

Universities and Higher Education in Development

Rodrigo Arocena

Bo Göransson

Judith Sutz

Abstract

This chapter traces the origin of the modern university and its role in economic growth and development. From institutions primarily concerned with reproducing existing knowledge, universities have evolved into a crucial element in the advancement of the knowledge society by providing education, research, and third mission activities. With the recognition of the endogenous nature of technological progress in mainstream development theory, the importance

of universities and indigenous capacity building has significantly impacted the development strategies of international organizations and the donor community. To realize their full developmental potential, universities need to transcend the narrow confines of being market-driven knowledge producers and evolve toward developmental universities aiming at putting their knowledge at the service of social goals at large.

Keywords: universities, higher education, third mission, extension, developmental universities, knowledge economy

Introduction

Universities and higher education are increasingly seen as critical for economic growth and development. The tendency to regard academic institutions as important carriers of knowledge and social stability is not a new phenomenon, but it is particularly after the turn of this century that universities are being considered an indispensable vehicle for economic and social progress. In this chapter we discuss how contemporary perceptions of the role of universities have been interpreted by and incorporated into theories of development.

First, we trace the historical roots of the modern university and describe how it has evolved into the present-day institution. The next section summarizes ongoing transformational trends in response to external and internal pressures for universities to evolve toward higher efficiency and societal relevance. After examining the implications of these transformations for development theory, we discuss the emergence of new models for university-society interactions. We then examine the prospects for universities, particularly in the South, to evolve toward developmental universities as an alternative to a narrower interpretation of universities as primarily providers of

market-driven knowledge production. In the final section, we outline what signifies a developmental university and provide an example of a program toward this end.

A brief history of the university

Historically, universities have never been totally separate from the rest of society, or at least not from the demands of the rulers and governments endowing financial support for their operation. The precursors to the modern university, the medieval cathedral schools and monastic schools of Europe, were dedicated to the study of religious thought. As such, they provided education for a clergy supporting the secular state. Venturing beyond the ecclesiastical sphere, the medieval universities arose from a desire to apply knowledge and improve the functioning of society by educating students in law, medicine, and theology, but not so much through the creation of new knowledge as through the application and reproduction of tried and tested truths. The early medieval universities' emphasis was thus more on reproducing existing knowledge and maintaining status quo than on creating new knowledge for the advancement of society.

Briefly recalling some main changes and continuities in the evolution of universities from medieval times helps the understanding of present trends and conflicts. According to Müller (1996), four successive stages can be distinguished in a long and complicated history: the university of faith, the university of reason, the university of discovery, and the university of calculation.

A fundamental structural change occurred when “the university of faith transformed itself into the university of reason” (Müller 1996: 15). The change came to be called the Academic Revolution; it is usually symbolized by the foundation of the University of Berlin in 1810. The University of Berlin, which was based on the ideals of Wilhelm von Humboldt, is seen as the eponymous modern institution of higher education. It was the emergence of the Humboldtian ideal of *Bildung* (German for “education” or “personal development”) that firmly established the notion that education should be integrated with the task of research. Von Humboldt’s main idea was that research is as important and legitimate a role for the university as teaching, and that both would benefit if jointly performed. The “Humboldtian project” is the joint practice of teaching and research (Clark 1997). It shaped the classic “idea of University” in Germany, and gave rise to the so-called research university characterized by the combination of those two roles.

The consequences of such a change were enormous, including the institutionalization of research and the emergence of the professional scientist (Ben-David 1984). Academic communities with shared interests and purposes expanded. Moreover, technological research found its ways into the academic realm, augmenting the interactions and related benefits between scientific knowledge and techniques. The Humboldtian university thus prescribed that teachers also be researchers in their efforts to instill *Bildung* in shaping the student's character and perception of the world. The concepts of research and *Bildung* were thus indissolubly linked (Anderson 2004). The cornerstone of university governance, academic freedom, further guaranteed the researchers the right to formulate their research agenda free from external pressure and based on personal interests. In other words, new scientific knowledge emerged as a result of a peer-guided process within the academic community that provided indirect benefit to the development of society. With the rise of the nation-state in Europe, higher education came increasingly under the auspices of the state, and modern governance structures began to emerge, prompting some scholars to proclaim that "the university is a European institution; indeed, it is the European institution *par excellence*" (Rüegg 1992: xix).

The academic freedom and autonomy of the universities did not mean that universities engaged only in obscure and self-oriented research, as they sometimes were caricatured. Universities have

always maintained certain ties with influential parts of society. Tacit demands from funding institutions or through public debates could influence the choice of the area of investigation. In Victorian England, for example, social commentary and debates prompted an inquiry into the causes of poverty, eventually leading to the foundation of systematic empirical research in political economy. Public opinion at the time was divided as to whether economic growth and social justice were incompatible. Theories forwarded by economic thinkers such as Adam Smith and Thomas Robert Malthus were interpreted by some to imply that economic injustice was inherent in the system, leading critics of capitalism like Karl Marx to conclude that social inclusion could not be achieved within the present economic system.

Many of these theories were hampered by a lack of solid empirical observation on the effects of economic growth over time, and it fell to a new breed of political economists to provide it.

