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A Great Leap Forward to Excellence in Research at Seoul National University, 1994-2006

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This paper addresses to the question of how to empower research competence of a kind which would lead a peripheral university like SNU to becoming a world-class university. There have been noticeable achievements in building competitive, first class universities in many developing nations, particularly in Asian countries. This paper will examine the process by which SNU can be transforming SNU into a world-class university in Korea. The analysis will focus on the internal reforms implemented at SNU over the last 10 years and the effectiveness of these policies. The main strategy undertaken to bring SNU up to the world-class level was to emphatically pursue excellence in research. Long before governmental funds were allocated for this purpose from 1999 onwards, SNU had already vigorously pursued excellence in research and teaching. The experiences of SNU in these endeavours represents an important case study that bears vital theoretical and practical implications for other Korean universities, as well as for universities in other middle-income countries.

Key words: research competence, Korean universities, higher education, higher education reform

To the Memory of Late Martin Trow (1926-2007) of Emeritus Professor of Public Policy at UC-Berkeley, especially of his seminal work on the transition from elite to mass to universal education.

Introduction

Can a peripheral country like Korea build a so-called world-class university? What would it take for a non-western country to create an internationally competitive research university? In response to an increasingly globalized economy, many developing countries have been paying serious attention to building world-class universities. How to develop a research university which can compete with world flagship universities presents challenges on a number of fronts; and this is especially true in the case of a country like Korea that has been peripheral for so long and has only joined the ranks of middle-income countries relatively recently. As Altbach (2003) poignantly points out, the patterns, ideas and values of a world-class university among academic institutions in the Western tradition are reflected in the criteria themselves. Applying these terms of reference to universities in non-western regions may invite skeptcism or worse. Furthermore, it is becoming increasingly difficult for a middle-income country to become a competitive player in the international knowledge system, because the fiscal demands of playing on the world's stage of science and scholarship are growing exponetially.

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Despite these challenges, there has been noticeable achievement in building competitive universities in many developing nations, and particularly in Asian countries. Singapore's attempt to establish itself as the "Boston of the East" and South Korea's "Brain Korea 21" program are cases in point (Altbach, 2000). China launched its "211 Project" in 1994 with an ambitious plan to build 100 universities by the early 21st century and the "985 Project" in 1998 with an impressive budget of 3.4 billion U.S. dollars invested in 33 key universities with the intention of developing them into world-class institutions. While Altbach (2000) maintains that these attempts have produced mixed results, it is arguably premature to draw any conclusive judgments.

There has been serious commitments undertaken and efforts made on the part of Korean universities to empower themselves to produce internationally competitive human resources. One of the most central strategies in moving toward this goal has been to empower graduate programs with a specific focus on excellence in research and build them up to a world-class level. However, the very term "world-class" is not by any means an analytic one and therefore is not a very clear term of reference for scholarly discussions. As shown clearly in refectory remarks by an American historian (Lucas, 1994), since no attempt has been made to construct a true "global" history of higher education, in the use of this term an unabashedly "Eurocentric" discourse prevails. According to various measures and standards, Seoul National University (SNU), a flagship university in Korea, seemingly appears to have achieved world-class status in line with western conceptions of the university. In 2005, the *Times Higher Education Supplement*, a British newspaper, ranked SNU as 45th among the world's top 100 science universities and as the 93rd overall. One year later, to every body's surprise, the overall ranking of SNU increased dramatically to 63rd, a great leap of 30 ranks. The only two other Korean schools within the world's top 200 universities are Korea University (150th) and KAIST (198th). This leap by SNU is less to do with improvements in research competence but more to do with a noticeable presence of foreign students, post-doctoral fellows and faculty members at SNU. Here we clearly see *The Time*'s heavy reliance on internationalization in its rankings of world universities. However, with a short institutional history of 60 years, and with a mere 30 years of offering full-fledged doctoral programs, SNU's accomplishment is extraordinary. What were the driving forces behind this university's great leap forward?

This paper examines the process by which SNU transformed itself into a world-class university. The analysis will focus on the internal reforms implemented at SNU over the last 10 years and the effectiveness of these policies in building a world-class university. SNU is an important case study which bears vital theoretical and practical implications for other Korean universities, as well as for universities in other middle-income countries.

