

Peripheries and Centres: Research Universities in Developing Countries

by

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The research university is a central institution of the 21st century – providing access to global science, producing basic and applied research, and educating key leaders for academe and society. Worldwide, there are very few research universities – they are expensive to develop and support, and the pressures of massification have placed priorities elsewhere. For developing countries, research universities are especially rare, and yet they are especially important as key ingredients for economic and social progress. This article argues for the importance of research universities in developing countries and points out some of the challenges that such institutions face.

The research university is a central institution of the 21st century. It is essential to the creation and dissemination of knowledge. As one of the key elements in the globalisation of science, the research university is at the nexus of science, scholarship and the new knowledge economies. The research university educates the new generation of personnel needed for technological and intellectual leadership, develops the knowledge so necessary for modern science and scholarship, and, just as important, serves as an element of worldwide communication and collaboration.

All but a few research universities are located in the developed economies of the industrialised world. Any of the recent world rankings of top universities show that the main research-oriented universities are found in a few countries. This article, however, looks at the realities and prospects for research universities in developing and middle-income countries – a small but growing subset of research universities worldwide. If knowledge production and dissemination are not to remain a monopoly of the rich countries, research universities must become successful outside the main cosmopolitan centres. In establishing and fostering research universities, developing countries face problems that are to some extent unique.

Research universities are defined here as academic institutions committed to the creation and dissemination of knowledge in a range of disciplines and fields and featuring the appropriate laboratories, libraries and other infrastructures that permit teaching and research at the highest possible level. While typically large and multifaceted, some research universities may be smaller institutions concentrating on a narrower range of subjects. Research universities educate students, usually at all degree levels – an indication that the focus extends beyond research. Indeed, this synergy of research and teaching is a hallmark of these institutions, which employ mainly full-time academics who hold doctoral degrees (Kerr, 2001).

Motivating this discussion is a conviction that knowledge production and dissemination must spread internationally and that all regions of the world need a role in the knowledge network (Altbach, 1987). While there will always be centres and peripheries – the centres mainly concentrated in the major industrialised countries for the foreseeable future – there is room, indeed a necessity, for a wider dissemination of research capacity throughout the world. It may not be possible for each country to have a research university, but many developing and middle-income countries can develop universities

with research capacity and the ability to participate in the world knowledge system. Smaller countries can form regional academic alliances to build enough strength in selected fields to promote participation in global science.

The argument can be made that all countries need academic institutions linked to the global academic system of science and scholarship so that they can understand advanced scientific developments and participate selectively in them. Academic institutions in small or poor countries cannot compete with the Oxfords or Harvards of the industrialised countries. But most countries can support at least one university of sufficient quality to participate in international discussions of science and scholarship and undertake research in one or more fields relevant to national development.

Research universities generate growing enthusiasm worldwide. Countries come to the conclusion that such institutions are the key to gaining entry into the knowledge economy of the 21st century. Not only do these institutions train key personnel, but they form windows to scientific information worldwide by providing opportunities for top-level scientific communication. Faculty members and students at these institutions connect with colleagues everywhere and participate in global science and scholarship. Even in the United Kingdom and the United States, concern is rising about maintaining the standards of existing research universities (Rosenzweig, 1998). Germany worries about the international competitiveness of its top universities and has allocated resources to some key institutions, while the Japanese government has funded competitive grants to create “centres of excellence”. China has placed emphasis on creating “world-class” research universities, and India is finally beginning to think about the quality of its mainstream institutions. Similar programmes to enhance standards exist in Chile, South Korea, Taiwan and elsewhere. Several of Africa’s traditionally strong universities are seeking to improve their quality in an effort to achieve research university status, with assistance from external funders, although it is, in general, behind levels of academic development on the other continents.

In keeping with the rising profile of research universities in developing countries, many national policy makers, analysts of higher education, and even the international aid agencies and the World Bank, previously convinced that only basic education was worth supporting, now understand that research universities are important for national development. Research universities have emerged on the policy agenda in many developing countries, especially larger countries that seek to compete in the global knowledge economy.

History and perspectives

Universities, since their origins in medieval Europe, have always been concerned with the transmission, preservation and interpretation of

knowledge, although not primarily with the creation of new knowledge (Perkin, 2006). While they have served as cultural and intellectual institutions in their societies, universities have not traditionally been research-oriented. Science was conducted elsewhere for the most part. Wilhelm von Humboldt largely invented the modern research university when the University of Berlin was established in 1818. Von Humboldt's idea was that the university should directly enhance German national and scientific development. This revolutionary idea harnessed science and scholarship – produced, with state support, in universities – to national development. The Humboldtian concept proved to be highly successful, and the new German universities (and others that were reformed to conform to the new model) contributed to the emergence of Germany as a modern country by producing research and educating scientists. A significant additional contribution of the Humboldtian model that affected both science and the organisation of higher education was the idea of the “chair” system – the appointment of discipline-based professors. This innovation helped to define the emerging scientific fields and also shaped the organisation of the university.