Prompted by the public discourse, economists like Alfred Marshall and Beatrice and Sydney Webb helped establish the academic inquiry into the actions of economic agents and the distributive effects of economic growth. The latter two went on to co-found one of today's most prestigious universities, the London School of Economics and Political Sciences.

A further example from the nineteenth century of society's expectations of the academy is the establishment of land-grant universities in the United States. Created in the second half of the nineteenth century, the land-grant universities were tasked with a new mission: to promote development and fight poverty in rural areas by complementing the more abstract liberal arts of the existing university system with practical knowledge and research in subjects pertinent to the rural population, such as agriculture and mechanics. The land-grant universities were an important innovation in technological teaching at tertiary level; soon their "research centers became a second component" of them and in "the early 1900s, state extension activities became another component of the land-grant colleges" (Rogers 1995: 358). Thus, collaborating with regional economic development was included as a new role.

With a different meaning, "extension" also appeared as a role of universities in Latin America during the first decades of the twentieth century. It was defined as a third mission centered in cultural diffusion and technical assistance oriented to deprived groups; extension should be carried out in close connection with teaching and research; its aim was to engage students, graduates, and universities as such in social transformation. In Latin America from the 1920s to the 1980s, prevailing ideas and relevant changes concerning higher education converged with the

search for alternative routes to autonomous development. Such processes shaped a specific Latin American “idea of University.”

Also in other regions of the South, the emergence of national higher educational systems has been central for national education efforts and for the shaping of post-colonial nation building. In Africa, national universities were established after independence with a mandate to confront poverty and underdevelopment. The new universities could generally not live up to the expectations and were long characterized as providing education for an elite few, with marginal impact on development (Mosha 1986). Also, countries in Asia struggled to fulfill their objective of addressing local needs. For countries following the Soviet model of separating education and research institutions, the evolution toward increased relevance has been particularly challenging. Universities in countries like China and Vietnam have only recently combined education and research to address third mission issues.

The wide use of the expression “third mission” or “third role”—adding to the two original ones, teaching and research, coming from the Humboldtian tradition—is quite recent. It can be seen as a consequence of the growing direct impact of new knowledge in productive activities. The emphasis on discovery and invention as explicit tasks for universities was greatly fostered during

the last century by major events with immense impacts in economic activities. Computer sciences and the new genetic technologies emerged in universities. As research became more relevant, the “mission of the university began to be described in such terms as expanding the frontiers of knowledge and penetrating the hitherto unknown;” in this context, the “university of discovery” flowered in the second half of the twentieth century (Müller 1996: 16–7).

Changing modes of knowledge production (Gibbons et al. 1994) started to be discussed: should university research be shaped mainly by academy or by negotiations with external actors? In a similar vein, the concept of post-academic science (Ziman 2000) was proposed to describe the transformation of academic ethos, from the ideal Mertonian rules to rules that express the process of knowledge privatization.¹ A shift was seen in the perception, particularly by governments, of the mission of universities. Discussions and changing perceptions were fostered by a central fact: at the end of the century many universities became direct producers of goods and services for end users (Sutz 1997).

Growing attention came to be paid to the concept of a “third role” of universities, mainly associated with economic growth. According to Etzkowitz (1990, 1997, 2003), capitalization of knowledge is a new mission besides teaching and research, and the university characterized by

assuming such a mission should be termed the “entrepreneurial university.” This theory, carefully elaborated and based on several case studies, is at the same time a description, a prediction, and a prescription: it asserts that the rise of the entrepreneurial university is an empirically testable phenomenon, that its consolidation will be a main trend in the future, and that fostering it should be a fundamental goal of policies for higher education. In this sense, the theory of the entrepreneurial university is a distinguished member of the prevailing approach, which at the same time gives priority to a “third role” of universities and identifies it with direct collaboration with firms.

It is worthwhile stressing that similar descriptions and predictions of the evolution of universities can generate widely different normative evaluations. The fourth stage in Müller’s view is a reality akin to the entrepreneurial university: clearly thinking about the North, although he does not say it explicitly, he characterizes the emerging university of calculation as:

“a huge, expensive institution, highly functional in terms of training and continuing innovation in science and technology, no longer committed to learning per se not to character development, and representing a convenient aggregation of talents more like a marketplace of research and training than an intellectual community. A further

implication of such an institutional evolution is that participants in its activities would not necessarily share any common set of values beyond the economic imperative of producing well enough to be compensated, and vice versa. If this forecast is justified then the university of calculation would play no institutional role based on its own set of values in the public affairs of society.” (Müller 1996: 21)

If that is the prevailing trend, an alternative is clearly needed, both in the South and in the North.

Ongoing transformation

Alternatives to Müller’s “university of calculation” must be discussed in the context of main changes within universities and in their relations with society at large. They include an increase in the number of tertiary students, that roughly can be seen as a shift from an elitist to a mass (though quite stratified) higher education system; new curricula focused on tailor-made study programs, problem-based learning, increased focus on entrepreneurship, and life-long learning activities; increased collaboration with external partners; increased dependence on external funding such that different universities and disciplines have quite different possibilities of

accessing resources; and changing governance structure, fostered at least since the 1990s with emphasis on top-down management, external representation on boards, productivity measurements, and activity-based financing.