Economic Restructuring and Higher Education Reform

The speed and level of economic development that Korea has achieved since the early 1970s have been well documented. By 1996, South Korea, with a per-capita national income of $10,000, had become a major competitor in the world market. By the end of the 1990s, however, the Korean economy was faced with serious economic hardship, mainly due to the foreign exchange crisis. The unemployment rate jumped from 2.6% in 1997 to 7.9% in 1998. This economic crisis uncovered the limitations of a materials-oriented manufacturing economy, and the Korean government proposed a shift to a knowledge-based economy as one of its major policy goals. The Ministry of Education formulated a series of educational reform policies to lay the foundations of a knowledge-based society. In this context, building world-class research universities that can play a central role in Korean economic development has become a national priority.

One of the major policies in this goal of establishing and supporting world-class research universities was the Brain Korea 21 Project (BK21). BK21 is a major higher education reform project that aims at cultivating the creative, high-quality human resources necessary for a knowledge-based society. To accomplish this goal, the Korean government decided to invest approximately US$1.2 billion in universities over the seven years between 1999 and 2005. The most significant difference in this project compared to previous education reform policies lies in its specific focus on graduate programs, and it is the graduate students in the selected schools who are the direct beneficiaries of this project. Research funds do not go directly to the faculty in the form of grants. Instead, three quarters of the entire BK21 budget is used to provide a supportive educational environment for graduate students in the form of stipends, financial support for overseas study, and research infrastructure.

The budget allocated to BK21 was absolutely unprecedented. However, the amount actually available for policy-related reform programs was still relatively limited.

For example, in 2004, the Ministry of Education (MOE) allocated 13% of its budget (about US$28 billion) for higher education. This amount is about 0.43% of Korean GDP, which in comparison to other OECD member countries is less than half of the average percentage (0.9) of GDP spent on higher education. The actual amount spent on policy-related reform programs is only 1.3 trillion Won (1.3 billion U.S. dollars), which is less than 40% of the total budget. In the same year, the MOE spent 858.2 billion Won (8.6 million U.S. dollars) on supporting research and development at universities. Of the budget allocated for research and development, 31% was given to research universities with graduate programs, 46% was given to 4-year teaching universities, and the rest was spent to support vocational colleges and schools. About 140 billion Won (140 million U.S. dollars) from the budget allocated for research and development was spent on BK21, and 123.7 billion Won (123.7 million U.S. dollars) was spent on supporting pure sciences and humanities. Besides the MOE, other government institutions provide financial support for research and development for universities. In 2003, about 2 trillion Won (2 billion U.S. dollars) was spent on research and development at universities. Of this funding, 76% came from the government, 14% was donated by private parties, and 9% was supplied by universities themselves. The largest portion went to the field of engineering. The second and the third largest amounts of research funds were given to the fields of natural sciences and pharmacy, respectively. The most competitive university received the largest amount of financial support for research and development. The top 10 universities received 46% of research funds, and the top 20 universities received 63% of research funds. Two thirds of research funding was given to public universities.

Although the funds available for the actual reform policies were limited, BK21 has had an enormous impact on Korean universities as a whole. In particular, both its emphasis on graduate programs and graduate students and the scale of the project have provided Korean flagship universities, and especially SNU, with an unprecedented opportunity to become world-class universities despite their position on the periphery.

Rapid Transition to Universal Access to Higher Education

As Trow (1970, 1980) has repeatedly pointed out, higher education in contemporary society has gone beyond the stage of elite education, has passed the stage of mass education, and has entered the stage of universal education. The experience of higher education in the United States is a case in point.

The way higher education expanded in Korea during the last several decades is unique. First of all, the speed of the transition has been very impressive. Korean higher education has accomplished in about three decades what the U.S. took half a century to achieve (Trow, 1961). By 2000, Korean high school graduates were 5% more likely to obtain higher education in one form or another than their counterparts in the U.S. In the same year, Korea's enrollment rate in 4-year colleges was 38%, and the enrollment rate in various higher education institutions overall reached 81%. This trend is continuing today. It appears not only that tertiary education has become universal, but also that even graduate education is becoming increasingly standard in Korea. Between 1995 and 2000, the number of graduate students doubled to 230,000 and has continued to increase. Additionally, and unlike the U.S. experience, the rapid transition from mass higher education to universal higher education occurred almost immediately after, or simultaneously to, the swift transition to universal secondary education. However, it is this unprecedented double transition with little time for adjustment that has brought about the so-called "examination hell" or "educational bottle-neck" for students as they advance from secondary to tertiary education.

