

# CHAPTER 12

## Globalization of Research Universities in Korea

*Nam Pyo Suh*

### INTRODUCTION

**A**n important consequence of economic globalization is expected to be that only a few leading universities will dominate the world of higher education, just as a few companies are dominating different industrial sectors worldwide. Globalization has thus become a major goal for most research universities in Korea. It is driven by a number of other factors as well, including the industrial demand for graduates who can work globally, the need for global collaboration in knowledge generation and technology innovation, and the search for talents and technologies that are no longer bound by national boundary. Korean research universities also must globalize their educational and research programmes to be competitive, viable and effective. There are many different versions of globalization, but the common elements are cooperation among universities and industrial firms in other countries, instruction in English, exchange of students, recruiting of foreign students, and hiring of international instructional staff. There are many challenges in achieving the goal of the globalization of Korean universities. These universities, like their counterparts in other non-English speaking countries with monolithic cultures and people, face a set of structural problems. To overcome these challenges, the Korea Advanced Institute of Science and Technology (KAIST) has established strategies and policies which will be reviewed in this paper.

#### **Brief History of Modern Korea**

To understand the globalization of higher education in Korea, it is first necessary to understand the modern history of Korea. During the last four decades, both higher education and the economy of Korea have grown exponentially. Econom-

ically, before 1960, Korea was not industrialized, having gone through 35 years of Japanese colonization, followed by the Korean War from 1950 to 1953.

Industrialization of Korea began in the early-1960s. The initial phase started in low-value add, labour-intensive industrial sectors such as apparel, textile and leather goods, following the typical process of industrialization of developing nations in the latter half of the 20th century. After having established labour-intensive industries in the 1960s, Korea began the process of transforming its industry from that of labour-intensive industries to higher value add, capital-intensive industries in the 1970s. It made significant investments in heavy industries such as shipbuilding, steel, machinery and automobiles. Then, beginning in the mid-1980s and 1990s, Korea began to invest in technology-intensive businesses such as semiconductors, LCDs and telecommunications. Today, Korea is investing in R&D that may lay the foundation for knowledge-intensive industries.

During the past four decades, Korean industries have performed well. Korea is now the first among industrialized nations in shipbuilding, DRAMS, and LCD technologies, and is in the top five or six in IT-related business, steel-making, and automobile production. Korea's IT and Internet infrastructure is considered to be one of the most advanced in the world. Korean exports in 2006 exceeded \$300 billion, which was larger than the exports of all 53 African nations combined, and about equal to that of all Latin American nations combined, excluding Mexico. Now many Korean industrial firms, like their counterparts in the US and Europe, have begun the inevitable process of moving some of their production of automobiles, steel-making, and consumer electronics to lower-labour cost countries with large markets.

Korean industrialization has been possible because Korean society, which has its cultural roots in the teachings of Confucius, has always put a high premium on education. Korea's education system has always been highly competitive, with better students going to a few highly selective schools, which is the case even as Korea has vastly expanded its educational system.

During the past four decades, higher education in Korea has grown both in quantity and quality, starting from a handful of undergraduate institutions at the end of the Second World War. Korea began the expansion of its university system in the 1950s, even before there were industrial jobs available, by establishing both public and private universities. By the 1970s, in response to the high industrial demand for education, Korea accelerated the expansion by creating many new private and national universities with primary emphasis on undergraduate education. Since then, Korea has expanded its graduate education because of the growing industrial demand for highly educated personnel, patented technologies and technology innovation.

Now, with the entry of Korean industries into the knowledge-intensive businesses, the leading industrial firms in Korea are searching for the most talented

scientists and engineers worldwide — irrespective of their nationality. The challenge for Korean universities is to respond to the demand for highly educated personnel, to meet the aspirations of the Korean people for better education, to lead in the generation of basic knowledge and technologies, and to be able to compete for talent and financial resources with the leading universities worldwide.

### **Korea's Educational Infrastructure**

To understand the role of Korea's research universities, it would be useful to understand the overall educational infrastructure and the investment made in education in Korea. There are 360 higher educational institutions in Korea, including 26 national universities and 173 colleges and private universities. Most of the 26 national universities and many leading private universities in Korea have graduate schools offering masters and doctorate degrees. However, a mere five or so graduate schools dominate graduate education.

In 2004, there were 2,734,238 students in these colleges and universities, up from 179,877 in 1970. In 2004, more than 81% of high school graduates in Korea went to colleges and universities, which is a substantial increase from 33.2% in 1990. Because the entrance to college is highly competitive, parents of K-12 students spend a large portion of their income — estimated as high as 30% — on private education and tutoring in the evenings after regular school hours.

The number of students attending Korean universities is likely to decline in future years since the birth rate in Korea is low. A fairly large number of parents send their children abroad for education in other countries, such as the US, where the competition for entrance to better universities is less severe than in Korea. Therefore, some universities and colleges also will face a serious problem due to the lack of students.