Of these, the significance of the rapid expansion of higher education cannot be overemphasized. The higher education system has been deeply affected by the massification of the universities in the North from the 1960s to the end of the twentieth century, and later for transition economies and other countries. As an example, enrollment in higher education in China expanded from 3.4 million students in 1998 to over 21 million in 2010, a six-fold increase in just over a decade (China Statistical Yearbook). Such massive expansions have brought with them a host of new demands and new realities for the university system to deal with.

The impressive growth of the higher education system has been accompanied by an equally remarkable change in the gender balance. Women's enrollment in higher education has expanded rapidly, and today more women than men are enrolled in higher education around the world. According to UNESCO (2010), the gender balance in enrollment in higher education has shifted from men, who historically have comprised the overwhelming share of students, to women, who today have an advantage in terms of level of participation. In the Americas and Europe, the

figure is as high as 25 percent greater participation by women. While a number of countries in Africa and Asia have yet to achieve gender parity in enrollment, they have nevertheless experienced a steady increase in female enrollment.

What explains this rather rapid change? UNESCO (2010) notes that affirmative action policy or legislation mandating women's participation in higher education remains relatively rare. Instead, this phenomenon seems to reflect changing values and attitudes toward the role and aspirations of women in society, stemming in part from global social movements that emerged in the 1960s.

However, almost all over the world, higher enrollment and graduation levels on the part of women have not led to a leveling in their career prospects. In many countries, the rise of women's enrollment is more pronounced at the undergraduate and master's level, but has not translated into greater participation at the doctoral level, nor in the formal research and development (R&D) workforce (UNESCO 2010: 77). To some extent this gap may simply reflect the time lag needed for a new generation of women to progress through the education system. Yet there is no doubt that substantial barriers to women's achieving higher degrees and employment exist. At the same time, enrollment rates also suggest both different alternatives in

the labor force for men and women, and potential new barriers that discourage men from pursuing higher education (UNESCO 2010: 71).

The demands on universities for greater relevance for society have grown over time as increasing public funding has turned universities into institutions open to everyone, not only the privileged few. The growing demand is the result of mounting external and internal pressures on universities to redefine themselves in an increasingly integrated, competitive, and globalizing world and to take on a multitude of new challenges, including outreach functions and technology transfer activities.

With the demise of the linear model of innovation (the notion that technological progress and innovation expand in a linear relationship from basic research to industrial applications), universities are charged with taking on a more active role in technological development and university–industry relationships. Research policy measures to support this development have been enacted in a number of countries, most famously through the Bay-Dole act in the U.S. in 1980, which granted universities the intellectual property rights to inventions resulting from federal government-funded research. Moreover, universities are under pressure to provide industry with an increasingly specialized workforce, to comply with the students' demand for

relevance in education and good prospects for finding a job after graduation, while at the same time addressing pressing social, medical, and other ills. This has prompted scholars like Burton Clark to declare that the university as an institution is facing a crisis where demand outruns the capacity of the universities to respond (Clark 1998).

How have the universities responded to these challenges? The reaction from universities to the call for more relevant and deeper interactions with society differs considerably between countries. Modern universities have evolved to include all three tasks of universities (education, research, and “third mission”), but how they do it is path dependent and does not follow any “best cases” or standard models (*Science and Public Policy* 2009). A common trend appears to be that in countries devoting a high share of resources to R&D, the third mission of universities is narrowly interpreted to mean transfer of technology from university to industry. Conversely, in countries with fewer resources available for R&D, the third mission is more likely to include a broader societal involvement (Göransson and Brundenius 2011). Thus, the more money a country spends on R&D, the more the universities tend to become focused on industrial development and competitiveness, much in line with Müller’s characterization of the “university of calculation” discussed above.

New models are being proposed for guiding the evolution of universities, such as Triple Helix models involving private–public partnerships, the creation of entrepreneurial or specialized universities, large-scale excellence-driven environments, or the concept of developmental universities, more in tune with supporting the social and economic development of a country. Pioneering work by Rosenberg and Nelson (1994) shows that entrepreneurial managers in various industries tend to value more the advance of knowledge in scientific fields than the concrete university research results obtained in the same fields. In a Humboldtian perspective, linking teaching with cultivating knowledge helps to develop creative thinking and problem-solving capabilities.

The innovation potential of a firm is based on its “absorptive capacities” to recognize the value of external information, assimilate it, and use it; such capacities are highly dependent on knowledge previously accumulated by the firm; accumulating advanced and sophisticated knowledge requires an internal team of scientists and technologists who are at the same time highly competent in a variety of fields and well acquainted with the different aspects of the firm and its external relations (Cohen and Levinthal 1990: 128, 135).

Thus, innovation studies offer some clues to gauge the contribution of universities to economic development, suggesting that at least as important as their direct involvement in solving problems of immediate interest for firms is that universities provide high-level teaching, which requires performing high-level research. That holds also in the South. Twenty years ago, the engineers who had created in Uruguay an unexpectedly efficient set of professional electronic firms asserted that their high-level training in basic sciences was fundamental to their success as entrepreneurs, because it developed their capabilities and self-reliance for problem solving, that is, for innovating (Sutz 1986).