Two countries focused on modernisation and development. After 1862 the United States and, several decades later, Japan quickly adopted parts of the German model. The US “land grant” model proved to be particularly successful. It combined the Humboldtian emphasis on research and science and the key role of the state in supporting higher education based on the idea of public service and applied technology (Altbach, 2001). The great American public university, as exemplified by the University of Wisconsin and the University of California in the latter 19th century, opened the door to direct public service and applied technology. It also “democratised” science by replacing the hierarchical German chair system with the more participative departmental structure. Variations of the German, Japanese and US research university concepts largely characterise today's research universities.

Almost all contemporary universities, regardless of location, are European in structure, organisation and concept. Academic institutions from Tokyo to Tashkent and from Cairo to Chicago are based on the Western model. This trend means, for most developing countries, that higher education institutions are not integrally linked to indigenous cultures and in many cases were imposed by colonial rulers. Even in such countries as China, Ethiopia and Thailand which were never colonised, Western academic models were chosen (Altbach and Umakoshi, 2004). For developing countries subjected to colonialism, higher education growth was generally slow paced, and in much of Africa and some other parts of the developing world, universities were not established until the 20th century.

Research universities and academic systems

Research universities generally constitute part of a differentiated academic system – an arrangement of postsecondary institutions with varied roles in society and different funding patterns. Countries without such differentiated systems find it difficult to support research universities, which are always expensive to maintain and require recognition of their specialised and complex academic role. Germany, for example, considers all of its universities as research institutions, and as a result is unable to provide adequate funding to any of them, although a few German universities have been recognised for their research quality and are being given enhanced funding to compete globally. Research universities are inevitably expensive to operate and require more funds than other academic institutions. They are also generally more selective in terms of student admissions and faculty hiring and typically stand at the pinnacle of an academic system.

The creation of a differentiated academic system is thus a prerequisite for research universities and is a necessity for developing countries (Task Force on Higher Education and Society, 2000). A differentiated system has academic institutions with diverse missions, structures and patterns of funding. In the United States, the first country to design academic systems as a way to organise its expanding and multidimensional postsecondary institutions in the early 20th century, the “California” model is generally seen as the most successful approach. California’s public system has three kinds of academic institutions, each with quite different purposes (Douglass, 2000). This tiered model – with vocationally-oriented “open-door” community colleges, multipurpose state universities and selective research-oriented universities – has specific patterns of funding and support for each of the tiers as well as quite different missions (Geiger, 2004). In the United Kingdom, since the 1970s, mainly as a result of government policies, research assessment exercises and other initiatives have created a tiered system in which institutions that emerged at the top as a result of quality reviews – Oxford, Cambridge and a modest number of others – have been funded more generously than other universities.

Academic systems often evolve during the massification of higher education. As Martin Trow has pointed out, most countries have inevitably moved from an elite higher education system toward mass access, with half or more of the age cohort attending postsecondary institutions (Trow, 2006). Ever larger numbers of students, with varying levels of academic ability and different goals for study, require a range of institutions to serve multiple needs. Just as important, no country can afford to educate large numbers of students in expensive research universities.

Research universities are a small part of most academic systems. In the United States, perhaps 150 out of a total of more than 3 000 academic

institutions are research universities. Yet these universities are the most prestigious and are awarded 80% of competitive government research funds. Academic salaries tend to be higher, teaching responsibilities for the faculty members lower, and library and laboratory facilities better than the national average. Many countries have just one or two research universities because of their cost and the resources available. Even in fairly large countries, the number of research universities is often small; the United Kingdom has perhaps 20 institutions and Japan has a similar number. China is aiming to establish well over 20, and Brazil has five. Some countries may have more research universities than they can afford; Sweden and the Netherlands are examples.

To allow research universities to flourish requires a way to differentiate them from other types of postsecondary institutions, provide funding at a higher level, and legitimise the idea that these institutions are indeed special and serve a crucial role in society.

Research universities and research systems

Research universities are not the only institutions in which research is conducted. Specialised research institutes, government laboratories, corporate research centres, and other agencies carry out research, and many participate in the international scientific community. In large countries, research universities form part of a more complex research system that includes other kinds of institutions. Universities, however, serve as some of the most effective institutions for carrying out research. In addition, they provide formal training and credentials for the future generation of researchers, scholars and teachers. Using advanced students, typically at the doctoral level, to assist with research reduces the cost of research, provides valuable training for students and employs the insights of the new generation of talented researchers.

Research institutes, usually publicly funded, remain common establishments in many countries. The Academy of Science system of the former Soviet Union is one of the most influential models (Vucinich, 1984). Top researchers are appointed at discipline-based (or occasionally interdisciplinary) academies that are usually attached to a research institute. These key scientists in some cases have affiliations with universities, but their main appointments and work are based in the research institutes. The hard sciences and engineering dominate the academy system; the humanities and social sciences are underrepresented. In the case of the former Soviet Union (and contemporary Russia to some extent) and some other countries like those in Eastern Europe and China, these academies are the main providers of research. In these countries, universities have a lower research profile and little direct funding for research. Taiwan, through its Academia Sinica, operates in much the same way. The French CNRS (*Centre National de la*

Recherche Scientifique) and the German Max Planck Institutes have similar functions, although in both cases there are increasingly strong links with universities, including shared researchers. In the United States, the National Institutes of Health (NIH) resemble the European examples although in general the NIH focus more on applied research. Many countries are moving away from the research institute model and toward embedding research laboratories in universities.

