, which was built in a rural area lacking basic infrastructure such as utilities and sewage as well as specific requirements for conducting research in fields such as microelectronics and biotechnology laboratories.

Nevertheless, cost-overrun concerns were raised on May 4, 1988, when HKUST came before the Legislative Council for approval. Because funds for the campus came from the Jockey Club, supplemented by the

government, a review by the legislature was required before approval. The government's initial cost estimate for capital construction was conservative and was made public. As campus construction proceeded and was put on a fast track to permit an earlier opening date, building engineers recognized the project's complexity and consulted with the government and the Jockey Club. The exchange of views led to a common understanding of the gap between the originally publicized estimate and the project's cost increase because of both inflation and faster pace of construction. In this context, the new president and his team noted inadequacies in laboratory facilities and building area. The University and Polytechnic Grants Committee expanded the area of the campus, and by June 1990, the budget was increased to HK\$3.548 billion (US\$455 million), a figure approved by the Legislative Council without objections (Chung 2001, 157). Phases I and II of the construction were completed on schedule in 1993 for HK\$3.224 billion (US\$413 million), 8.6 percent less than the estimate without overruns (Walker 1994).

In general, the establishment and development of new research universities in developing societies can periodically be plagued by cost overrun issues because of the vast sums required to build a research university. If not handled correctly, these issues can affect the public's view of a new institution. In the case of HKUST, the effort to speed the building process in the interest of facilitating the overall expansion of access to higher education in Hong Kong was overshadowed for a time by building costs. Such cost issues are often quite detailed, and their complexities are not easily presented to the public. Thus, a country's system of governance, especially its legal system and accounting transparency, is critical when establishing a new research university. Today, a developed society like Hong Kong SAR, China—with its vigorous legal and financial accounting systems held in high regard by the international community—commonly has extensive oversight on such large government projects. With the freest press media in Asia, Hong Kong SAR, China, has a literate public kept informed during every step of the process about any questions in the cost of large public projects. Yet, the financial issues surrounding such a large enterprise are often open to multiple interpretations by the media and can become convoluted by the politics of a particular era. Nevertheless, a high degree of transparency is essential for establishing a new research university despite the risks of multiple interpretations. Although the public continues to question major expenditures, past and planned—including a cyberport, a Disneyland, and a high-speed railway—this association of ideas does not include HKUST.

Presidential Search

The name of the university was chosen in 1986 and was officially proposed in the first report of the planning committee in September 1987. HKUST was formally incorporated in April 1988 and immediately sponsored the first meeting of its University Council. After a global search, the first president was appointed in November 1988. Forty-four applications were received, and 47 other names were put forward. More than half came from England (25 applications and 35 names put forward); nine applications from the United States and Canada plus seven other names put forward; two applications from Australia plus one other name put forward; five applications from Hong Kong with seven other names put forward; and three applications from other countries with three other names put forward. Of these, 14 applicants were interviewed, and five of them (from Australia, Hong Kong, the United Kingdom, and the United States) were selected for final consideration (Kung 2002, 5). Though selection committee members, Chung Sze-yuen and Lee Quo-wei, suggested the new president be a person of Chinese descent, the governor would agree only that the final choice must be a candidate who was president of a top Western university. The final choice, put forward and reported to the governor on September 21, 1987, was Woo Chia-wei, a distinguished theoretical physicist and president of San Francisco State University (which had 25,000 students). The choice was approved on October 10, 1987, and publicly announced on November 5. He was well-known in Hong Kong and spoke the commonly used Cantonese dialect as well as the national language of Mandarin. It was highly significant that Woo Chia-wei was the first person of Chinese descent to head a major university in the United States. This distinction would translate as a tremendous boost to the HKUST recruitment of academic staff, a key factor in its rapidly won success.

The government provided HKUST and its new president with an initial vision statement:

To advance learning and knowledge through teaching and research, particularly: (i) in science, technology, engineering, management and business studies; and (ii) at the postgraduate level; and to assist the economic and social development of Hong Kong. (HKUST 2010)

President Woo appreciated that this vision generally provided the proper guidance and was worded loosely enough to allow the founding faculty to interpret it more forcefully. When he assumed the presidency,

he requested that the university be allocated a larger percentage of graduate students. Although this request was not granted, he nevertheless succeeded, on the basis of the words “social development,” to upgrade the university’s General Education Centre into a School of Humanities and Social Sciences that granted master and PhD degrees.

Elements of HKUST

Language of Instruction

Instruction at HKUST was to be delivered in English. The University of Hong Kong had always adhered to the principle that all instruction be delivered in English, though the campus life of students reflected the bilingual nature of society.¹² The Chinese University of Hong Kong permitted its teachers to use either Chinese (Cantonese or Mandarin) or English as their instructional language. The new university’s orientation toward science and technology contributed to this uncontroversial decision to adhere to English-language instruction, despite the upcoming reunion of Hong Kong with China. Most senior professors had been accustomed to teaching in English, and most could not lecture in Cantonese, which was the lingua franca of Hong Kong.

The global university rankings indicate that the language of instruction does not automatically determine the ranking of a research university. For example, Tokyo and Kyoto universities (Japan), where much funding is allocated to translation of English-language journals, are among the world’s top-rated Asian universities. There are other top universities, but the issue of language of instruction in world-class universities is complex and has been discussed elsewhere. For example, Jamil Salmi (2009, 61) mentions 11 non-native-speaking higher education systems where some graduate programs are offered in English. Although Hong Kong SAR, China, where most graduate programs are in English, is not mentioned within this group, its higher education system receives a special distinction within China and has two official languages, Chinese and English. Although some of mainland China’s top universities use English in selected courses and programs, the only examples of English-language universities on the mainland are relatively new joint ventures: the University of Nottingham Ningbo, China; Xi’an Jiaotong-Liverpool University in Suzhou; and United International College (Hong Kong Baptist University and Beijing Normal University) in the Zhuhai Special Economic Zone adjoining Hong Kong SAR, China.