The preceding overview of the role universities really play in innovation activities tends to be corroborated by innovation surveys. Such surveys have an important feature: they offer an overall view of the innovative behavior of the productive sectors of a country. Although they do not fully capture the complexity of the special relations that some sectors—pharmaceuticals, for instance—hold with universities, they do provide a global picture of the interactions that firms in all sectors maintain with external knowledge and information providers. In spite of several differences, surveys tend to show three similarities between countries: i) firms are much more engaged in expenditures devoted to internal R&D than to external R&D; ii) firms rely heavily on clients and suppliers, as well as on internal sources, for innovation-related information; iii) only a

very small proportion of firms consider universities important as a source of innovation-related information. For some business sectors, particularly those more science-based, and in specific settings that have a special tradition of academy–industry interactions, the picture depicted above may not be accurate. The “open innovation” model, with its emphasis on business collaboration with universities as well as with other firms, works well there, but in general terms, recent literature confirms the trend already mentioned.

Universities in development theories

The role of universities and higher education in economic growth and development is historically closely connected with how science and technology are perceived in society. As discussed above, the Humboldtian ideal of seeking knowledge for its own sake and for personal development was long the norm in academia. New knowledge was basically a luxury item produced in the proverbial ivory tower. Accordingly, universities were perceived as playing only a marginal or indirect role in economic growth and development. Even with later recognition of the importance of knowledge production, scientific progress was long conspicuously absent from mainstream economic growth models or was considered an exogenous factor taking place

outside the models. In neo-classical economic theory, the role of technology in economic growth emerged late as an explicit topic of interest.

Mainstream economics has primarily been interested in problems associated with making optimal use of given resources at any point in time, not with dynamic adjustments caused by the application of new knowledge. The allocative mechanisms and the static efficiency of the economic system have thus tended to attract more attention than the structural changes and dynamic performance. This is perhaps surprising given that the writings of classical economists in the nineteenth century, as well as pioneering research in innovation-based economics by Joseph Schumpeter, pointed to the importance of technological change in economic growth. As early as the 1950s, Robert Solow demonstrated in economic models that the production factors of capital and labor accounted for only a small part of total economic expansion, and that technological progress was in fact driving economic growth (Solow 1956).

Further exploration in the following decades revealed the necessity to open up the “black box of technology,” in Rosenberg’s terminology (Rosenberg 1982), and saw the emergence of the field of evolutionary economics, which treated technological change as a logical outcome of an evolutionary process (Nelson and Winter 1982). It was not until the 1990s that technological

progress entered mainstream economic mathematical models as an endogenous factor in economic growth, in the new growth theory proposed by Paul Romer (1990) and Robert Lucas (1988).

So what does this mean for how universities and the knowledge they produced were regarded in development theory? The inability of economic models to explore the origins of growth obviously has had practical implications for development agencies and policy diffusion organizations in their strategies on universities and competence building in developing countries. According to the prevailing economic development theories, should the limited resources available be allocated to long term capacity building in higher education, or would alternative strategies be more efficient?

In terms of understanding the role of science in development, the dominant paradigm since the Second World War has been the modernization theory. This theory has in different ways guided the strategies pursued by international organizations and the donor community, and thus the conditions in which universities in developing countries were to function and evolve. The modernization theory widely held the view that, although the application of science was instrumental in development, universities and higher education in developing countries could not

function as a credible source of new technology; they were either not sufficiently advanced or disconnected from society. Instead of building local capacity through higher education and research, the needed knowledge could preferably be imported from more advanced countries. Higher education was not perceived as particularly relevant to solving the pressing needs of the developing world.

In its extreme, this view culminated in drastic and crippling cutbacks to the higher education system, particularly in Africa, under Structural Adjustment Programs in the 1980s and 1990s that required fiscal contraction for the reduction of public sector deficits. Since that time, higher education in Africa has recovered in quantitative terms, with tertiary enrollment expanding at a pace higher than the world average, but the achievements are again threatened by the failure of governments to maintain adequate funding. A World Bank report concluded that in sub-Saharan Africa (SSA), “public expenditure per tertiary student has fallen from USD 6,800 in 1980 to USD 1,200 in 2002, and recently averaged just USD 981 in 33 low-income SSA countries” (World Bank 2009: xxvii).

Not all observers agreed that fostering science and technology capabilities in developing countries should be low on the priority list. From the 1960s on, a growing body of scholars

argued that the only viable long-term solution to addressing a broad range of pressing problems in developing countries would be to enhance the indigenous capacity for technological development (see, e.g., Moravcsik 1966). While recognizing that the immediate need for technology developed in the North was at odds with the need to create an indigenous science and technology infrastructure, it was still argued that the only sustainable solution would be to strike a balance between the imminent short-term need and the long-term goal of building a science and technology capacity (Moravcsik 1987). Consequently, the donor community should complement its technological upgrading strategies through imports with efforts to reform science education curricula and strengthen the emerging research community at universities and research centers.