There are several issues that the Korean higher education system has encountered due to its rapid growth and transition. Many universities have experienced rapid expansion, or rather "exploration," without having the opportunity to make adequate adjustments to their missions, functions and structures. Instead, such universities offer similar programs and majors without any real, functional differentiation among various levels of schooling. All universities in Korea consider SNU as the "defining institution," to use Steedman's term (1987), and attempt to model themselves after SNU. In other words, what Riesman (1966) called a "meandering procession" on the road toward excellence, observed in the U.S., is also occurring in Korea. Most universities in Korea aspire to be like SNU, a Harvard or a "Todai" of the Korean penninsula (Cutts, 1999).

Another serious issue resulting from the rapid transition of higher education concerns funding. The speed and level of expansion of higher education in Korea exceeded the government's ability to support it financially, which has resulted in both parents and students having to shoulder an ever greater financial burden. It is worth noting that in the case of Korea, the main driving force behind the rapid

transition of higher education came from the zeal and willingness on the part of parents to financially support their children's higher education, rather than from the central planning efforts of the government. As a matter of fact, 83% of the national budget for higher education comes from family funds (Kim, 2005), a phenomenon unseen even in Japan or the U.S., where the private sector is far more dominant than the public sector.

Private education has always played a key role in Korean higher education. While privatization of education in Korea began long before the open-door era, the modern form of private education appeared with the arrival of Western missionaries in Korea (Lee, 2004), which continued during the Colonial Period (1910-1945). From 1948, when the independent Korean Republic was founded, privatization was further intensified as the country experienced rapid educational expansion in the absence of the central government's financial commitment or capacity. Currently, more than 80% of college students attend private schools. Additionally, unlike the U.S., where private universities were founded and sponsored by private donations, Korean private universities are sponsored and financially sustained mainly by student tuition.

Some Characteristics of Korean Universities

There are several unique characteristics of Korean universities, and these characteristics are intimately linked to the evolution and historical development of university education in Korea. In traditional Korean society, the ruling elites were the main beneficiaries of the educational system. A good number of academic circles (or what Korean scholars may call "Gates"[1]) were formed with a prominent scholar of Buddhism and Confucianism as a central figure. Indigenous scholastic traditions were cultivated and maintained through academic discussions and extended exchanges of manuscripts, correspondence and letters. In contrast to Europe, a formal educational institute like "*universitas,*" (identified by Durkheim (1938) in his extraordinary historical sociology of medieval University of Paris), did not serve as the institutional basis of intellectual life and scholarly activities in Korea. During the Chosun Dynasty (1392-1910), although there was a system of formal, governmental educational institutions that could also be readily found in China (Min, 2004), Korean intellectuals participated in academic activities through informal channels of communication between mentors and their disciples. Just as Western Scholasticism blossomed in medieval universities, so did the renaissance of Korean Confucianism occur among Gates, and not through any formal institutions led by either the central or local government. Interestingly, these traditions and practices are found even in today's academic environment in Korea, and they serve as a powerful and effective driving force for successful academic achievement. It was against this cultural background that the Western concepts of the university were introduced and implemented, firstly by American Protestant missionaries (Lee, 2004) and later by Japanese colonizers.

During the Colonial Era (1910-1945), Imperial Japan imposed its own notions of the university, largely adopted from Germany and based on the Humboldt model (Fallon, 1980). This Japanese version of a research university was transplanted to Korea in the 1920s (Altbach, 1998), and since then until recently was regarded as "the University." The current system of higher education in Korea was established during the presence of U.S. military forces (1945-1948). A Columbia University graduate who worked as deputy-director at the Bureau of Education under the U.S. military government introduced an American concept of the university with a whole system of modern public education in 1946. However, graduates of the Japanese colonial universities and colleges made persistent efforts to maintain the colonial legacy of the Japanese-German idea of "the University," which was in fact a "faculty republic" (Fallon, 1980; Musselin, 2001).