The language of instruction has implications for HKUST's aim to internationalize its student recruitment, which already extends far beyond Hong Kong SAR, China—including mainland China and overseas. In fact, HKUST has the highest percentage of nonlocal students among its counterparts (UGC 2010a). Although the figures for students from overseas and other parts of Asia are comparable to those at other universities, the percentage of students from the Chinese mainland surpasses other universities, which will probably have a long-term effect of strengthening future partnerships and collaborations. Although most graduate students are from the mainland, the proportion of undergraduate students from the mainland matches that at other universities and will continue to do so as HKUST adopts a four-year university system—in 2012—similar to that on the Chinese mainland.

Innovations in Governance

A key innovation of HKUST that contributes to its maxim “be unique and not duplicate” is the manner in which administrators are chosen. All deans are appointed by recommendations from search committees, and the search committees are dominated by faculty members, rather than appointed by the administration or elected from within a school or faculty, as was the case in the universities of Hong Kong at the time. This process was innovative within the context of Hong Kong, which had a system that adhered closely to the British model of higher education. The HKUST system was a U.S. model in terms of academic field appointments and reflected the U.S. corporate system in which faculty governed the academic part of the university. HKUST also triggered a change at other universities in Hong Kong away from traditional academic titles (lecturer, senior lecturer, and reader and professor) to those used in the United States and elsewhere (assistant professor, associate professor, and professor). Similarly, the current customary administrative titles in universities in Hong Kong SAR, China (vice-chancellor, deputy vice-chancellor, and pro-vice-chancellor) are also undergoing some change with increased use of the titles president, provost, and vice president.

A potentially valuable advantage is created when (a) a new research university is to be established and nested within a particular model of higher education and (b) the system provides enough autonomy for it to develop a particular edge over other long-established institutions of the system by innovating its governance or academic structure in accordance with a unique vision. This project also represents a system to speed up the process of introducing reforms in other top institutions, among which

ethos and long history prevent any radical changes that would be risky to the identity and long-established brand of the university.

This type of innovation is a potential advantage in the establishment of research universities. HKUST was established during the sunset years of the British administration and at a time when the United States and mainland China were Hong Kong's major trading partners. Not only were most major universities in the world located in the United States, but the higher education system in mainland China also operated more closely to the U.S. model of higher education, and most of China's prospective academics who studied overseas did so in the United States. This situation gave HKUST a tremendous advantage. HKUST's adaptation of innovations from the U.S. university system made it unique. Meanwhile, the British style of higher education in other institutions, although well established and successful, had more inertia toward change than a newly established university. Thus, the timing of HKUST's establishment, something that "may be difficult to duplicate elsewhere," contributed a great deal to its rapid rise (Wong 2010).

Another factor contributing to HKUST's innovative character was the relatively autonomous nature of higher education in Hong Kong at the time. Although HKUST has been a public institution from the beginning, it possessed a high degree of autonomy in most respects and could freely innovate in academic research and instructional delivery. Though it did not have to await approval by government or the University Grants Committee, it adhered to several basic conventions followed by the other two government research universities, especially in terms of student recruitment. Beginning in 2012, all universities in Hong Kong SAR, China, will move to a standard four-year undergraduate program and will begin to recruit from "senior secondary form six."

Academic Staff—Key to the Academic Kingdom

Although there is a global trend toward recruiting part-time academic staff, HKUST instead sought full-time academic staff, as was the case in Hong Kong's university system. The initial planning of academic staff followed a distinct strategy for faculty: (a) 214 engineering faculty members—21 professors, 54 associate professors, and 139 assistant professors; (b) 171 science faculty members—17 professors, 43 associate professors, and 111 assistant professors; and (c) 160 business administration faculty members—16 professors, 40 associate professors, and 104 assistant professors.¹³ This structure differed from the single professor chair system used by departments in Hong Kong's other universities at the time (Chung 2001, 5–6).

HKUST recruited practically all academic staff from outside Hong Kong, most of whom were born in China. If the staff had been recruited largely from the traditional expatriate and local academic pools, that practice would have detracted from the uniqueness of HKUST. This is another point worthy of consideration by universities in a developing country that have a large contingency of students and scholars who study overseas for doctorates but have yet to return home in great numbers. Jamil Salmi (2009, 61) considers this issue but does not mention that Hong Kong SAR, China, probably has the largest proportion of returned diaspora academic staff members, though many are originally from other parts of China. Korea, for example, has been able to attract back a significant number of its overseas academics, though they largely populate second-tier universities. However, Mongolia has not yet been successful in luring them home. The establishment of a new and well-endowed research university can be an attraction. For example, if Mongolia's newly discovered precious mineral deposits tip its economy forward as predicted for future years, it may be able to consider such an initiative. There are other potential examples from the ranks of developing countries.

Another distinguishing characteristic of HKUST concerns the qualifications of its academic staff and the academic centers from which faculty are recruited. Not only do all of HKUST's faculty members possess doctorates from universities around the world, but at least 80 percent also have worked or earned doctorates at renowned research universities—such as California Institute of Technology; Carnegie Mellon University; Columbia University; Cornell University; Harvard University; Imperial College London; Massachusetts Institute of Technology; Northwestern University; Princeton University; Purdue University; Stanford University; University of British Columbia; University of California, Berkeley; University of California, Los Angeles; University of Cambridge; University of Chicago; University of Illinois; University of London; University of Michigan; University of Oxford; University of Toronto; University of Wisconsin–Madison; and Yale University. These qualifications are not only an indication of the caliber of academic staff, but also represent a wellspring of academic capital that is used to build transnational research collaborations among networks of scholars from similar institutions.

Working Environments: The Best of Both Worlds

The adage about Hong Kong SAR, China, being a meeting point between East and West turns out to be more than a cliché for the academic born in China and trained as a scholar and scientist in the West. The Hong

Kong SAR, China, work environment carries many advantages not available elsewhere for some Chinese academics. These advantages include living in a Chinese society and working in an English-language university, teaching in English to Chinese students, conducting research with methods learned in the West and applying them to China's development, publishing in Western academic journals and attaining international recognition, and having their work translated into Chinese for a much larger audience. It also means avoiding the glass ceiling sometimes experienced by Chinese academics overseas and avoiding the restrictions on academic freedom on the mainland. Hong Kong SAR, China, represents a relatively easy adjustment to both academic and societal culture and provides a unique and advantageous environment for innovative academic work. Moreover, a large number of academic staff members at HKUST and at other universities in Hong Kong SAR, China, are foreign nationals, some of whom have Chinese heritage though they may have been born or naturalized overseas. The United Kingdom, for example, has a high proportion (27 percent) of foreign-national academic staff (Salmi 2009, 61). However, in a recent international survey, Hong Kong SAR, China, ranked second (after Australia) in the proportion of foreign nationals.