In the new millennium, much of this has indeed happened. The donor community has responded with increasing support to capacity building at universities and research centers in an effort to enhance the relevance of local science-based knowledge production. The World Bank—which in the late 1990s restructured itself into a “knowledge bank”—is now emphasizing knowledge and learning (World Bank 2002), and most donor organizations offer support to universities and research projects in developing countries. This inflow of funds is a considerable source of revenue for universities and research centers. In Tanzania, over 50 percent of funds for research

come from donor sources, and in Mozambique that share is over 70 percent. While this development undoubtedly reflects a much-needed injection of research funds, the resulting dependency also raises issues of who determines the research agenda.

For universities in developing countries, it is often still an uphill battle. Competence building is costly and takes a long time, often without any tangible or immediate results. As in the North, pressure for relevance and high quality is increasing from funders and society at large. Carden (2009) identifies a number of features that effectively hinder universities from producing relevant and timely research results for evidence-based policy making and weaken the links between the university researchers and policy-makers: there is high staff turnover and brain drain in research organizations, policy-makers lack confidence in their own researchers, researchers in development often lack hard data, Southern countries too seldom share research among themselves, demand for research can be low, and researchers sometimes must construct their own research-to-action machinery.

Addressing these issues is a formidable task for the political as well as the academic system in developing countries, but history shows that it can be done and that investment in higher education and research can yield high dividends for development and economic growth.

The developmental role of universities

As we have seen, the search for a new third role of universities is progressing in different directions. A most constructive idea is the notion that in an emerging knowledge-based and innovation-driven economy, with its lights and shadows, universities can greatly contribute to the betterment of human life. In a developmental context, such an idea is underscored by the changing nature of some indications of underdevelopment, notably those related to the rising impact of the learning divides. Possibilities for learning at an advanced level expand quickly in the North, where, for example, the majority of young people access tertiary education, and important opportunities exist for working in knowledge-demanding contexts, thus fostering learning by using in problem-solving what has already been learnt. That is far from being the prevailing situation in the South, so capability building is hampered, a phenomenon that greatly contributes to the persistence of underdevelopment.

In such a context, development—normatively characterized by the expansion of freedoms and the betterment of human life—demands the overcoming of the learning divides. That points to

two main tasks. The first is the extension to the majority of the population of the possibilities of acquiring capabilities by accessing various types of life-long higher education, closely connected with work. The second main task is to extend the opportunities of using and improving capabilities by upgrading the knowledge content and problem-solving demands of every productive activity, including the so-called traditional sectors, in order to improve competitiveness, particularly in sectors related to the attention of social needs. Thus, the developmental university can be defined, in a first approximation, by commitment to development as its third role (Arocena, Gregersen, and Sutz 2010).

A more precise characterization can be proposed. As already recalled, the Humboldtian project is not exactly defined by the adoption of research as a second role of universities, but by the joint practice of the fundamental missions of teaching and research. As suggested by the evidence previously discussed, performing those missions is essential for the contribution of universities to innovative activities. Thus, the developmental university is characterized, in a neo-Humboldtian perspective, by the joint practice of three missions: teaching, research, and cooperation for development with other institutions and collective actors. That means that developmental universities can only exist in active partnerships with external stakeholders. It

also implies that the developmental role of universities demands more and better teaching and research, not less.

Compared with so-called developed countries, most other countries are more or less poor in terms of access to and use of knowledge. One relevant cause among others for the persistence of that situation in the South is the weakness of market demand for knowledge addressed to endogenous sources, combined with a preference for seeking knowledge from abroad. Since production and use of knowledge are increasingly intertwined, it is increasingly difficult to use imported knowledge without hampering the endogenous generation of knowledge. Knowledge is not a commodity that can be bought and put to work with little additional effort. To put knowledge to work successfully, a strong local knowledge base needs to be created and nurtured. Without it, the world's information riches are out of reach, and therefore become meaningless and of little value. One relevant consequence of such situations is the generally weak use of knowledge for coping with the problems of deprived sectors, which are frequently highly context-dependent. This means that quite specific research and innovation is required to solve them. This situation can be seen as the core of the problem of knowledge for development. Giving priority to the needs of the deprived people is one of the ways to cope with such problems. It leads to thinking of innovation policies as social policies. It means that fostering

socially relevant knowledge demand should be a fundamental aim of developing policies in general. The contribution of universities to fostering and meeting such demand can be seen as a main clue for strengthening their developmental role.

The Humboldtian notion was both an ideal type *à la* Weber and a normative project. Real universities are heterogeneous and ever-changing organisms, where the combination at a high level of teaching and research is seldom the only game in town; but approximations to the ideal type could be found in practice and the project was to enhance them. Something similar happens with the notion we are discussing: it would be a good thing if relevant traits aligned with the idea of the developmental university were detected and fostered in existing universities.

If a trend toward the emergence of developmental universities can be detected, the best traditions of universities as learning communities that share some values are not doomed to vanish, as will happen if the forecast of the “university of calculation” is justified.

Developmental universities ought to achieve a fine tuning between traditions that are worth keeping and new features that are worth taking on board, between long-term commitments to knowledge and immediate involvements with society. That cannot be achieved in isolation or by

imposition: it can only grow out of multiple and respectful dialogues within universities, and between universities and widespread social actors.

In empirical terms, the developmental university in the South is first of all a set of questions. In what ways and to what extent are specific universities fulfilling their mission by making connections with the main tasks of development? How are they changing their internal structure in connections with such missions? How are they interacting with external stakeholders?