SNU was founded in this context of severe power struggles between the bearers of these two conflicting ideas of the university under the same banners of "de-colonialization" and democratic reforms (Kim, 1996). In other words, SNU, in its inception and subsequent development reflects the "twisted roots" of the Western university model (Altbach, 1998) or, more specifically, internal (by faculty autonomy) and external (Board of Directors) governance. SNU integrated the Seoul Imperial University and other professional colleges with the American university system of departments as units of the school and a Carnegie unit system for academic grading. The American model was further reinforced by the educational background of the faculty. Since most professors in Korean universities, and especially those in SNU, earned doctoral degrees from universities in the U.S., their idea of the university was the one which was learned through their own experiences at their alma maters. Thus, it is not surprising to find that the American pattern has served as a benchmark in recent self-directed efforts to restructure Korean higher education. In short, the current structures and operational environment of Korean universities, including SNU, reflect various systems and models including the traditional mentor-disciple (Gates) relationship, the German model of a

research university adopted and altered by Japan, and an American system of tertiary education. Therefore, like other Asian universities, the Korean ones are in indeed "hybrids" (Altbach, 1998). Furthermore, the interaction of these three conflicting models of the university may explain the enormous difficulties encountered in producing a working consensus among professors about how to reform their own universities and colleges, not to mention how to develop a world-class university.

Korean universities are differentiated at two levels, namely in accordance with reputation and in accordance with areas of specialty. SNU and KAIST (Korea Advanced Institute of Science and Technology), both public institutions, and POSTECH (Pohang University of Science and Technology), a private university, are the best known Korean research universities. These three plus Korea University and Yonsei University (both private schools) comprise the leading flagship universities. In a recent ranking by *The Times* of the 200 best universities worldwide, SNU, KAIST and Korea University were included for the first time in the history of higher education. The next tier among the Korean institutions is made of 4-year comprehensive universities located in the metropolitan area of Seoul. The group after that in ranking consists of provincial public and private universities. The last group in this differentiation includes 2-year and 3-year junior colleges and vocational schools. Differentiation by area of specialization reflects both institutional prestige and the university's marketability in the job market. The fields of medicine (including traditional Chinese medicine), law, business, pharmacy and education comprise the top tier specialties.

The hierarchy within the two levels of differentiation is determined by the level of applicants' academic aptitude and postgraduate employment. For example, specialty differentiation is consistent with applicants' test scores on the college entrance examination (which is equivalent to the SAT in the U.S.). College ranking is determined by the rate at which graduates are placed in high-ranking occupations, such as prestigious civil service positions (e.g., judges, attorneys, diplomats, civil officials, and teachers), medical doctors, pharmacists, and employment in large companies (e.g., Samsung, LG, and SK). The academic background of those who are currently high-ranking government officials, judges, journalists and CEOs of large corporations reflects the ranking order of colleges in Korea.

A typical path for a successful student is to be a top-caliber student in high school, to be admitted to a high-ranking college, such as SNU, to pass a qualifying examination, and eventually to become a medical doctor, a judge, or an attorney. A similar pattern is found in Japan (Cutts, 1999). Unfortunately, this employment pattern makes for an educational experience in high school, as well as in college, that is based on rote memory and repetition of formal knowledge rather than higher order thinking and creativity, because students focus on the college entrance examination while in high school, and on preparation for various examinations that will lead to prestigious jobs while in college. Curriculum-in-reality in high school is simply drilling and preparation aimed at obtaining high university entrance exam scores. Even children in elementary school attend private after-school academies (*Juku* in Japan) with the ultimate goal of entering a top-ranking college in the future. The prime clients of these private academies are high school students and those who were initially unsuccessful in entering the institution of first preference. After entering college, instead of concentrating on the college curriculum, students are concerned with the job market and begin to prepare for the qualifying examinations for their future careers. In contemporary Korea, even students majoring in engineering and natural sciences are spending 3 to 4 years during college to prepare for civil service examinations for careers in law and the public service. It appears that education in Korea, rather than reducing the level of social and economic inequality, instead perpetuates, reinforces, and even justifies inequality in the social and economic system.