There is a growing trend, especially in the United States, of university-based research facilities that are sponsored by corporations and engaged in advanced research involving products or research themes of interest to the sponsoring company. Most focus on applied research that results in marketable products for the sponsoring corporation. US and Japanese companies have been especially active in sponsoring university-related research centres. Companies have set up research facilities near universities to take advantage of academic expertise – the relationship between biotechnology corporations and the Massachusetts Institute of Technology is well known. In other examples, corporate laboratories have been set up at universities or agreements have been made with academic units to provide funds for research in return for access to knowledge products (Slaughter and Leslie, 1997). China has been active in university-industry linkages, with mixed success. While some observers have noted that not all efforts have been successful and have argued that traditional academic values are being weakened, others have praised innovative programmes (Ma, 2007; Liu, 2007).

Universities assemble in one place researchers, teachers and students who create an effective community for knowledge, discovery and innovation. Advanced doctoral-level students can provide highly motivated scientific personnel who at the same time can benefit from direct involvement in sophisticated research. Universities have a wide range of disciplines and scientific specialisations, and research can benefit from interdisciplinary insights, which is especially significant in frontier areas such as biotechnology and environmental science. Universities can also combine basic research with applied applications in ways that other institutions cannot.

The academic environment is enriched by the unique combination of the academic norm of scientific discovery and interpretation, the link between teaching and research, and the presence of scientists and scholars from a range of disciplines. Universities also exemplify the “public good” – the idea that scientific discovery may have wider social benefits – and their focus on basic research is unique. While science can take place in other venues, universities are a particularly effective environment for discovery.

Common characteristics of the research university

Despite variations among research universities worldwide, common characteristics exist that are worth noting precisely because they are so nearly universal.

Research universities, with few exceptions, are government-funded public institutions. Only in a few countries such as Chile, Japan and the United States do private research universities exist, although with the current worldwide growth of private higher education it is possible that a small number of these institutions will aspire to the top ranks. This is the case for a number of reasons. Tuition-dependent private institutions can seldom fund expensive research universities. Research universities are typically large in terms of student enrollments and numbers of departments and faculties. Basic research, the most expensive part of the university, requires public support because it typically seldom produces direct income. The facilities necessary to produce top-quality research, especially in the sciences, are exceedingly expensive. Even in the United States, the research mission of some private universities is supported by the government through competitive research grants obtained by individual scientists. In most of the world there is no academic tradition of private research universities. Tax laws generally do not reward philanthropic assistance to private universities. As a result, few institutions except in Japan and the United States have endowment funds that permit the support of research. The growing trend internationally toward for-profit private institutions will further weaken private interest in research universities, although it is possible that a few private institutions trying to reach a competitive place at the top of the academic system may seek to become research universities.

Most research universities are, as Clark Kerr pointed out, “multiversities” (Kerr, 2001): institutions with a multiplicity of missions among which research is only one, but where research and graduate study tend to dominate. Kerr was writing about the University of California, Berkeley, but this generalisation could apply to most of the world’s research universities. The mission of these universities encompasses undergraduate education on a large scale to reach out to and serve local and national communities, along with offering a range of vocational and professional credentials to students. Some universities, such as UNAM (*Universidad Nacional Autónoma de México*) in Mexico and the University of Buenos Aires in Argentina, sponsor secondary schools as well. But in all cases, the research mission is at the top of the prestige hierarchy of the institution. This emphasis on research tends to have a negative impact on the quality of undergraduate instruction and typically has a major influence on the direction of the university (Lewis, 2006; Hutchins, 1995). Many, however, argue that research-active faculty members bring a vitality to their teaching that benefits students, even at the undergraduate level.

Research universities are always resource intensive. They are considerably more expensive to build and operate than other academic institutions because of increasingly expensive scientific equipment; rapidly expanding, costly information technology and access to worldwide scientific knowledge; and the need to pay their professors more than the norm for the rest of the academic system. The cost per student is always higher than for the rest of the system. Funding must be available on a sustained basis; fluctuating budgets can damage these institutions.

Finally, research universities attract the “best and the brightest” students in the country and, in some instances, from around the world. Because of their prestige and facilities, these universities generally attract the most able students, and the admissions process is highly competitive. Similarly, research universities generally employ the most talented professors – scientists and scholars who are attracted by the research orientation, by the facilities and often by the more favorable working conditions at these institutions. Research university faculty generally hold doctoral degrees, even in many countries where the doctorate is not required for postsecondary teaching.