Multigenerational Recruitment from the Top Down

As mentioned earlier, the first president of HKUST took a major role in recruitment and is quoted as saying: "You've got to start from the top because only first-class people can attract other first-class people. In fast-moving fields like science, engineering, and management, you are either first class or without class" (Course 2001, 8). The academic pillars of HKUST began with those age 50 or younger who were born on the mainland; whose families left for Taiwan, China, in the 1940s; and who had gone to the United States for study and had remained there to start families. Although many became naturalized U.S. citizens and worked in the United States for decades, their aspirations included making a contribution to their homeland. According to Woo: "They had talent, they had ability, but in the end, what brought them here was their hearts" (Course 2001, 9).

Academics of that generation included Jay-Chung Chen, an aeronautics expert recruited from the Jet Propulsion Laboratory at the California Institute of Technology. Chih-Yung Chien was a top experimental physicist from Johns Hopkins University who had conducted his research on the world's largest high-energy accelerator at the European Organization for Nuclear Research. Shain-Dow Kung, a specialist in biotechnology and

acting provost at the University of Maryland Biotechnology Institute, became the dean of science in 1991. Other recruits during the first decade included Leroy Chang, a world-renowned experimental physicist from International Business Machines (IBM), and fivefold national academy member in the United States and China. Another internationally noted HKUST scholar was Ping Ko, who came from the University of California, Berkeley, and was director of the microfabrication laboratory. Otto C. C. Lin, who was dean of the School of Engineering at Tsing Hua University and director of the world-famous Industrial Technology Research Institute (ITRI) in Taiwan, China, became HKUST's vice president for research and development. Other notable scientists included Eugene Wong, who had been recruited by the U.S. White House to be associate director of the Office of Science and Technology Policy and who came to HKUST from the chair of electrical engineering and computer science at the University of California, Berkeley, where he developed the theory that provides the statistical foundation for processing images and other multidimensional data.

The younger generation of recruits comprised those in their late 30s and early 40s, including Chan Yuk-Shee, who was the Justin Dart Professor of Finance at the University of Southern California and became the founding dean of the HKUST School of Business and Management. They were mandated to "establish a leading business school in Asia by the end of the century" (Course 2001; Kung 2002).

A striking theme among top recruits was the idea of making a new beginning with a vision that HKUST could become a world-class research university. The caliber of these scholars and scientists in turn attracted other senior academics, including many non-Chinese, from North America, Asia, and Europe. Peter Dobson, first HKUST's director of planning and coordination and later its associate vice president for academic affairs, was recruited from the University of Hawaii. Thomas Stelson was executive vice president of the Georgia Institute of Technology and became vice president for research and development. Gregory James came from the University of Exeter to become the director of the HKUST Language Center.

Recruitment is one of the most strategic aspects in the rapid establishment of internationally recognized universities. Although this recruitment requires finding already-established leaders in their fields, a good portion of these scholars may be close to retirement and will lead their departments in the new university for only a few years. Thus, their value may be more in attracting top younger scholars than in contributing over

the long run at the new university. They could also become influential emeritus professors if they reside in the university's region and maintain close contact after retirement, which is less likely if they were originally recruited from overseas. Moreover, in any new recruitment exercise, a certain degree of attrition of top scholars is not unexpected, something that factor must be built into all recruitment plans.

Finally, although salaries may not be a singular attraction for some scholars, their salaries at the new university will be viewed as an indication of their status and can signal to other scholars in their home university that their departure is not one of downward mobility. In short, a new university must be prepared to provide attractive salaries to distinguished scholars while viewing their motive for joining the university as not merely financial.

Timing

Although salaries were clearly not the most essential attraction for the original group of leading HKUST scholars, the economic growth rate in Hong Kong at the time permitted academic salaries to approach levels compatible with those overseas, thus making relocation easier. Nevertheless, for academics based at U.S. universities, relocating often meant a transition from spacious houses to modest apartments. Although Hong Kong academic salary levels had generally been lower than their counterparts in U.S. universities, this situation began to change. The five-year period from 1988 to 1993 saw a doubling of salaries. By 1998, the increases were 2.7 times more than in 1988.

In the 1990s, academic salary scales were linked to those of the civil service and rose steadily, though academic salaries have since been unlinked from those of the civil service.¹⁴ Although some government officials had opposed the rise in academic salaries, the approaching date of sovereignty retrocession had caused some concern about a possible brain drain. HKUST recruited 120 faculty members each year, averaging about 10 recruits per month, 80 percent of whom had received their PhDs in North America.

Timing contributed to HKUST's success in several other ways. It acted as a confidence booster to a society in transition from a colony to a new system within China. As stated earlier, many of HKUST's Chinese academics would probably not have accepted an offer to work at HKUST a decade earlier when it was not clear that the colonial status of Hong Kong would end. Other timely factors were the expansion of Hong Kong's degree enrollment from 8 percent to 16 percent of the

relevant age group between 1989 and 1995 and the increasing availability of research funds from the newly established Hong Kong Research Grants Council.

Governance Structure

HKUST established itself as a new international university without assaulting the governing traditions of the United Kingdom in Hong Kong. The governance structure now consists of a court, council, and senate.¹⁵ The court, established in May 1994, meets once per academic year for several hours, is an advisory body on general policy, and considers presidential and council reports. However, it plays no actual role in the governance of the university.¹⁶

The council is the supreme governing and executive body of the university. It is responsible for investments, contracts, property, appointments of presidents and vice presidents, budget, finances, and statutes; and it confers honorary degrees and academic awards. It consists of up to three public officers appointed by the chief executive of Hong Kong SAR, China; up to 18 external members who are not public officers or employees of the university; and 12 internal members of the university including the president, vice presidents, deans of schools, and academic members nominated by the senate. It is presided over by a lay chair (that is, a non-HKUST employee). The council may meet several times per year. However, an executive committee, known as the standing committee of the council, meets regularly. This body promotes the university's interests in local, regional, and international spheres, and some of its members volunteer to raise funds.