Self-Strengthening Research Competence at SNU, 1994-2005

The current system of doctoral programs at SNU was fully implemented in 1975 as a part of upgrading the university after it moved to a new campus, now embracing all its scattered colleges except the medical college. Obsolete was the "old form" of doctoral program, in which a degree could be earned based solely on a thesis. That was the common practice taken from the colonial Japanese university system, and thus the term "old form" was used. Replacing it was the "new form," with prescribed graduate course-work and a qualifying examination to be passed before writing a doctoral thesis, in accordance with the standards of American research universities. As mentioned above, though SNU had a historical legacy from Japanese colonial universities at its inception, its structure and operation since then have been modeled after American universities. It is important to note that the self- strengthening efforts toward building a world-

class university began at SNU long before the launching of BK21 in 1999. Altbach (2003) points out several important conditions that are necessary to achieve world-class university status, including excellence in research by top-quality scholars, institutional autonomy, academic freedom, adequate facilities for academic work, and long-term public funding. The main strategy to bring SNU up to the world-class level was to emphatically pursue excellence in research, the first among the five critical conditions identified by Altbach. Governmental support came at an opportune time for SNU to take full advantage of the resulting funding and other forms of assistance in the university's endeavor to empower its doctoral programs. As a major beneficiary of this 7-year-long, large public funding effort, SNU was provided with an extraordinary opportunity and resources to pursue its long-cherished goal, chosen and supported by the faculty, to become a world-class university.

In order to promote quality research among the faculty, newly hired faculty were required to have established publication records in internationally renowned science journals and to participate in a tenure review process, which was recently deferred to the stage of promotion from associate professor to full professor. The research records of the top-ranking U.S. schools have served as a benchmark in evaluating the progress of yearly academic accomplishment and productivity at SNU since 1994. Various internal evaluations of progress have been conducted at the university, college, departmental, and research group levels (Kim et al., 2004; Kim, 2005; Kim et al., 2005). A self-evaluation appears to be the only reasonable way to assess academic achievement and progress, for there is no "right" formula for a flagship university in the periphery to become world class (Altbach, 2003) SNU bolstered its graduate program by providing graduate students with generous stipends and research assistantships. Also, the postdoctoral program was expanded in order to support young scholars.

Global connections and cooperation are also critical for creating a world-class university. SNU has promoted global connections by regularly inviting internationally accomplished scholars in various fields for both short-term and long-term residencies. International cooperation was pursued by implementing a joint-degree program with foreign universities and other scholarly exchange programs. SNU's outreach efforts now include academic exchange programs with about 90 universities in 27 countries around the world. There were only 100 foreign students at SNU in 1995, however, by 2005, there were more than 700. Over the last five years the number of foreign professors has doubled to 58. SNU supports graduate students for their overseas studies and their participation in international conferences. These overseas experiences are particularly important in that they give junior scholars a strong sense of self-confidence in their competitive status in the international arena. Additionally, there is considerable infrastructure support, including an electronic library with easy access to various academic databases, high-tech computer labs, and a housing facility for international scholars and students.

These series of changes and reform policies have produced impressive results. Senior officers at SNU began to pay particular attention to the number of science papers published in America and other advanced countries. It is well known among scientists that the Institute of Scientific Information (ISI) in the U.S. maintains a database on the published scientific articles in the Science Citation Index (SCI) annually. Reform-minded school officers, and government bureaucrats as well, believe that the number of published articles listed in SCI could serve as a quantitative indicator of productivity for a university. According to a tally of the number of articles by SNU faculty listed in the SCI, the world ranking of SNU was 75th in 1999, and has increased dramatically every year since then, reaching 34th place in 2003 (Kim et al., 2004). Even though this quantitative index is a controversial one, the trend of a consistent increase in ranking gives senior officers a sense of the direction of SNU's self-strengthening efforts. The latest ranking is far higher than their early estimation based on the current, observable trend and has indeed been a surprise to all interested observers.

The measurement of productivity levels by the number of published scientific articles provides insufficient information, however, for it only captures the gross productivity, not the real net productivity. The real productivity actually depends on the level of financial investment devoted to the school under consideration. Harvard University, the University of Tokyo, and the University of California at Los Angeles are the top three universities with regard to the number of published articles in 2004. In fact, Harvard University produces three times as many articles as SNU (9,421 vs. 3,116). However, looking at the financial resources invested in each institution produces a somewhat different ranking order. Table 1 compares the productivity levels indexed by the number of papers of these top three universities with those of SNU, the one adjusted for annual budgets and research funds of each school[3] (Office of Research Affairs, 2006). SNU's budget is only about one-quarter that of Harvard University. The amount of funds spent on research at Harvard University is more than twice as high as that at SNU.