Challenges

Research universities face severe challenges at a time when they are recognised as the pinnacle of the academic system and as central to the new globalised economy. The following factors are among the problems faced by research universities in all countries. While the scope and depth of the issues discussed here may vary, they are universally applicable.

Funding

As noted earlier, the basic cost of operating a research university has increased, placing more stress on traditional funding sources, mainly governmental, and forcing institutions and systems to seek new revenues. At the same time, the basic concepts underpinning public funding for higher education are being questioned. Higher education is traditionally viewed as a public good, serving society by means of improved human capital as well as research and service. Thus the society is responsible for paying for much of the cost of higher education. Since the 1980s, spurred by thinking from the World Bank and international policy organisations that have shaped the “neoliberal economic consensus”, higher education is increasingly seen as a private good that mainly benefits individual graduates. From this perspective, the individual and his or her family should pay the main costs of higher education through tuition and other fees. This change in thinking occurred at the same time that massification became a key factor in many countries; dramatically increased enrolments were impossible for traditional

government funding levels. Leaving aside the broader economic arguments, this combination of financial factors has been particularly difficult for research universities, which are quintessential “public good” institutions. Their costs are high and their products – educating the top echelons of society, providing research, and serving as repositories of knowledge and sources of social analysis – may not yield practical results in the short run. Student tuition alone cannot support research universities. Further, basic research cannot be expected to fund itself. For these and other reasons, research universities face severe financial strain.

Research universities are subject to the pressures of privatisation (Lyall and Sell, 2006). The privatisation of public universities has become a common phenomenon since public funding is inadequate to support these institutions. In the United States, for example, many of the “flagship” public research universities receive as little as 15% of their basic funding from their primary sponsors, the state governments. The rest of the budget comes from student tuition, research grants, income from intellectual property and ancillary services, and donations from individuals and foundations, as well as endowments. To produce sufficient income, Chinese universities have increased tuition, earned income from consulting and other work by faculty members, and established profit-making companies. In some countries, including Australia, China, Poland, Russia and Uganda, research universities have admitted “private” students who are charged high tuitions, in contrast to the publicly supported enrollments, in order to earn extra funds. Many of these activities significantly undermine the core role of the university.

Research

A culture of research, inquiry and quality is an essential part of a research university. Because of the financial pressures described here, the trend is toward applied and often profit-oriented research, which can be more easily funded than basic research and may yield profits for the university. The commercialisation of research has significant implications for research universities. It changes the orientation of the research community to some extent by emphasising commercial values rather than basic research. Universities have entered into agreements with corporations to produce specific research products or provide access to university facilities. The controversial links between the University of California, Berkeley and the multinational pharmaceutical company Novartis exemplify the possible conflicts between traditional academic norms and commercial interests. The ownership of knowledge, the use of academic facilities and the ultimate openness of scientific research are all issues raised by these new commercial linkages (Slaughter and Rhoades, 2004).

With the rising costs of university research due to expensive laboratories and equipment, large interdisciplinary scientific research teams and other factors, raising funds to support research in the sciences grows more difficult. Even large and well-funded universities in the industrialised countries struggle to support cutting-edge research. In some fields, only the richest institutions can support frontier scientific research.

Research universities in developing countries will need to select fields of research that are affordable and linked to national needs and priorities, for example agriculture or some areas of biotechnology. Appropriate links with private-sector companies, including multinational corporations, may be necessary, and a balance between applied and basic research will need to be worked out. Work in the sciences is only one part of the research agenda of a university. The social sciences and humanities are often neglected because the hard sciences are seen to be more profitable and prestigious. Yet the social sciences and humanities are important for the understanding of society and culture. Disciplines like history are of course relevant, and so are newer fields such as policy studies. They are also considerably less expensive than the hard sciences.

The details of allocating funding for research are also central policy issues. While basic resources, from the university budget, for laboratories, libraries and other research infrastructures are necessary, funding for specific research projects can come from a variety of sources and be allocated in different ways. A system of competitive awards encourages innovative ideas and granting funds for the best projects. Such funds can come from government ministries and granting agencies, private and foreign foundations, or business firms. An appropriate mix of funding sources and allocation mechanisms encourages competition for research funds and the best quality and most innovative research ideas.

Commercialism and the market

The intrusion of market forces and commercial interests into higher education is one of the greatest challenges to universities everywhere. The threat to research universities is particularly great because they are quintessentially “public good” institutions. Market forces have the potential for intruding into almost every aspect of academe (Kirp, 2003). Roger Geiger has written about “the paradox of the marketplace for American universities”:

Hence the marketplace has, on balance, brought universities greater resources, better students, a far larger capacity for advancing knowledge, and a more productive role in the US economy. At the same time, it has diminished the sovereignty of universities over their own activities, weakened their mission of serving the public, and created through

growing commercial entanglements at least the potential for undermining their privileged role as disinterested arbiters of knowledge. (Geiger, 2004, p. 265)

For developing countries, the challenge of the market is particularly serious because there is less basic financial stability and a weaker tradition of academic autonomy. External market pressures can quickly affect the entire institution. For research universities, market forces may significantly shift the direction of research, the focus of the academic profession and the financial balance of the institution. It is clear, however, that if research universities are forced to rely increasingly on their own resources for survival, market forces will determine institutional directions and priorities.