The senate sets academic policies. Members are employees and students, including the president; vice presidents; deans of schools; heads of academic departments, units, and centers; academic staff members elected by their peers; and student representatives. It has a maximum of 54 members, of whom 32 hold academic offices or department positions, while 19 are elected or co-opted from the academic staff and three are student representatives. Its work covers academic planning and development; management of facilities for residence, teaching, learning, and research (libraries, laboratories, and so forth); and provision of student welfare. Finally, boards of the four schools (science, engineering, business and management, and humanities and social science) and the newly named HKUST Fok Ying Tung Graduate School are responsible to the senate for teaching and other work of the schools.

The top governance layers of the government-funded universities of Hong Kong SAR, China, generally manage with some uniformity. They provide a certain amount of integrity with the elite leadership strata of Hong Kong SAR, China, as reflected in the membership of the court and council. This uniformity does not mean that government university relations are always smooth. For example, despite the University Grants Committee being a buffer between government and universities, the HKUST planning stage was not without controversy. The chair of the planning committee's view was that the University and Polytechnic Grants Committee (now the University Grants Committee) stifled its development by allocating places "equitably" rather than according to "needs and values" (Chung 2001, 155). However, in general the government has not interfered directly with the universities in Hong Kong SAR, China. This situation is reflected in Jamil Salmi (2009, 59) quoting Ruth Simmons: "Great universities are not only useful in their own time, but in preparing for future times. What allows a great university to do that is as little interference from the state as possible." However, the amount of interference by government can be interpreted in various ways. Although government interference may not be direct, it does have ways to steer the path of universities—making its interference more subtle. Chung Sze-yuen interpreted what he thought were limits placed on HKUST's post-graduate expansion, and a more recent University Grants Committee report supported the secretary of education's preference that HKUST and the Chinese University of Hong Kong consider a merger. In fact, the University Grants Committee's role in university development in general and in HKUST's development in particular cannot be overlooked. For example, the committee sees itself as key for proactively helping universities make Hong Kong SAR, China, Asia's world city and the education hub of the region, particularly with mainland China. However, the University Grants Committee has not been proactive in helping the universities fend off efforts by government to interfere in their development. Clearly, some debate exists about the committee's role. Its supposed proactive role extends into "strategic planning and policy development to advise and steer the higher education sector," which is to be done with incentives and other mechanisms that "assist institutions to perform at an internationally competitive level in their respective roles" (UGC 2010b). These mechanisms include the Teaching and Learning Quality Process Reviews, Research Assessment Exercise, and Management Reviews, which are mandated for HKUST and other institutions. HKUST submitted a Self-Evaluation Document in July 2002 and successfully completed

the Teaching and Learning Quality Process Reviews in 2003. These were its second set of such reviews. It also successfully completed management reviews in 1998 and 2002. The Research Assessment Exercise, a mechanism borrowed from the United Kingdom, was still used in Hong Kong SAR, China, in 2006. Yet, the perceived value of these and related University Grants Committee exercises, by the administration of HKUST and other universities, has not been evident.

Research Funding and Donations

HKUST remains a young university, and its governance structure continues to evolve. In 2009, HKUST's second president, Paul Ching-Wu Chu, completed his term, and Tony Chan began his presidency. President Chu, a world-renowned scientist, took office during difficult times—when Hong Kong SAR, China, still suffered the effects of both the Asian economic crisis and the SARS (severe acute respiratory syndrome) crisis. He still managed to establish an Institute for Advanced Study, modeled after the one at Princeton University. The institute provides a center for noted scientists from around the world to visit, think, and conduct workshops.

The Institute for Advanced Study of HKUST champions collaborative projects across disciplines and institutions. It forges relationships with academic, business, community, and government leaders for helping to transform Hong Kong SAR, China, and the greater Chinese region into a global source of creative and intellectual power. Its visiting members included Aaron Ciechanover, Nobel Prize winner in chemistry in 2004. Eric Maskin, Nobel laureate in economics in 2007, visited on March 17, 2010. The Institute for Advanced Study also has a highly distinguished international advisory board, comprising 12 Nobel laureates. It is also recruiting 10 “star scholars” as permanent institute faculty members and will honor each with a named professorship (each with an endowment of HK\$30 million [US\$3.87 million]), which provides salary enhancement and additional research funding. Another 60 named fellowships (each with an endowment of HK\$10 million [US\$1.29 million]) are available for young and promising scholars who join the institute as post-doctoral fellows to work closely with the permanent institute faculty.

The research and development (R&D) budget for Hong Kong SAR, China, is only 0.7 percent of gross domestic product, placing it 50th in global rankings for this indicator. Thus, the amount of research funds available to HKUST might be considered as quite substantial, until compared with the counterpart universities from which the first generation of its

leading scientists were recruited. Though modest by comparison, research funding available to HKUST has steadily increased except around the time of the Asian economic crisis. Donations for research by such groups as Hong Kong Telecom of about HK\$10 million (US\$1.3 million) and the donation by the Hong Kong Jockey Club of HK\$130 million (US\$17 million) for biotechnology were also helpful to the research profile of HKUST.

As of June 2008, the HK\$350.9 million (US\$4.5 million) research fund included Hong Kong SAR, China, private funds of HK\$98.8 million (US\$12.66 million; 28.2 percent); non-Hong Kong SAR, China, sources of HK\$6.5 million (US\$832,860; 1.9 percent); Research Grants Council funds of HK\$125.3 million (US\$16.05; 35.7 percent); University Grants Committee funds of HK\$84.7 million (US\$10.85 million; 24.1 percent); and other Hong Kong SAR, China, government funds (mostly from the Innovation and Technology Commission) of HK\$35.5 million (US\$4.55 million; 10.1 percent).¹⁷ The total includes R&D projects administered by R&D corporations (HKUST R and D Corporation Ltd 2010). The high-impact areas of research are nanoscience and nanotechnology, electronics, wireless and information technology, environment and sustainable development, and management education and research. Aside from their scientific significance, these areas are viewed as adding value to the social and economic development of the region, including Hong Kong SAR, China, and the surrounding Pearl River Delta.