Table 1. *University Publications and R&D Expenditures at SNU and the Top Three World-Class Research Universities, 2004*

Variables	Harvard	Tokyo[c]	UCLA	SNU
Publications[a] (ranks)	9,421 (1)	6,631 (2)	5,232 (3)	3,116 (31)
Operating budget				
Total Costs (TBW)[b]	2,857	1,732	3,651	647
Publications per TBM[b]	3.3	3.8	1.4	4.8
Research funding				
Total funds (TBW)[b]	648	426	611	270
Publications per TBW[b]	14.5	15.6	8.6	11.5

Note. Exchange rates;US$1=1,100 Korean won; 1¥=9 Korean won.
[a]SCI-indexed articles
[b]TBW = 10 billion Korean won, approximately US$10 million.
[C]University of Tokyo data from 2003.
From *Research activities at Seoul National University: 2005/2006* by Office of Research Affairs, 2006, Seoul: Seoul National University; *How to Get a World-class University in Korea? The Case of Self-strengthening Program of SNU, 1994-2005* (Research Note, No. 24) by Seoul National University and K. S. Kim, 2005, Seoul: Educational Research Institute, SNU. Copyright 2006 by Seoul National University. Adapted with permission.

As shown in Table 1, considering the relative lack of financial resources available at SNU, the adjusted productivity level according to the level of investment at SNU is not very far behind that of the other top-tier universities. For 1 billion Won (about 1 million U.S. dollars) of the school operating budget, SNU and Harvard produced about 5 and 4 articles, respectively. Every 1 billion Won in development funding yielded 56 articles at SNU and 10 at Harvard, and the same amount in research funding yielded 13 and 16 articles, respectively. With the exception of productivity per dollar of research funds expended, the figures for SNU are fairly competitive. When we move from gross to adjusted productivity, we can see some potential for international competitiveness in research at SNU.

However, creating a world-class university requires qualitative rather than just quantitative advancement. To measure quality in the manner widely used by specialists is an impact factor which has potential shortcomings for understanding the research competence of a paper. Principal investigators of the BK21 groups began searching for a qualitative index to reveal the level of research competence at SNU. Kim and his colleagues (2005) produced an internal evaluation on SNU's international competitiveness in terms of the level of research competence in the field of science and technology. The report analyzed both the quantity and quality of research articles published in SCI-indexed journals within six different fields: mathematics, physics, biological science, chemical engineering, mechanics and aerospace engineering, and pharmacy. As indicators of the quality of research papers, investigators counted the number of times each published paper was cited, based on the ISI Web of Science Database. Tallying the citations for each scholarly contributor is a time-consuming and tedious, as well as error-laden, job. Not surprisingly, the estimated margin of error is said to be about 10 percent (Kim et al., 2005). To make a specific comparison with US counterparts, two groups of US universities were identified based on the annual rankings for selected fields reported by the *U.S. News and World Report*. The "top university" referred to an American university that ranked among the top three in a particular field, and "high-ranking" referred to the top 20 to 30 US universities.

The major findings of the analysis are as follows:

1. According to the measure of the quantity of articles published in the six fields, SNU achieved only 75% of the Top University category in the U.S. in 1994, but achieved 151% in 2004.
2. According to the quality index of the number times a paper was cited, during 1994–1995, SNU jumped to 35% of the Top University category and 53% of the High-Ranking Universities category. Since then, there has been a significant and steady improvement,