The Ministry of Education micromanages all schools — from elementary education through college education, and research universities — except KAIST. The government sets the policy on the entrance examination to colleges, the number of faculty positions, etc. This uniform educational policy has created a costly and inefficient educational system which has been controversial and criticized by nearly all, and yet it still continues.

### **KAIST AND OTHER RESEARCH UNIVERSITIES IN KOREA**

By 1970, it had become apparent that, with rapid industrialization, Korea would need scientific and technological workers with advanced science and engineering education. Until then, most Koreans who were interested in graduate education went to the United States and Europe — and many stayed where they emigrated. Thus, in 1971, the Korea Advanced Institute of Science and Technology (KAIST), the first university in Korea for graduate education in science and engineering, was established under a special law. The establishment of KAIST marked the beginning of a new era for research universities in Korea.

KAIST is the only university in Korea that can set its own system because it is not controlled by the Ministry of Education. Rather, KAIST is controlled by a board of trustees and receives its basic funding from the Ministry of Science and Technology (MOST) of Korea. In its early days, KAIST students were granted many special privileges: deferment of mandatory military service; free education, including meals, lodging and even spending money; and up-to-date research facilities. Professors were recruited from overseas — mainly expatriates from the US — at two to three times the then prevailing professorial salary in Korea. Some of these special privileges are still in place, except the faculty salary, which is now in parity with other universities.

The establishment of KAIST has had a profound effect on other universities. The creation of KAIST helped these other institutions by setting a new standard for universities, including the development of established graduate programmes, a more competitive compensation system and the creation of funds for research support.

### **Current Status of KAIST**

KAIST has been rated the best university in Korea. The quality of KAIST students is exceptionally high. KAIST accepts 70% of its freshmen from 19 special science high schools and a school for gifted students, based on their high school grades and interviews, without requiring a special examination. Each one of these science high schools is highly competitive, accepting about 100 students out of a potential pool of 100,000 eligible students. Out of the 1,800 graduates produced by these science high schools every year, KAIST accepts only about 700 students a year, although most of the applicants from these science high schools would be equally good students.

KAIST has 3,350 undergraduate students and 4,465 graduate students. This year's freshmen class consists of 7% foreign students. KAIST's goal is to increase the number of undergraduate students to 4,000.

There are 686 faculty members (424 tenure-track professors) and about an equal number of staff members. A significant proportion of KAIST professors were educated primarily in the US and some in Europe. There are 91 faculty members who are foreign nationals, of whom 34 are foreign nationals (mostly Korean-Americans) born in Korea.

KAIST has produced 32,941 graduates — 8,453 BS, 17,762 MS, and 6,726 PhDs — in 36 years. It has been the major supplier of PhDs to Korean industry and universities. Twenty-five per cent of PhDs at Samsung Electronics, the world's largest manufacturer of DRAMs, and about 10% of all professors in Korea are KAIST graduates. Some KAIST graduates are also now becoming professors in other countries.

The goal of KAIST is to become one of the best universities in the world. To achieve this goal, KAIST has recently recommitted itself to providing the

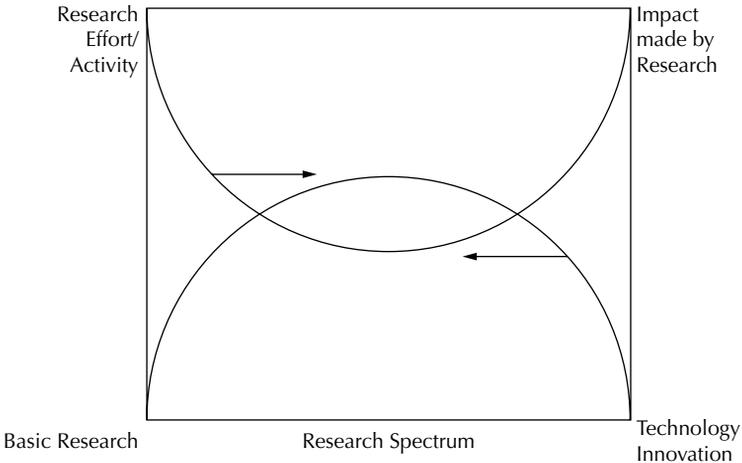
best undergraduate and graduate education, improving the effectiveness of its research investment and empowering its faculty. KAIST has instituted a multi-pronged approach to globalization: instruction in English, enrolment of foreign students, recruitment and appointment of international faculty, faculty and student exchange programmes, participation in and organization of international conferences, creation of dual and joint degree programmes with universities in other countries, and research collaboration across the globe.