Donations have come to play an increasingly important role in the finance and development of higher education in Hong Kong SAR, China. Starting off as the only university in Hong Kong without an alumni sector, HKUST was keen to find ways to offset this condition and took advantage of the timely rise of Chinese philanthropy. The Hong Kong government facilitated the donation culture by providing matching grants to donations made to universities. Selected donations included Sino Group HK\$20 million (US\$2.56 million), Kerry Group HK\$20 million (US\$2.56 million), Shun Hing Group HK\$10 million (US\$1.28 million), Shui On Group HK\$25 million (US\$3.20 million), and Hang Lung Group HK\$20 million (US\$2.56 million).¹⁸ By agreement, the donation amounts from the following donors were not disclosed: Hang Seng Bank, Hysan Trust Fund, and Li Wing Tat Family. IBM and JEOL (Japan Electron Optics Laboratory) also donated equipment. The Croucher Foundation made continuous donations to various projects of the university. All these donations were

made during HKUST's early development stage. During its 10th anniversary, HKUST noted that it had received contributions from 18 foundations and 19 corporations, as well as seven individual and family donors. There has been a continuous stream of donations too extensive to list here.

Collaborations and Partnerships

HKUST's collaborations and partnerships have contributed to its success (Ji 2009). The university has taken specific measures to address one of its major goals, stated earlier in the chapter, to collaborate closely with business and industry in promoting technological innovation and economic development. When declared, this goal set HKUST apart from the other two leading research universities of the time. Its major innovation in this respect was to establish a wholly owned company known as the Research and Development Corporation (RDC), a unit that serves as the business arm of the university to commercialize research. RDC is the signatory for contracts and contract administration carried out by all university departments.

To further develop its collaborations and partnerships with the private and public sectors in Hong Kong SAR, China, and the region, RDC has established a number of subsidiaries and joint ventures and has extended its reach into the Pearl River Delta and beyond. It has increased its presence on mainland China, where it offers services that meet specific market requirements. For example, RDC develops collaborations with public and private sectors within the adjoining Pearl River Delta in Guangdong Province and elsewhere in China, including Beijing. The corporation has a partnership with Peking University and the Shenzhen municipal government in a tripartite cooperative institution that engages in production, study, and research. The institution helps to commercialize high-technology research products. HKUST also has a partnership in Beijing's financial district under a tripartite agreement to establish an International Financial Education and Training Center in Beijing with Beijing Street Holding Company, Ltd., and Beijing International Financial Center (Liu and Zweig 2010).

RDC works closely with the university's technology transfer office to market intellectual property that has been created by the university. In this way, it acts as a technology transfer point between HKUST and both public and private sectors. It handles licensing for commercial collaboration in biotechnology, computer engineering, information technology, and 10 other areas.

As part of RDC, the university also established an Entrepreneurship Center. Opened in 2000, the center seeks to encourage participation of university academic staff members and students in the commercialization of new technology. The Entrepreneurship Center provides them with workspace, business consultation services, and incubation facilities. It also helps introduce venture capitalists to academic staff members and students, resulting in more than 20 spin-off and seven start-up companies, one of which is listed on the Hong Kong Stock Exchange.

In July 2010, HKUST submitted a Knowledge Transfer Report to the University Grants Committee (HKUST 2010a), in which it proposed a five-year strategy to establish a knowledge transfer platform to strengthen entrepreneurship, generate funding for innovation, and create new business opportunities.

Conclusion

Universities are nested within regional civilizations, each of which provides unique conditions that can be drawn upon to establish outstanding research universities. HKUST has drawn upon both Chinese and Western civilizations for talent and innovation and has capitalized on advantageous conditions such as institutional autonomy and the provision of capital resources. Yet its success was ensured by a strategically proactive recruitment that yielded an academic faculty with global recognition, shared purpose, and relentless drive, which taken together supported HKUST's rapidly unprecedented rise within one decade into the ranks of the so-called world-class research universities.

Establishment and Planning

A planning committee for a new research university needs to know how to take advantage of the context within which the institution will be established, including an economy on the rise, industrial restructuring, a shifting emphasis in higher education toward more research, an existing local system of distinguished research universities, and the intensification of the global discourse of knowledge economics. A planning committee also must be skillful enough to establish a new international university without assaulting the existing governing traditions, in this case the British academic model of Hong Kong.

In short, the HKUST case emphasizes the centrality of a skillfully executed establishment phase. The caliber of the individuals who design and carry forth the planning during the preparatory phase has a profound

influence on the initial trajectory of a research university and can make or break its takeoff period. Among the many key decisions made by a preparatory committee is the selection of a university leadership that can drive the recruitment of the top layer of academic talent. Clearly, there is no more crucial activity for the establishment of an internationally recognized research university than initial faculty recruitment.

Recruitment

Undoubtedly, access to top talent from around the world is a process that cannot be fully controlled. However, access on a personal level to defined networks of noted scientists and the ability to persuade academic leaders to trade a secure position at a top university for the opportunity to join a new enterprise in a country of their ethnic heritage are indispensable traits for a founding university president. In the case of HKUST, that recruitment process involved geographically expansive interviewing of prospective faculty, in one case conducting interviews in nine cities within seven days. Moreover, the HKUST case demonstrates that competitive salaries, though helpful, may be of only limited benefit to recruitment efforts. This issue holds true especially for recruitment of academics who can drive a university beyond its opening day and remain committed over time not only to maintain a high caliber of research, but also to build a purposeful engagement with the society and country where the university is situated. For HKUST, salary was not the main factor in persuading already-established top talent to move. Many recruits were already highly paid in U.S. universities, and relocation to HKUST meant a significant decrease in their living space, often affecting their family's routines and children's educations. Given the risks, distinguished scientists at top U.S. universities would have been unlikely to relocate to a new but unknown university if ethnic and emotional attachments to China had not been as much a factor as competitive salaries.