Expanding the developmental role of universities

The above stated general questions lead us to consider a number of issues of descriptive and prescriptive interest, because they can be seen both as indicators of what is really happening and as goals for policies. Let us mention some of those issues, stressing in each case some aspects that can be seen as indicators of how “developmental” a given university is becoming, so they deserve special attention both from researchers and policy-makers.

Closing the enrollment gap

Ten years ago the World Bank (2002) pointed to the damages for development stemming from the “enrollment gap” due to the different rates of increase in tertiary enrollment between North and South. To close this gap, the generalization of advanced life-long education is needed.

Almost by definition, permanent education has to be permanently connected with working activities. In connection with this issue, at least three aspects deserve close examination:

- a) How can universities cooperate with other institutions and agencies to create a wide and diversified system of tertiary education that offers learning opportunities to the majority of the population?
- b) What efforts are being made, at practical and theoretical levels, to cope with the fundamental challenge posed by life-long education: offering advanced education to people of different ages and backgrounds?
- c) To what extent does tertiary education employ the human and material resources available in the best ways for socially useful production?

Commitment to solving social and productive problems

Teaching can and must foster the acquaintance of students with social and productive problems of the region where the university is located. In public universities, when enrollment is free or tuition is very low, the privilege of access to advanced education should go hand in hand with social duties; these could be implemented by a “social duty” of the university, where students and graduates could cooperate in the socially valuable use of their specific capabilities. Those are ways of systematizing the connections of teaching with the third mission, understood as “extension.” In order to connect them with research, specific problems of productive sectors and those derived from the social situation should be considered in defining research agendas, in ways that foster all capabilities and do not give the humanities and social sciences a second-rate treatment. Neo-Humboldtian projects should be evaluated according to the different ways the university cooperates with external actors to open new opportunities for using advanced capabilities, which as stressed is a main task for development.

Adapting the evaluation system to development imperatives

The research agenda of the university is a main indicator of its true role in society. What is researched and what is not researched there reflects a complex web of interests, power, and voice, both within the academic community and coming from the “external” world. Even if in many cases indirectly, the universities’ research agendas shape to a great extent the possibilities, direction, and scope of innovation. In the South, the latter presents some important specific challenges. There are problems that are not researched in the North but are of great significance in the South: while some of these problems have been researched in the South and suitable solutions found, some problems—for example, several “diseases of the poor”—have not been researched nor solutions found, either in the North or in the South. On the other hand, there are problems that have been researched and solved in the North that also provide suitable solutions for the South: this is the type of innovation whose diffusion occurs through the diverse mechanisms of technology transfer.

But many of the solutions/innovations found in the advanced industrialized countries (AICs) are not applicable to the same kind of problems in the developing countries (DCs), typically because they are unaffordable there. Table 1 (below) presents a taxonomy of situations in this context.

Table 34.1: A scarcity-induced innovation framework

	Problems for which solutions have been found in AICs	Problems for which solutions have not been sought or found in AICs
Problems for which solutions suitable for DCs conditions exist	The vast majority of solutions acquired through technology transfer	Solutions to problems arising mainly in DCs and developed locally
Problems for which solutions suitable for DCs conditions do not exist	“Canonical” solutions exist, but for various scarcity reasons they are not suitable for DCs conditions	No solutions (yet) Typically health issues like vaccines against cholera

Source: Srinivas, S. and Sutz, J. (2005). “Economic Development and Innovation: Problem-Solving in Scarcity Conditions,” paper presented at the DRUID Tenth Anniversary Summer Conference, Copenhagen, Denmark, June 27-29. Accessible at: <http://www.druid.dk/conferences/summer2005/papers/ds2005-441.pdf>, last accessed March 3, 2013.

So, in order to address the lack of research and/or the non-suitability of existing results, several issues of great importance for development should enter the pipeline of academic research. The content of such a pipeline emerges from academic research agendas, which are shaped by different factors, including the academic reward system. The evaluation of academic work follows more or less common criteria and procedures around the world. The justification for using similar criteria in widely different contexts has its merits: it is intended to assure suitable and consistent standards of quality for academic work.

However, this formal homogeneity also has significant drawbacks. One of the most serious relates to evaluations heavily biased toward publication in international journals, thus shifting the research agendas of the South toward the study of problems highly ranked in the research agendas of the North, although priorities in many cases are different. This is why promoting the developmental university includes changing the academic evaluation system to encourage dedication to local needs. High-quality research devoted to problems of local relevance, regardless of their international acceptance or impact, should be rewarded by monetary or career-advancing means. That requires avoiding both international isolation and subordination; as well, discussing different approaches and seeking cooperation at the international level should both be promoted. Strong research groups identify their own problems and are able to cooperate with

other groups in solving those and other problems. One indicator of success for research groups in developmental universities is their capability to foster international cooperation with an agenda that includes issues and approaches stemming from the South.

Example of a program inspired by the notion of developmental university

Thinking of innovation policies as social policies implies a radical shift not only in the innovation policy agenda, but in the research agenda. In Uruguay, the research council of the public university attempted to foster such a shift through a call for research projects that would contribute to social inclusion by addressing problems that prevent marginalized people from achieving a better quality of life (defined by actors outside the academic realm), and that involved commitment from others to implement the results of the project. Three rounds of the call were made, leading to thirty projects.