### KAIST’s Emphasis on Research at the Two Ends of the Research Spectrum

In research, KAIST is a global university. The KAIST faculty has been active in international conferences, collaborating with many researchers across the globe. They also have published extensively in international journals and obtained many patents in a number of countries. The annual publication rate of our faculty is around five papers per faculty, which is on par with the leading universities in the US. Many KAIST professors are the recipients of international awards in various engineering and scientific fields, especially in semi-conductors, IT, composite manufacturing, biology, materials and engineering.

Notwithstanding these achievements, KAIST also has implemented a couple of policy changes to strengthen the effectiveness of its research. First, the contributions of its faculty are assessed based on the impact made by their research, not by the number of papers published. Faculty members are strongly encouraged to work at the two ends of the research spectrum where the impact is greatest: basic research and technology innovation. (Shown in Figure 1.)

**Figure 1:** Research Spectrum vs. the Research Effort spent by Researchers, and Research Spectrum vs. the Impact made by Research



Second, we have created research organizations, the KAIST Institutes, in seven areas to promote research at the narrowly focused intersection of different disciplines, where faculty and students from various departments work together. New faculty positions are allocated to the Institutes, and every department can recruit faculty members who can participate in these institutes. There is no formal allocation of faculty positions to the departments. The research institute and the department must agree on faculty candidates. The faculty member belongs to the department that hired the professor to do teaching, but is free to do research outside the department. However, when there is an exceptionally gifted faculty candidate, the department is allowed to hire the person at any time regardless of the candidate's field of specialization.

## **GLOBALIZATION OF KOREAN UNIVERSITIES: PROS AND CONS**

The globalization of universities in Korea has been driven by government and industry, as well as by the universities themselves. To remain competitive in the global economy, Korean government leaders understand that Korean universities must have a world view. Large Korean industrial firms that conduct business in many countries require employees who not only have proficiency in English, but also have skills that match their competition. To remain academically competitive in an increasingly flat world, universities know that they must prepare their students for global jobs.

While these are valid concerns on globalization, the proponents of globalization believe that its benefits far outweigh its disadvantages. In the global economy, a few leading universities will dominate research and education, just as a few leading industrial firms have consolidated their positions in their industries. They will attract the best brains from all corners of the world, as well as financial support for research. Students and faculty in these institutions will have competitive advantages, which will enable them to amplify and leverage their research capabilities. Unless a university can compete on a global scale, it may not provide the education and research opportunities their best students deserve.

## **GLOBALIZATION AT KAIST**

KAIST is implementing its globalization plan with the support of the Korean government, which is providing \$100 million over five years. The KAIST's programme for globalization is as follows.

### **Undergraduate Programme**

KAIST has taken several steps to globalize its undergraduate programme. First, all freshmen courses are taught in English. To support this ambitious practice, KAIST has strengthened the language-learning centre where stu-

dents can hone their English language skills and has set up an English cafe where only English is spoken. In addition, some of KAIST's best professors who are fluent in English are teaching freshmen classes.

Second, 5.5% of the students in the freshmen class of 2007 are international students, coming from nations in South-east Asia, Central Asia and Eastern Europe. To accommodate students and faculty from other countries, KAIST will be strengthening its healthcare system to make it easier for all students, faculty and staff to receive medical services on campus. In addition, KAIST is planning to build a new International Student Center, funded by a local church, and a new apartment building to improve the accommodation for international faculty.

Third, KAIST is in the process of creating a dual degree programme with universities in the US, Europe and Asia in order to generate graduates who can work with and in other countries. Under the programme, participating students at KAIST and its counterpart university will earn two B.S. degrees after four years, splitting their time equally between the two institutions.

To teach the synthesis and design process to all students, a design subject is required of all freshmen, just like mathematics, physics, chemistry and biology. This undergraduate programme, which emphasizes both analysis and design, is unique. The goal is to impart to the student the ability to think and reason in the two opposite domains of synthesis and analysis with equal facility.

### **Graduate Programme**

KAIST has a large number of research collaborations with many universities in the US, Europe, Japan and China. For example, the KAIST Physics Department has research collaboration with the Cavendish Laboratory of Cambridge University. The KAIST business school also has established a dual masters degree programme for business and law with the law school of Northwestern University in the US.

### **Research**

KAIST has established research institutes — KAIST Institutes — in such areas as biology, IT, entertainment, design of complex systems, energy, nanoscience and technology, and mega-city. These research institutes will conduct research at the intersection between disciplines. For example, in the KAIST Institute for the BioCentury, professors and students from several departments such as biology, chemical engineering, mechanical engineering, physics and chemistry, will work together on joint projects. As part of this research effort, they also will collaborate with industrial firms and universities both in and outside Korea. KAIST is currently seeking special research collaborations with leading global industrial firms.

## **Faculty**

KAIST is actively recruiting international faculty members with the goal of eventually having 100 non-Korean faculty members out of 700 tenure-track faculty members in four years.