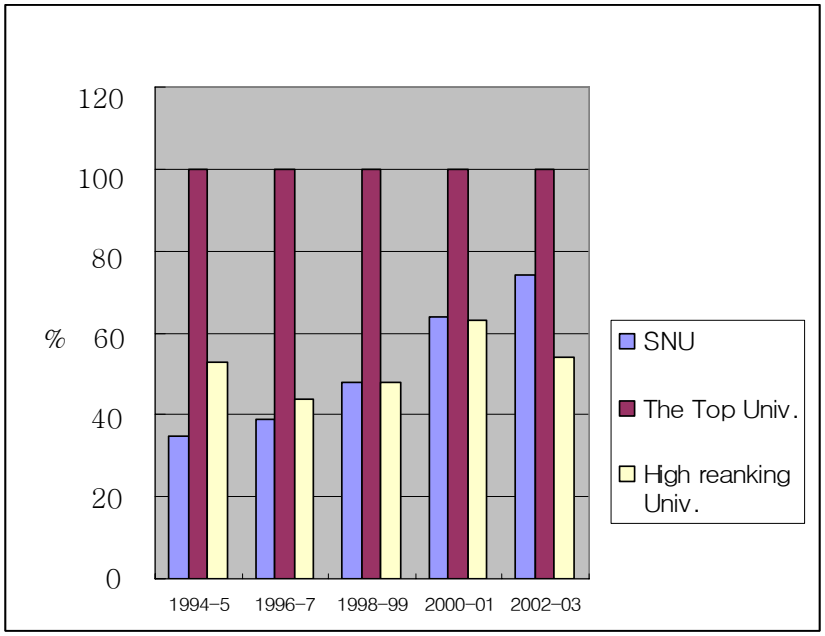

Figure 1. Comparison of Quality Index between American Research Universities and SNU, 1994-2003. Percentages of the average of six fields, taking the top American university as 100%. From *An assessment of research competence in science and engineering* (Research Bulletin), by K. W. Kim et al., 2005, Seoul: Seoul National University, Copyright 2005 by Seoul National University. Adapted with permission.

and by 2002-2003, using the same index, SNU reached 74% of the Top University category. In comparison with the group of High-Ranking Universities, SNU's quality was in fact higher than the former by 37% for 2002-2003.

3. Judging by the quality of published journal articles, SNU's graduate program in science and engineering is ranked at approximately 20th place amongst High-Ranking American Universities.

This internal review, however, provoked many hot debates and controversies, with much deep skepticism surrounding the evaluation, simply because it ranked SNU in the 20th place among American research universities. However, this soon was seen to be a reasonable estimation. An examination of SNU's internal review data and *The Time*'s international comparisons of the world's top 100 science universities yields quite consistent results for the ranking of SNU.[2]

This ranking would drop quickly, as with *The Times*'s overall rankings, if we took into account other criteria for ranking world-class universities, such as the ratio of professors to students, the number of foreign students, and the number of visiting or hired foreign scholars. The remarkable leap forward achieved by SNU during the last 10 years is the result of many factors. Although the American model may have served as a benchmark, it should be noted that SNU has made deliberate efforts to develop an academic model that is globally competitive and at the same time maintains culturally relevant mentor-disciple relations.

Conclusion

The great leap forward in terms of excellence in research shows that SNU appears to have reached the world-class level. It shows that a flagship university in the periphery has the potential to become a world-class university. There are many factors that may have led to these impressive achievements.

The first factor is the fundamental strength of the Korean secondary education system. Students who enter SNU do so after having undergone a tremendous amount of high-quality preparation. According to an international survey published by the Organization for Economic Cooperation and Development, Korean students in secondary education ranked among the top three countries in terms of problem-solving and mathematical

skills (OECD, 2004a, 2004b). Thus, it is not surprising that SNU, which admits only the most able students from a wider pool of students who already exhibit high level problem solving and mathematical skills, has the potential of becoming a world-class university.

The second factor is the quality of undergraduate education received by the students while at SNU. In the *Chronicle of Higher Education,* it was reported that SNU was second only to the University of California, Berkeley in producing more undergraduate students who later earned doctorates from American universities between 1999 and 2003 (Gravois, 2005). The undergraduate programs of SNU seem to serve as the second-best "university college," an outstanding source of undergraduates who went on for advanced study in the United States (Jenks & Riesman, 1968, p. 20–27).

The third factor supporting the creation of world-class universities involves the Korean intellectual tradition of a strong and committed relationship between a mentor and disciple that serves as a potent academic force for graduate programs. It is fascinating to see the Korean traditional cultural pattern playing a practical role as a crucial resource in the globalization of its modern educational institutes.

One of the reasons for Altbach's (2000, 2003) pessimism about the possibility of a middle-income country establishing a world-class university is the issue of institutional autonomy, which is particularly critical for academic creativity and freedom. He questions whether the ambitious Korean BK21 Project would be effective, given the lack of institutional autonomy in Korea. Since central governments in many middle-income countries are attempting to build world-class universities to promote economic growth, it is a tremendous challenge for academic institutions to maintain a meaningful level of autonomy. In fact, it has been difficult for SNU to remain autonomous as a public institution, especially because it was a main recipient of public financial resources. To receive adequate funding, SNU has had to compromise its autonomy, and this is something which has made it difficult to maintain consistent policies. Given their insufficient financial resources, even private universities in Korea face this dilemma—albeit to a lesser extent.