Autonomy and accountability

The tension between autonomy and accountability is a perennial concern for academic institutions. Universities' tradition of academic autonomy involves the ability to make their own decisions about essential academic matters and to shape their own destiny. At the same time, external authorities, including funders, governmental sponsors and religious organisations, held some control over higher education. Since the origins of universities in medieval Europe, these tensions have been evident. In the era of mass higher education, demands for accountability have increased given higher education's rising impact on both the economy and society. Higher education is both a significant state expenditure and of growing relevance to large numbers of people (El-Khawas, 2006). The demand for contemporary accountability almost always comes from the state, the source of much of the funding for higher education.

Research universities have a special need for autonomy, and current demands for accountability are especially problematical for them. While academe in general needs a degree of autonomy to function effectively, research universities must be able to shape their own programmes, carry out a long-term perspective, and manage their budgets and the academic community. Not only do research universities require steady funding commitments, they also need autonomy to develop and maintain their strengths. The academic community itself is the best judge of the success of programmes. Basic research, especially, must have autonomy to develop, since it typically emerges from the interests and concerns of the faculty.

Accountability has become an ever more powerful force – reflecting not only the concerns of government authorities, but increasingly market forces as well. Students have demanded greater knowledge of the performance of academic institutions, and commercial enterprises, linked ever more closely to academic, also demand information and often influence academic policies.

This is, of course, an essential part of contemporary higher education. In this context, research universities, with their need for autonomy, face a difficult environment in the era of markets and accountability.

The globalisation of science and scholarship

Science in the 21st century is truly global in scope. Research results are immediately available worldwide through the Internet. Scientific journals are circulated internationally, and academics contribute to the same publications. Methodologies and scientific norms are used worldwide more than ever before. Scientific equipment, ever more sophisticated and expensive, is available everywhere, and there is pressure for research universities to have the most modern laboratories if they wish to participate in global scientific research. Further, research is increasingly competitive, with researchers and universities rushing to present results and patent or license potentially useful discoveries or inventions. Science, in short, has become a “high-stakes” and intensely competitive international endeavour. Entry into advanced scientific research is expensive, as is maintaining a competitive edge.

The challenge consists not only of laboratories and infrastructure but also the definitions and methodologies of science and scholarship. Scientific globalisation means that participants are linked to the norms of the disciplines and of scholarship that are established by the leaders of research, located in the major universities in the United States and other Western countries. The methods used in funded research and presented in the main scientific journals tend to dominate world science. Further, the themes and subject areas of interest to leading scientists and institutions may not be relevant to universities at the periphery. Involvement in world science means, in general, adherence to established research paradigms and themes.

The high cost of science creates serious problems for academic institutions without a long tradition of research and the required infrastructure and equipment. It is no longer sufficient to build an infrastructure that permits research on local or regional themes if a university wishes to join the “big leagues”. Universities that wish to be considered research-oriented need to participate in the international scientific network and compete with institutions and scientists worldwide. The costs of joining the league of research universities is an especially serious problem for developing countries, with funding problems and no experience of building such institutions. Small academic institutions in both larger countries and small industrialised countries seeking to transform themselves into research universities face similar challenges. The world of global science is expensive to join, and sustaining participation is also costly.

The paradox of global science is similar to globalisation in general. Globalisation – through information technology, better communications, the worldwide circulation of highly trained personnel and other factors – permits everyone to participate in the global marketplace of science, scholarship and ideas. At the same time, globalisation subjects all participants to the pressures of an unequal global knowledge system dominated by the wealthy universities, and imposes the norms and values of those institutions on all (Altbach, 1987, 2004).

Public and private

As discussed earlier, almost all research universities outside Japan and the United States are public and state supported. It is likely that this trend will continue, although with some changes. The fastest-growing sector of higher education worldwide is private. Thus the expansion of the private sector will have an impact on research universities, albeit indirectly, since private higher education is not focused on research (Altbach, 1999). With only a few minor exceptions, the new private institutions focus on teaching and providing credentials to students in professional and other fields, often in specialised niche areas. New private universities are not full-fledged academic institutions with a range of disciplines in most fields of science and scholarship. Specialisation is particularly an aspect of the rapidly expanding for-profit sector of private higher education. The sector is never concerned with building research capacity, since research does not produce profits rapidly.

A small number of nonprofit private universities may succeed in building research capacity to raise their status and contribute broadly to education and research. The Catholic University in Santiago, Chile, and the American University in Cairo, Egypt, are two examples of high-status private institutions that are focusing on developing significant research profiles to build national and international reputations. Institutions such as these generally have a tradition of academic excellence and access to philanthropic funds to develop research programmes.