We also have appointed many faculty members who are teaching at foreign universities as adjunct professors who spend a significant amount of their time at KAIST and KAIST-affiliated organizations such as the Korea Institute for Advanced Studies.

## **External Advisory Council**

Each unit of KAIST has an advisory group called the External Advisory Council (EAC). They review academic programmes and research projects of academic departments and research institutes. One third of the EAC members — about five — come from other countries, and they serve as ambassadors and advisors for KAIST.

## **CHALLENGES THAT MUST BE OVERCOME FOR GLOBALIZATION**

Globalization is a challenge in Korea for a number of key reasons, including language, culture and financial resources. These challenges must be addressed for Korean universities to successfully compete against the world's best academic institutions.

### **Linguistic barrier**

KAIST's freshmen class is now instructed in English. However, the linguistic barrier to learning will be present for some time. The Korean language linguistically belongs to the Ural Altai Language group (spoken by Mongolians, Turks, Hungarians and Finns), which is distinctly different from English in grammar, structure, etc. Although English is now being taught from the elementary school level, many Korean students coming in as freshmen at KAIST are not proficient in English. KAIST needs to increase the number of international students and faculty to help convert the campus into a bilingual campus. KAIST plans to accept about 10% of its undergraduates and a slightly larger number of graduate students from overseas. This year's freshmen class consists of about 6% international students.

### **Cultural constraints**

There are many cultural constraints in the globalization of the higher educational system in Korea — from eating etiquettes, interpersonal relationships and cultural values. Korea has been a country with virtually one nationality and one race. KAIST must teach its students the social and cultural norms in other

countries, as well as how to respect them by learning how to adopt culturally sensitive behaviour. The peoples of all nations must adjust their social norms and accept others to be able to work across cultures in the global economy.

### **Financial resources**

Research universities need financial resources. For public universities, government support is the primary source of funding. At KAIST, the rate of progress in achieving its goals will be gated by government funding of its programmes.

The Korean government is aware of the importance of the globalization of research universities. The Ministry of Education started the BK21 Program (Brain Korea in the 21st century) eight years ago to fund graduate fellowships and research. These grants can be used to finance global collaboration. Other ministries also fund research at universities in such areas as telecommunications, defence, construction, environment, culture and entertainment; some of this funding provides for global collaboration.

Industrial support of academic research at research universities also promotes industrial collaboration across national boundaries. Currently, industrial support is significantly less than government-funded research.

### **Foreign faculty**

One of the major goals of KAIST and other universities is to recruit outstanding foreign faculty. They bring a new world view into Korean education and offer unique skills and talents in instruction and research. Although some universities have done better, most Korean universities have difficulty hiring full-time foreign faculty. KAIST has been able to hire Korean-American faculty members and some American and European faculty members, but the number of faculty members is short of its goal of having at least 10% foreign faculty in five years.

### **Foreign students**

The number of foreign students is increasing in Korean universities, but still the number falls far short of the target. Like international faculty, these students will bring new ideas to Korean education and their inclusion will be a signal that universities are offering the highest quality education the world can offer. It is going to take an aggressive effort to recruit students from overseas, especially from the US and Europe.

## **PROSPECT OF GLOBALIZATION AT KAIST**

Since KAIST's goal is to become one of the world's premier universities in science and technology, globalization is just a matter of time. With further

growth of the Korean economy and the globalization of Korean companies, there will be further incentives for Korean students to prepare to work in and outside Korea and, conversely, for international students to study in Korea. Therefore, efforts made by KAIST for globalization will continue to gather momentum in the future, although it may not reach the level of globalization that Singaporean universities have attained.

Globalization of KAIST and other higher educational institutions does not mean that these institutions will abandon their basic Korean values and pride. On the contrary, as Korean universities globalize, it is Korean culture that will make them truly unique and special, and Korean culture can be shared with a wider international audience.

## CONCLUSION

The globalization of higher education worldwide is driven primarily by economic necessity. Economic advances cannot be achieved by staying insular; countries must share knowledge and collaborate in research to produce workers who can work, lead and innovate.

The globalization of higher education is inevitable from a historical point of view. In the 21st century, knowledge can diffuse faster in the era of information technology, people can travel almost anywhere in the world in 24 hours, and synergy takes place when information is exchanged on a global scale. Most of all, the world needs people who can facilitate this process of globalization, which is the role of higher education in all countries.

In Korea, most research universities have begun the process of globalization with varying degrees of success. This process will accelerate and grow both in scope and substance during the coming decade, as changes demonstrate its positive impact on Korea's development in all areas.

KAIST has made significant changes to become a global university. We have a new undergraduate curriculum, new advanced research institutes, more international students and faculty, exchange of students with universities in other countries, and significant international collaborations in education and research. These changes should accelerate KAIST's goal of becoming one of the best universities in the world.