Sustainability

For any newly established university rapidly achieving success and status within the larger international network of research universities, the long-term aim is to sustain the gains of the initial developmental stage. As HKUST's vice president for research remarked, "eighteen years is not a long time" (Chin 2009). Therefore, the focus must remain on the areas of strength in terms of faculties and their programs. The areas identified by the founders continue to remain central to the institution. However, certain aspects of globalization have made universities, including HKUST,

modify the type of emphasis on courses and specialized areas of research. For example, disciplines of study have maintained their integrity; but as discussed earlier, a strategic shift toward multidisciplinary had to occur (Chin 2009). The need for depth remains, but the interactivity across fields on campus has increased. It is more widely recognized that the problems facing the region require solutions not focused on disciplinary boundaries. Whether it is gene-sequencing and community health policy, civil engineering and climate change, or life sciences and global communication, students increasingly need to look ahead and be prepared to solve problems across a spectrum of areas.

Models

Research universities are also sensitive to models. HKUST has remained cognizant of the Massachusetts Institute of Technology and Stanford University models. HKUST has already had to make modifications as the limitations of the original models arose. Although it experienced good timing and some luck, its focus remains the same: emphasize research, and hire the best scientists. Nevertheless, a shift has occurred. While the university can recruit top scientists from the outside initially, continuity cannot be sustained unless a certain indigenization takes hold in the next phase. The next generation of young scholars was more easily able to make Hong Kong SAR, China, a centerpiece of their academic lives. In short, the university went forward with the preparation of a generation of local scientists who will serve and become leaders for the surrounding region of south China as it develops in the decades to come.

Context: Institutions and Systems

Several sections of this chapter highlight how a new research university nests itself within a larger system of existing research universities. It can draw strength from other research universities as well as become a catalyst for those universities' reforms. Although this development requires a new university to identify with other research universities as part of a system, it also benefits the new institution to stand apart with enough vision and vitality to clearly project the institution's uniqueness. This balance can become upset from intrasystem recruitment during the establishment phase. Therefore, it is important for university leaders to reach an informal consensus on such matters. University heads in Hong Kong SAR, China, have channels for communication and meet periodically, not by government proclamation but as a group of university presidents with common interests. Registrars and other university officers at different

levels also have informal networks of communication. For example, although each university is currently developing its new first-year general education curriculum and each is free to design and develop in its own way, informal opportunities exist to periodically share experiences and outcomes at forums or other academic events.

HKUST and other research universities in the Hong Kong SAR, China, system share basic characteristics at the institutional level that are common to research universities everywhere. However, these research universities share the challenge to justify their existence within a bustling Asian business center whose lifeline is global competition in business, trade, and commerce and whose institutional and academic conventions were largely born from colonial transplants. It was within that system that HKUST had to distinguish itself from the other colonial institutions of the time. It did so by establishing a highly entrepreneurial research-culture university without assaulting local governing traditions. It also anticipated the postcolonial context from the beginning.

Thus, this case provides knowledge about lessons for the way a new research university nests itself within a larger system of research universities. In each phase, from planning to establishment to daily operations, the new institution must enhance rather than tip the balance in the larger system. For HKUST to succeed, there needed to be an existing system of respected and well-established institutions that viewed the massive investment of resources in a new institution not as a loss for themselves but as a win-win situation for the system as a whole. This cooperation will not diminish the competitive discourse among the institutions in the system. If anything, it sharpens it. The new research university draws strength, stands apart, and becomes a catalyst for change. Such system change would have been inevitable, but weighty traditions in long-established universities can resist change without the needed catalyst.

Yet it is useful to point out certain systemwide conditions for the successful establishment and development of a new research university that were then present in Hong Kong and for which a new institution cannot be a catalyst. Academic ethics and a corruption-free environment were in place before HKUST joined the larger system and have been sustained since then.

In a small system of less than 10 universities, it is easier to form and present a coherent identity across borders. Sharing core commitments such as intellectual freedom, knowledge exchange, ethnic equality, and other factors, which all help wed institutions to a larger system, facilitates this collaboration. The University Grants Committee also plays a role here

in articulating the differences in institutional roles within the larger system and reinforces these differences in the way it finances institutions.

Financing Research

If Hong Kong SAR, China, had not moved to innovations in competitive financing, there would be less vitality in the system and less of a platform for a new university to have a compelling presence within a larger system. Within that framework, there is also a built-in collaborative element. Competitive research grants are administered by the Research Grants Council of Hong Kong. These research grants, though not on a scale compatible with major universities in the United States, have generally led to effective outcomes in terms of research productivity. For example, in 2002, a decade into HKUST's development, a portion (less than 15 percent) of these grants was directly allocated to HKUST and other universities to support small-scale research projects. HKUST administered these grants through internal competition. However, the major portion (more than 80 percent) was allocated for competitive bids from individuals or groups of academic staff members from all universities. The remaining portion (about 5 percent) placed an emphasis on collaboration across institutions and disciplines—"allocated in response to bids from the institutions for major research facilities/equipment or library collections to support collaborative research involving two or more institutions, or group research activities that operate across disciplines and/or normal institutional boundaries" (UGC 2002b). HKUST has established collaborative projects at other universities within Hong Kong SAR, China. These projects cover a number of areas, including Chinese Medicine Research and Further Development (with the Chinese University of Hong Kong), the Institute of Molecular Technology for Drug Discovery and Synthesis (with the University of Hong Kong), the Centre for Marine Environmental Research and Innovation Technology (with the City University of Hong Kong), Developmental Genomics and Skeletal Research (with the University of Hong Kong), and Control of Pandemic and Inter-Pandemic Influenza (with the University of Hong Kong). Nevertheless, the depth of collaboration may be shallow in certain areas, because this scheme was a top-down initiative by the University Grants Committee.

The Research Grants Council of Hong Kong's competitive bidding occurs on the basis of evaluations by specialized academic referees in Hong Kong SAR, China, and overseas. Overseas assessment, though expensive on a large scale, is crucial because of a limited number of

assessors in particular fields within Hong Kong SAR, China. Another factor distinguishing HKUST from other universities is that during the early phase of development, many of its scientists already had experience with major research grants from their previous academic appointments at U.S. universities.