The growing role of private higher education worldwide means that a smaller proportion of universities will focus on research. This might, in some ways, benefit public research universities since the state may have some of the burden of mass higher education access lifted and be able to focus on promoting the research sector. It is, however, more likely that as the private sector takes on more responsibility for higher education, the state will continue to decrease its support for the sector, as has been the trend in many countries. The rise of the private sector, with its lack of focus on research, may threaten the research role of universities in most of the world, especially in developing countries.

Research universities as meritocracies

In some parts of the world, universities do not adhere to strict meritocratic values. Corruption is a problem and grants and promotions may be awarded for reasons unrelated to quality and merit. For research universities, adherence to meritocratic norms and academic honesty is of special importance. Universities are, of course, part of a broader social and political system, and if the polity is rife with corruption and favoritism, academe will not be immune. The problem of academic corruption in its many facets is present in some developing countries. Systemic corruption is also evident in some of the countries of the former Soviet Union as well as elsewhere. Bribery in student admissions and the awarding of degrees, flagrant plagiarism by students and academics, widespread cheating on examinations, and other forms of clearly unacceptable behaviour have become endemic. In India students have demonstrated for the right to cheat on university examinations. In China there has been a growing public concern about plagiarism at all levels of the academic system and violation of intellectual property at some research universities (Pocha, 2006). In a healthy academic system, when such behavior takes place, it receives the condemnation of the academic community and is rooted out.

The situation is even more dangerous when it directly involves the academic profession. Poor academic salaries contribute to unprofessional professorial practices. Widespread illegal selling of lecture notes and other course materials in Egypt by professors is linked to the need of academic staff to earn enough money to survive (Arishie, 2006). Selling academic posts is a common practice in some countries, and awarding professorships on the basis of ethnic, religious or political factors is widespread as well.

While corrupt practices are damaging in any academic environment, they are toxic to the culture and ethos of the research university. The ideal and practice of meritocratic values are central to the research university. Excellence and intellectual quality are key criteria for student admissions, academic hiring, promotion and reward in research universities. The underpinnings of these academic institutions depend on meritocratic values. Widespread violations will inevitably make it impossible for a research university to flourish.

Academic freedom

Academic freedom is a core requirement for research universities (Altbach, 2007). However, a few definitions are necessary. Of primary importance is the freedom to undertake research and publication in one's area of research and to teach without any restriction in one's areas of expertise. These rights are parts of the more limited German definition of academic freedom. The right of academics to express their views in any public forum or in writing on any topic, even on subjects far from the individual's academic

expertise – the broader US definition – is increasingly accepted around the world. Academic freedom is in some countries protected by specific academic legislation as well as traditional norms and values. Tenure systems in many countries and civil service status in others provide guarantees of employment security so that it is difficult, if not impossible, for governmental authorities or others to terminate a professor who is protected by these guarantees.

Research universities are particularly dependent on a robust regime of academic freedom because their faculty members are directly engaged in the discovery of new knowledge. Research university professors are also more likely than other academics to be “public intellectuals”, engaged in civic discourse on topics of societal importance. History shows that academic freedom – freedom in the classroom, in the laboratory and in publishing the results of research and scholarship – is central to building a research culture.

In some countries, the norms of academic freedom are not fully entrenched, and as a result it may be more difficult to sustain top-quality research universities. Where academic freedom is entirely missing or severely restricted, as is the case in a small number of countries, research universities with reasonable standards cannot be successful regardless of financial support or resources. More common worldwide are universities with some restrictions on academic freedom. In many countries, especially developing countries, in areas of knowledge that are considered politically or socially sensitive, research, publication or commentary is restricted. Such fields include ethnic or religious studies, environmental research, and studies of social class or social conflict, among others. The sanctions for critical analysis in these fields may be as severe as firing from academic posts, jail or exile. More common are less serious penalties or informal warnings.

There seems to be a delicate balance between academic freedom and a viable research university. Singapore has adopted the 19th-century German definition of academic freedom: scholars are free to express their views on issues directly in their fields of expertise, but not on broader issues. Politically sensitive areas such as ethnic relations may create special problems for academics. At the same time, Singapore has been successful in building research universities and establishing collaboration with respected universities abroad. The situation in China is similar, although restrictions are reportedly greater and sanctions for violations can be more severe. In the Middle East, there are taboos on research and publication concerning politically sensitive Arab-Israeli relations or certain religious or ethnic topics. In some African countries, criticism of the ruling regime in power can result in jail terms or job loss, although in general academic freedom is respected. It seems that reasonably successful research universities can be built under conditions of incomplete academic freedom so long as the restrictions are not too severe, although broad comparisons show universities with the greatest amount of academic freedom do best as effective research institutions.

In the United States and other industrialised countries, the main threat to traditional norms of academic freedom comes from the commercialisation of research and the increasing links between universities or individual researchers and corporations interested in university-based research. Under the banner of university-industry collaboration, agreements are made that sometimes restrict access to research findings, focus the attention of research groups on commercially focused products and emphasise applied research at the expense of basic work (Slaughter and Rhoades, 2004; Kirp, 2003). This commercialisation may be financially advantageous to the university and to individual researchers but often places restrictions on the free communication of knowledge, thus violating one of the principles of academic freedom.