There is another unique Korean dynamic that has affected SNU's autonomy. In the Korean educational arena, the private sector plays a very important role. The educational zeal of parents has been the strength and driving force behind the consecutive transition to universal higher education in Korea. The highly competitive college entrance examination system has always been a major source of conflict among parents, teachers, the government, and the universities. The policy concerning the college entrance examination system has become a political bargaining chip between the government and the private sector, which in turn has threatened the autonomy of universities. SNU, the flagship university and the dream destination of all Korean students, has paid a heavy price for its academic prestige. For SNU, all policies in general, and admissions policies in particular, have always been under close scrutiny by politicians as well as the public, resulting in some loss of institutional independence. It is not a university like SNU but, rather, the central government that has set critical limits on admissions policies. Among the "four essential freedoms" of a university, SNU lacks the freedom to determine "who may be admitted to study" (Bok, 1980). In the current political milieu of emphasizing social equity in Korea, the coming of a credential-based society and an intensifying pecking order among universities are hotly debated political issues. There have even been radical proposals—such as one in which SNU would be completely closed down to defuse and resolve this ever intensifying competition.

The achievements of SNU are indeed remarkable and should serve as a model and encouragement to other middle-income countries with similar aspirations and determinations. On the other hand, lessons can be learned by reflecting on the experiences of SNU. First, the focus of higher education reform policies should be on comprehensive and fundamental change. Although quantitative measures have been taken, they should not be the sole approach in creating a world-class academic institution.

The delicate balancing act between institutional autonomy and the role of the central government is critical for building a world-class research university in middle-income countries. While the government should provide financial and institutional support, as Altbach argues, institutional autonomy is a critical aspect of the intellectual environment that promotes academic freedom and innovation.

Lastly, scientific knowledge is not immune to political and ideological forces. A challenge that will require ongoing attention is the task of enabling a university in a middle-income country to find a niche in the global intellectual community while maintaining a commitment to the country's unique traditional heritage without compromising the institution's international competitive edge. Participation in the global community of world-class universities as a competitive partner requires enormous reserves of determination, tremendous effort, and a plethora of resources. Even while taking as a benchmark the models

developed and refined in the core industrial countries, middle-income countries should not abandon their own intellectual traditions. These countries need to be relevant in the global intellectual community while being mindful so as not to become victims of any emergent tendency towards intellectual neocolonialism in the 21st century.

Notes

1 The term "gate" originated from and was widely used in the Buddhist academic traditions and practices from thousands of years ago. The Buddha himself is, for example, the gate to the Buddhist way for his many thousands of disciples and greater number of faithful followers. Likewise, Confucius himself is also the gate to the Confucius way for his legendary 3,000 disciples from all over China. For Buddha and Confucius, a gate signifies the highest degree of intellectual excellence combined with the same degree of moral integrity of a prominent mentor. Entering a certain gate means positioning oneself as a lifetime disciple of the mentor. Korean scholars often call someone "a student working under a certain gate" to classify a serious and committed disciple of a particular prominent scholar. Here "under" means making the student a humble disciple. Heated debates among competing gates reinforce their own intellectual standings among scholars with and without civil service jobs. Sometimes a group evolves into a political party, especially when national security is in danger. These circles constitute loosely connected mentor-disciple relations but have neither an institutional base as in European universities nor an organizational base as in medieval guilds among artisans. These relations, however, have been the center of excellence in research in keeping with the Confucian way and teaching of the power elites during the Kingdom of Chosun.

2 According to *The Times*, SNU with a score of 38.3 is located between Johns Hopkins University with 39 and UC-San Diego with 36.7. If we only count American research universities, leaving out European, Japanese and Chinese institutions, among the 100 universities, Johns Hopkins University is 16th and UC-San Diego is 17th. If these rankings are valid, we can hardly reject SNU's self-evaluation of its standing among its benchmark counterparts in America. For data on Harvard, see the school's 2004 *Analysis of Financial Results*. For data on the University of Tokyo, see the school's statement of 2003 (http://www.u-tokyo. ac.jp/fin 01/06_01j.html); its total research funds included a research subsidiary from the Japanese Ministry of Education, Culture, Sports, Science, and Technology, in addition to external funds from private groups, enterprises, and other sources. For data on UCLA, see the Campus Facts in Brief 2004–2005 (http://www. universityofcalifornia.edu/annualreport /2005/).

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