In sum, the crucial factors learned from this case study illustrate that purpose must include a shared vision. HKUST's founding president summed up these crucial factors: (a) vision—shared vision, clear mission, zeal; (b) goals—regional preference, national positioning, global impact in selected specialties; (c) focus—selection of fields and specialties, focusing of resources; (d) governance—organization and system; (e) adaptation—internationalization without an assault on the dual traditions; (f) heart—brains, muscles, spirit, mind, strength; and (g) soul—faculty as the soul of the university, shared purpose, and relentless drive. In this formula, the goal is to become the preferred regional university, with national positioning and global impact in selected academic research specialties. The focus must be on the selection of fields and specialties for an efficient focusing of resources. Governance needs to support an organization and system that is innovative and unique, promotes a sense of ownership among academic staff, protects the academic research atmosphere, and is international without assaulting local or national traditions. Finally, the heart of a research university is always a faculty that is not only talented, but also has a shared purpose, proactive spirit, and relentless drive.

HKUST facilitated the creation of a robust scholarly community adjoining a globally emergent and reformist China. In this sense, HKUST identified a niche within the Hong Kong system—by establishing a new international university and projecting its vision far beyond that system and into mainland China—especially signified by the new Southern University of Science and Technology under planning in the adjacent Shenzhen Special Economic Zone.

HKUST identified a niche not only in the field of science and technology, but also in delivery of a research-focused university culture, and it encapsulated that niche into an institutional vision that stressed its entrepreneurial uniqueness. The central factor underlying its success was the substantial recruitment from two generations of overseas-based Chinese scholars. By providing them and other local and international faculty members with a unique historical opportunity and a scholarly work environment that was adequately resourced, HKUST sustained its creation of a robust scholarly community.

Hong Kong's two-pronged development strategy was resilient enough to provide HKUST with the autonomy to sustain its uniqueness even during economic recession. When a consolidation of HKUST with one of the other top two universities was considered, the initiative was unanimously opposed by HKUST's faculty and staff members, students, and alumni and was eventually buried. HKUST was able to successfully distinguish itself from other local institutions in a system largely financed by government that guarantees a high degree of autonomy for innovation.

Notes

1. In 1900, US\$50 million was roughly equivalent to US\$3 billion in 2000.
2. HKUST's first president, Woo Chia-wei, was influenced by his time as a post-doctoral fellow in physics at the University of California, San Diego, and 11 years later as its provost, when its Revelle College required science and technology students to take 40 percent of their coursework in the humanities and social sciences.
3. The government's later support for establishment of a cyberport, conceived in 1999 and modeled on Silicon Valley, failed miserably as the technology stock bubble began to deflate. The cyberport became viewed more as a high-end real estate development rather than a setting where technology companies would fuel the leap of Hong Kong SAR, China, into the 21st century.
4. Because of the Tiananmen Square event, some Chinese mainland academics studying overseas at the time were granted automatic residency in the United States, and a few of them later sought employment in the Hong Kong academe. Nevertheless, most of the first tier of senior academic leaders recruited by HKUST from the United States had originally studied in Taiwan, China.
5. These universities include Chinese University of Hong Kong, City University of Hong Kong, Hong Kong Baptist University, Hong Kong Polytechnic University, Hong Kong University of Science and Technology, Lingnan University, and the University of Hong Kong. The only exception is the recent decision to bestow university status to Shue Yan College, the first private university in Hong Kong. The Open University of Hong Kong is not included because it was initially financed by the government before moving toward a self-financing model.
6. The Chinese University of Hong Kong was also, to some extent, American in character because of its U.S. missionary heritage, four-year curriculum, and high proportion of academic staff with degrees from universities in the

- United States. However, it was established when the colonial government was in a dominant position, whereas HKUST was established in the last years of the colonial government when its legitimacy was more open to question.
7. The data in a, b, c, and d are from the Academic Ranking of World Universities in Shanghai. The category rank for social science (e) results from the methodology of these Shanghai rankings in which the data distribution for the various indicators used is examined for any significant distorting effect and standard statistical techniques are used to adjust the indicator. See <http://www.arwu.org/> and also <http://www.arwu.org/FieldSOC2010.jsp>.
 8. President Paul Chin-Wu Chu led HKUST from the beginning of 2001 to August 2009.
 9. Faculty and student numbers were to rise proportionately, but the third phase of the expansion plan did not take place, leaving faculty numbers below their planned expansion number.
 10. See Joint Declaration of the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the People's Republic of China on the Question of Hong Kong, December 1984, Ministry of Foreign Affairs, China. <http://www.fmprc.gov.cn/eng/ljzg/3566/t25956.htm>.
 11. The Hong Kong Jockey Club is the largest single taxpayer in Hong Kong SAR, China—HK\$12,976 million (US\$1,666 million) in 2008–09 or about 6.8 percent of all taxes collected by the government's Inland Revenue Department. (By 1997, "Royal" had been dropped from the club's name.) A unique feature of the club is its nonprofit business model whereby its surplus goes to charity. Over the past decade, the club has donated an average of HK\$1 billion (US\$0.13 billion) (rate effective January 1, 2008) every year to hundreds of charities and community projects, such as HKUST. The club ranks alongside organizations such as the Rockefeller Foundation as one of the largest charity donors in the world. It is also one of the largest employers in Hong Kong SAR, China, with about 5,300 full-time and 21,000 part-time staff members.
 12. The only exception is for those students who major in the study of Chinese language and literature. The language of campus life moved from bilingual (English and Cantonese) to trilingual as the number of students from the Chinese mainland increased, along with the international rise in popularity of Mandarin.
 13. It is useful to note that the total figure in the original staff planning scheme, without the faculty of humanities and social sciences, was 525, while the figure for all academic staff was only 483 as of 2009 (see table 3.2).
 14. Since then, academic salaries have been reduced more than once because of market forces and the economic recessions.

15. Information on the governance structure of HKUST is drawn from the detailed regulations found in the university calendar and replicated on its website. <http://www.ust.hk/>.
16. It consists of one immediate and two honorary chairs, eight ex officio members, and up to 44 appointed members, plus a maximum of 100 honorary members. Currently appointed members include 40 business and community leaders appointed by the council or by the chancellor (chief executive of the government of Hong Kong SAR, China), in addition to four representatives of the university senate appointed by the council. Members hold office for three years from the date of their appointment and are eligible for reappointment.
17. These amounts were converted using the rate effective June 1, 2008.
18. These amounts were converted using the rate effective June 1, 2008.