Researchers found the program difficult to grasp, as they were accustomed to working from the supply side, that is, they tended to identify “their” own problems. This program required them to work from the demand side, on problems identified by others. This led to two difficulties, the first of which was to transform needs into demands. When an actor voices a problem (in

Hirschman's sense), it becomes a demand and it becomes visible, even though it may be a non-effective demand in economic terms. Several problems of social inclusion do not have a voice or the actors able to voice them are weak or isolated, making it particularly difficult to detect demand. The second difficulty relates to demarcation (Alzugaray, Mederos, and Sutz 2011). Not all the problems related to social inclusion are suited for research: only those that require new knowledge to find a solution are eligible. But quite often the following question arises: Is new knowledge necessary to solve an identified problem, or is the solution already known—in which case what is needed is prioritizing the problem in the policy agenda?

Some projects failed to achieve the aimed academic results: this was a research failure. Other projects represented a program failure: they should not have been supported in the first place. Learning from these experiences, successive calls were modified to make the requirements more precise and to try to eliminate confusion.

Some successes were notable. A first group can be labeled “new research results available,” such as cheap artificial skin made from collagen-rich bovine tendon, and an alternative strategy to communicate health messages to very deprived teenagers and young women. A second group consists of “new research results that are in use,” such as software to analyze digital images of

the brain with the aim of detecting epilepsy. The user of the software was a pediatric surgeon working in the university public hospital. A third group is “capacity for future inclusion.”

It is unrealistic to expect to solve complex social problems in one step. Yet some projects served as laboratories for gaining experience in dealing with social problems, which later contributed to policy. For example, a team supported in 2003 that evaluated the nutritional impact of the food given to children in public schools subsequently helped shape the Uruguayan government’s National Social Emergency Plan.

Such programs offer lessons on how to stimulate more meaningful dialogues between communities (or those that act on their behalf) suffering from different forms of social exclusion. The lessons include an assessment of the difficulties involved in scaling up the program into a demand-side innovation policy at the national level. One difficulty is the weakness or non-existence of research units in different spheres of public policies or public enterprises, which considerably complicates the detection of such demand. Another difficulty is the isolation of the different research and innovation support programs at the national level. The consequence is that projects cannot easily evolve, for instance starting at the research stage in the university and continuing at a development and scaling-up stage through a different national program.

Conclusion

Promoting research in support of development—understood as a process whose aims are the expansion of freedoms and the betterment of human life—shapes a mission for universities. Such a mission, as this chapter has argued, is particularly important in developing countries, given that new knowledge and innovation are needed to find solutions to issues that hinder the social inclusion of vast parts of the population.

This mission need not be seen as opposed or contradictory to the contribution to expanding knowledge or interacting with productive actors to enhance their economic performance.

Cooperating with development requires first-rate knowledge production capabilities to address problems of social exclusion, given that new heuristics are often needed to solve them.

Cooperation with productive actors, besides its intrinsic merits, is also needed to foster development and social inclusion. This is so because solutions need to be developed at scale in order to be realized and implemented, something only productive actors can do.

Universities are accustomed to rewarding the advancement of knowledge. In recent times several mechanisms have been devised to reward the university–productive actors relationships or, moreover, those university actors who become directly entrepreneurial. Contrastingly, the academic reward system has done little so far to recognize research devoted to fostering development. A different metric is indeed needed, given that academic papers in this area will probably not be produced at the usual rate, and patentable results will hardly follow from these R&D efforts. However, promoting research in order to cooperate with development can be highly rewarding both in intellectual terms and in social terms.

The conjecture that developmental universities may exist as communities with some shared values and a specific role in society is partly based on another conjecture: that many researchers really want to be as socially useful as possible. Studies of academic diasporas have shown that the motives for returning to their home country for people able to get a very good university position abroad often relate to a feeling of social usefulness. Such a feeling is also valuable for university people who work in the challenging conditions of developing countries. Social usefulness, though, is related not only to individual will but to the institutional building of conditions that allow people to put their knowledge at the service of social goals. This is a main justification as well as a main challenge for developmental universities.

¹ The Mertonian rules, known by their acronym CUDOS (communalism, universalism, disinterestedness, originality, and [organized] skepticism), refer to the ethical norms the academic community should follow while pursuing its task of advancing knowledge. (Merton 1973)

References

Alzugaray, Santiago, Leticia Mederos, and Judith Sutz (2012). “Building Bridges: Social Inclusion Problems as Research and Innovation Issues,” *Review of Policy Research*, 29(6): 776–96.

Anderson, Robert D. (2004). *European Universities from the Enlightenment to 1914*. Oxford: Oxford University Press.

Arocena, Rodrigo, Birgitte Gregersen, and Judith Sutz (2010). “Challenges and Opportunities for Universities in Small Latin American Countries,” in Björn Johnson and Olman Segura (eds.), *Systems of Innovation and Development: Central American Perspectives*. Heredia, Costa Rica: Editorial Universidad Nacional, chapter 5, 163–96.