Academic freedom is a complex and nuanced topic, central to the success of a research university. It is a core value of higher education everywhere and for all types of academic institutions, but is of special importance for research universities. The challenges to academic freedom in the 21st century come not only from repressive external authorities but also from the new commercialism in higher education. Problems may also originate from within the academy due to the politicisation of the academic community or tensions caused by religious or ethnic relations in some countries.

The academic profession

The professoriate is central to higher education. Research universities rely especially on the quality and focus of the academic profession, and current developments relating to the professoriate worldwide are not favorable for either the profession or for research universities (Altbach, 2003). Research universities require academic staff with the highest possible qualifications: doctoral degrees from reputable universities. This seemingly obvious statement is necessary because the majority of academic staff in developing countries do not hold a doctorate.

Research universities require full-time professors, scholars and scientists who devote their full professional attention to teaching and research at the universities. Without a large majority of full-time academic staff, it is simply impossible to build a cadre to form a committed and effective professoriate. Not only required to fulfill the core functions of the university, full-time faculty also need to participate in governance and management because research universities need a high degree of autonomy and faculty governance. The lack of full-time faculty is one central reason Latin American countries have failed to build research universities.

Along with full-time commitment, salaries must be sufficient to support a middle-class lifestyle. While they need not be paid salaries similar to those of colleagues in the most highly remunerated universities internationally,

professors must be solid members of the middle class in their country. Frequently, full-time professors generate a significant part of their income through consulting, moonlighting at other institutions, or, at some universities, taking on extra teaching loads in fee-producing programmes. These arrangements detract from the core functions of the professoriate and make full academic productivity difficult to maintain. In some disciplines, consulting work, applied research for industry and other links with external agencies may provide useful synergies for academic work, but in many countries outside work and dependence on additional income are deleterious to the research university. Just as problematic, academic salaries, overall, have stagnated worldwide at the same time that remuneration for similarly educated professionals outside universities has increased in some countries quite dramatically. In order to attract the “best and brightest” to academe, salaries must be competitive.

Teaching responsibilities must be sufficiently limited to allow time and energy for research. In the United States, the standard teaching load in most research universities is two courses per semester or four per academic year. In some scientific fields, even less teaching is expected. Similar teaching loads are common in Europe. In many developing countries, much more teaching is required, leaving little time for research. The most active research-focused professors in the United States undertake a significant part of their teaching in graduate (postbaccalaureate) programmes, which helps to link teaching with research and increases productivity. In European countries, with doctoral programmes that are mainly focused on research, professors are given sufficient time for doctoral supervision and mentoring. Few developing countries have instituted these practices.

The academic profession must have a career ladder that permits talented professors to be promoted up the ranks of the profession on the basis of their performance and the quality of their work and a salary structure determined by performance. In many countries, an initial full-time appointment is tantamount to a permanent job. In some, such as Germany, it is difficult for a junior academic to obtain a post that has the possibility of promotion because of the organisation of the career structure. In much of the world, promotion up the academic ranks is largely a matter of seniority and not of demonstrated performance in teaching and research. In the majority of countries, academic salaries are determined by seniority, rank and, in some places, discipline rather than by job performance. This is especially true for countries where academics are considered civil servants – mainly in Western Europe (Enders, 2001). Civil service status provides strong guarantees of permanent employment but seldom measures productivity as an element of promotion.

The challenge is to link reasonable guarantees of long-term employment, both as a means of ensuring academic freedom and as a way of providing employment security and institutional loyalty. The US tenure-track system,

although much criticised within the United States, may be closest to this goal (Chait, 2002). It provides initial probationary appointments with a series of rigorous evaluations that, if passed, lead to a permanent (tenured) appointment after six years. Further promotion, from the rank of associate to full professor, is also merit-based and depends on a rigorous evaluation. Most US colleges and universities follow this pattern although the research universities have the most stringent evaluations. Increasingly, US universities have also instituted “post-tenure review” so that productivity is measured following the award of tenure. Typically, salary raises are given based on performance as well as seniority. Even in the United States, the academic profession is threatened – from the perspective of the research universities. The two most serious problems are the growth of a part-time academic workforce and the relatively new category of non-tenure-track, full-time appointments, similar in some ways to the German pattern of appointments that cannot lead to permanent careers. Now, half of the new positions at US colleges and universities are in these categories, although at research universities the proportion of tenure-track positions is higher (Schuster and Finkelstein, 2006).

The academic profession is central to the success of the university everywhere. A research university requires a special type of professor – highly trained, committed to research and scholarship, and motivated by intellectual curiosity. Full-time commitment and adequate remuneration constitute other necessities. A career path that requires excellence and at the same time offers both academic freedom and job security is also required. Academics at research universities need both the time to engage in creative research and the facilities and infrastructure to make this research possible.