References

- Altbach, Philip G. 2003. "The Costs and Benefits of World-Class Universities." *International Higher Education* 33 (6): 5–8.
- Altbach, Philip G., and Jorge Balán. 2007. *World Class Worldwide: Transforming Research Universities in Asia and Latin America*. Baltimore: Johns Hopkins University Press.
- Chin, Roland. 2009. Personal interview, Hong Kong University of Science and Technology, Hong Kong SAR, China, October 28.
- Chung, Sze-yuen. 2001. *Hong Kong's Journey to Reunification*. Hong Kong SAR, China: Chinese University of Hong Kong Press.
- Course, Sally. 2001. *HKUST Soars: The First Decade*. Hong Kong SAR, China: Office of University Development and Public Affairs and the Publishing Technology Center, Hong Kong University of Science and Technology.
- Ding, Xueliang. 2004. *On University Reform and Development*. Beijing: Peking University Press.
- Flahavin, Paulette. 1991. *Building a University: The Story of the Hong Kong University of Science and Technology*. Hong Kong: Office of Public Affairs, Hong Kong University of Science and Technology.
- HKUST (Hong Kong University of Science and Technology). 2010a. "Knowledge Transfer Annual Report 2009–10." Report to the University Grants Committee, HKUST, Hong Kong SAR, China. <http://www.ugc.edu.hk/eng/doc/ugc/activity/kt/HKUST.pdf>. Accessed November 10, 2010.
- . 2010b. "Mission and Vision." HKUST, Hong Kong SAR, China. http://www.ust.hk/eng/about/mission_vision.htm. Accessed August 23, 2010.

- . 2010c. "Our Mission." Postgraduate Programs, HKUST, Hong Kong SAR, China. <http://publish.ust.hk/pgstudies/>.
- . 2010d. "Rankings and Awards." HKUST, Hong Kong SAR, China. <http://www.ust.hk/eng/about/ranking.htm>. Accessed August 23, 2010.
- . 2010e. "Strategy." HKUST, Hong Kong SAR, China. http://www.ust.hk/strategy/e_2.html.
- HKUST R and D Corporation Ltd. 2010. "Policy and Procedures." Hong Kong University of Science and Technology, Hong Kong SAR, China. <http://rdc.ust.hk/eng/policy.html>. Accessed June 10, 2011.
- Ji, Shuoming. 2009. "Taking Aim at Hong Kong's Science and Technology: Fuse China with International Power." *International Chinese Weekly* (May 24): 24–31.
- Kung, Shain-Dow. 2002. *My Ten Years at the Hong Kong University of Science and Technology*. Hong Kong SAR, China: Hong Kong Joint Publishing Company.
- Liu, Amy, and David Zweig. 2010. "Training a New Generation of Mainland Students: The Role of Hong Kong." Paper prepared for submission to *Asian Survey*. http://www.cctr.ust.hk/about/pdf/David_CV_2010.pdf.
- Postiglione, Gerard A. 2008. "Transformations in Transnational Higher Education." *Journal of Higher Education* 29 (October): 21–31.
- . 2009. "Community Colleges in China's Two Systems." In *Community College Models: Globalization and Higher Education Reform*, ed. Rosalind Latiner Raby and Edward J. Valeau, 157–71. Amsterdam: Springer.
- Salmi, Jamil. 2009. *The Challenge of Establishing World-Class Universities*. Washington, DC: World Bank.
- So, Alvin, and Ming K. Chan. 2002. *Crisis and Transformation in China's Hong Kong*. New York: M. E. Sharpe.
- Times Higher Education Supplement. 2008. http://www.topuniversities.com/worlduniversityrankings/results/2008/overall_rankings/fullrankings/.
- UGC (University Grants Committee). 1996. *Higher Education in Hong Kong: A Report by the University Grants Committee*. Hong Kong: UGC. <http://www.ugc.hk/eng/ugc/publication/report/hervw/ugcreport.htm>.
- . 1999. *Higher Education in Hong Kong: A Report by the University Grants Committee: Supplement*. Hong Kong: UGC. http://www.ugc.hk/eng/ugc/publication/report/hervw_s/content.htm.
- . 2000. *Facts and Figures*. Hong Kong SAR, China: UGC.
- . 2002a. *Higher Education in Hong Kong: Report of the University Grants Committee*, Report for UGC prepared by Stewart R. Sutherland. Hong Kong SAR, China: UGC. <http://www.ugc.edu.hk/eng/ugc/publication/report/her/her.htm>.

- . 2002b. "Overview." UGC, Hong Kong SAR, China. <http://www.ugc.edu.hk/english/documents/figures/eng/overview2.html>. Accessed November 10, 2010.
- . 2004a. "Hong Kong Higher Education: To Make a Difference, To Move with the Times." UGC, Hong Kong SAR, China. http://www.ugc.edu.hk/eng/doc/ugc/publication/report/policy_document_e.pdf.
- . 2004b. "Integration Matters." UGC, Hong Kong SAR, China. http://www.ugc.edu.hk/eng/doc/ugc/publication/report/report_integration_matters_e.pdf.
- . 2008. "Role Statements of UGC-funded Institutions, Annex IV." UGC, Hong Kong SAR, China. http://www.ugc.edu.hk/english/documents/figures/pdf/A4_Eng.pdf. Accessed August 23, 2010.
- . 2010a. "Statistics." UGC, Hong Kong SAR, China. <http://cdcf.ugc.edu.hk/cdcf/statIndex.do>. Accessed June 10, 2011.
- . 20010b. "UGC Policy." UGC, Hong Kong SAR, China. <http://www.ugc.edu.hk/eng/ugc/policy/policy.htm>.
- Walker, Anthony. 1994. *Building the Future: The Controversial Construction of the Campus of the Hong Kong University of Science and Technology*. Hong Kong: Longman.
- Wong, Yuk Shan. 2010. Personal interview, University of Hong Kong, Hong Kong SAR, China, December 21.
- Woo, Chia-wei. 2006. *Jointly Creating the Hong Kong University of Science and Technology*. Hong Kong SAR, China: Commercial Press.
- Zakaria, Fareed. 2009. *The Post-American World: And the Rise of the Rest*. London: Penguin.