Ben-David, Joseph (1984). *The Scientist’s Role in Society*. Chicago: University of Chicago Press.

Carden, Fred (2009). *Knowledge to Policy: Making the Most of Development Research*.

New Delhi: SAGE Publications and Ottawa: International Development Research Centre.

China, National Bureau of Statistics (2012). *China Statistical Yearbook 2012*. Beijing: National Bureau of Statistics of China.

Clark, Burton R. (1997). “Las universidades modernas: espacios de investigación y docencia,”

Coordinación de Humanidades, Universidad Nacional Autónoma de México.

——— (1998). *Creating Entrepreneurial Universities: Organizational Pathways of Transformation*. New York: Pergamon Press.

Cohen, Wesley M., and Daniel A. Levinthal (1990). “Absorptive Capacity: A New Perspective on Learning and Innovation,” *Cornell University Administrative Science Quarterly*, Special Issue on Technology, Organizations, and Innovation, 35(1): 128–52.

Etzkowitz, Henry (1990). "The Second Academic Revolution: The Role of the Research University in Economic Development," in Susan E. Cozzens, Peter Healey, Arie Rip, and John Ziman (eds.), *The Research System in Transition*. Dordrecht, The Netherlands: Kluwer Academic.

——— (1997). "The Entrepreneurial University and the Emergence of Democratic Corporatism," in Loet Leydesdorff and Henry Etzkowitz (eds.), *Universities and the Global Knowledge Economy*. London: Pinter, 141–52.

——— (2003). "Research Groups as 'Quasi-Firms': the Invention of the Entrepreneurial University," *Research Policy*, 32(1): 109–21.

Gibbons, Michael, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott, and Martin Trow (1994). *The New Production of Knowledge*. London: SAGE Publications.

Göransson, Bo, and Claes Brundenius (eds.) (2011). *Universities in Transition: The Changing Role and Challenges for Academic Institutions*. New York: Springer.

Lucas, Robert (1988). "On the Mechanics of Economic Development," *Journal of Monetary Economics*, 22(1): 3–42.

Merton, Robert K. (1973). "The Normative Structure of Science," in Robert K. Merton, *The Sociology of Science*. Chicago: University of Chicago Press, Section 3, 267–80.

Moravcsik, Michael (1966). "Some Practical Suggestions for the Improvement of Science in Developing Countries," *Minerva*, 4: 381–90.

——— (1987). "Science Policy and Development in the Third World," *Bulletin of Science, Technology and Society*, 7(3–4) (Aug 1987): 598–604.

Mosha, Herme J. (1986). "The Role of African Universities in National Development: A Critical Analysis," *Comparative Education*, 22(2): 93–109.

Müller, Steven (1996). "The Advent of the University of Calculation," in Steven Müller (ed.), *Universities in the Twenty-First Century*. New York: Berghahn, 15–23.

Nelson, Richard R., and Sidney G. Winter (1982). *An Evolutionary Theory of Economic Change*. Cambridge, MA: Belknap Press of Harvard University Press.

Rogers, Everett M. (1995). *Diffusion of Innovations* (4th ed.). New York: Free Press.

Romer, Paul (1990). "Endogenous Technological Change," *Journal of Political Economy*, 98(5): S71–S102.

Rosenberg, Nathan (1982). *Inside the Black Box: Technology and Economics*. Cambridge: Cambridge University Press.

Rosenberg, Nathan, and Richard R. Nelson (1994). "American Universities and Technical Advance in Industry," *Research Policy*, 23(3): 323–48.

Rüegg, Walter (1992). "Foreword," in Hilde de Ridder-Symoens (ed.), *A History of the University in Europe, Volume 1: Universities in the Middle Ages*. Cambridge: Cambridge University Press.

Science and Public Policy (2009). Special Issue on the Third Mission of Universities, 36(2) (Mar 2009).

Solow, Robert M. (1956). "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, 70(1): 65–94.

Srinivas, Smita, and Judith Sutz (2008). "Developing Countries and Innovation: Searching for a New Analytical Approach," *Technology in Society*, 30(2): 129–40.

Sutz, Judith (1986). "El auge de la industria electrónica profesional uruguaya: raíces y perspectivas," Serie Cuadernos del CIESU N° 52. Montevideo: Ediciones de la Banda Oriental.

——— (1997). "The New Role of the University in the Productive Service," in Loet Leydesdorff and Henry Etzkowitz (eds.), *Universities and the Global Knowledge Economy*. London: Pinter, 11–20.

——— (2005). “The Role of Universities in the Production of Knowledge” [online policy brief], Science & Development Network (SciDev.Net), London, UK. (<http://www.scidev.net/en/policy-briefs/the-role-of-universities-in-knowledge-production-.html>, accessed January 22, 2013)

UNESCO (2010). *Global Education Digest 2010: Comparing Education Statistics Across the World*. Paris: UNESCO.

World Bank (2002). *Constructing Knowledge Societies: New Challenges for Tertiary Education*. Washington, DC: The World Bank.

——— (2009). *Accelerating Catch-Up: Tertiary Education for Growth in Sub-Saharan Africa*. Washington, DC: The World Bank.

Ziman, John (2000). *Real Science. What it Is and What it Means*. Cambridge: Cambridge University Press.