Developing countries: goals, aspirations and realities

Many developing and middle-income countries need research universities to participate in the expanding knowledge and service-oriented economy of the 21st century. Aspirations, however, must be tempered by realities. The goals of research universities in developing countries necessarily differ from those of the large industrialised countries. For developing countries, the goals include a number of core elements.

Creating and retaining a scientific community

Research universities employ scientists and scholars in a range of disciplines. Without these institutions, highly trained academics would leave the country – as happens in many developing countries today that lack these institutions – or would fail to be trained in the first place. Research universities provide the institutional base for top professors, scholars and scientists who comprehend what is happening at the frontiers of science in all fields and can

participate in the global scientific community. The institutions retain local talent at the same time as they produce additional talent. The academic community in the local research university can communicate with scholars abroad and can participate in the global scientific community.

The relevance of research and teaching to industry and society

Local research universities are the only institutions able to give attention to local needs. They understand the specific problems of the country in which they are located and can focus on these themes. External institutions have neither the interest nor the knowledge to do so. Research universities can bring international scientific trends to bear on local problems and contribute to the development of domestic industry, agriculture and society.

Cultural and social development and critique

Research universities everywhere constitute centres of culture and critique. They are of special importance in this regard in developing countries, where few other societal institutions have relevant expertise. In many countries, there are few museums, orchestras or other cultural institutions capable of building and interpreting indigenous culture. Research universities are often the only places with a “critical mass” of expertise and resources in a range of cultural areas. These institutions also provide social commentary, analysis and critique. Again, they are uniquely positioned for these roles; they have academic freedom and a community of faculty and students interested in a range of disciplines. While political authorities may find criticism unwelcome, it is of central importance for the development of a civil society.

Research and analysis in the national language(s)

Research universities must, of course, function in the international languages of science and scholarship. Simultaneously, they have a responsibility to disseminate research and analysis in local languages. Indeed, they may provide a key source for national-language development by producing scientific and literary work in the language and building up vocabulary. The role of indigenous languages in developing country research universities is a highly complex one. In many countries, including almost all of Africa, India and other regions, higher education takes place in nonindigenous languages (English, French, etc.) and the issues are quite complicated. But it is clear that research universities play a key role in supporting and developing local languages.

Educating a new generation of scientists, scholars and technicians

It goes without saying that the central role of the research university is education – the training of the next generation of educated personnel for the

society. Society's leaders, in politics, intellectual life, industry and, of course, education, are trained mostly in the local research university. The role of UNAM in educating generations of the Mexican elite is just one example of a common trend (Odorika and Pusser, 2007).

The aspirations of the research universities in developing countries must be realistic. With the exception of a few of the largest and most successful developing countries, including China and India, aspiring to compete with Harvard or Oxford or to build a top-ranking world-class university is not a reasonable goal. Rather, developing countries can seek to compete with second-rank but quite distinguished research universities in the industrialised world, such as Indiana University or the University of Nebraska in the United States, York University in the United Kingdom, or the University of Amsterdam in the Netherlands.

It is also necessary to select specific areas of science and scholarship to emphasise. Most research universities provide instruction in the main academic disciplines, and many have associated professional schools in fields such as medicine and law. A few research universities are smaller specialised institutions, such as the California Institute of Technology. Few research universities are outstanding in all fields. They make choices concerning which disciplines will be emphasised to build and maintain the highest standards of quality. In some other fields, good quality can be achieved but not necessarily at the highest international levels. These decisions may be made on the basis of available resources, an examination of national or regional needs, or a simple assessment of existing strengths. Some smaller developing countries may lack the funds to build and sustain a research university. In such cases, it may be possible to build a regional research university. Information technology makes this more practicable. Some regions make such initiatives easier to implement than others.

Conclusion

Research universities stand at the apex of a higher education system, providing access to international scholarship and producing the research that may contribute to the growth of knowledge worldwide or in local economies. These universities are also the means of communication with the international world of science and scholarship. For developing countries, research universities play a special role because they are often the sole link to the international knowledge network. Industrialised countries possess many points of access: multinational corporations, scientific laboratories and government agencies, among others. The best local academics are employed at research universities, which provide them with a home and with the possibility of contributing to science and scholarship without leaving the country. Research universities are, thus, centrally important for the success of any higher education system.

Maintaining research universities requires sustained funding to keep these institutions abreast of emerging fields and advances in knowledge. Research universities have special characteristics that may not be common in the academic systems of many developing countries. These aspects include a cadre of full-time faculty, academic freedom, a salary structure permitting a local middle-class lifestyle, promotion and salary enhancement based on performance rather than just seniority, reasonable guarantees of long-term appointment, absence of corruption in all sectors of academic work, and an academic culture of competition and research productivity. These elements may not be present in existing universities. They require resources as well as a cosmopolitan academic environment. Research universities constitute a kind of flagship for the rest of the academic system, providing examples of the best academic values and orientations. At the same time, the norms of the research university, which do not characterise the rest of the academic system, require support. Research universities provide the skills needed by 21st-century economies and societies and reflect the best academic values. Research universities are central institutions for the global economy.

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