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Knowledge policies and universities in developing countries: Inclusive development and the “developmental university”

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ABSTRACT

This paper links development approaches with innovation systems theory and social inclusion concerns. In exploring the relationship between development and knowledge, we propose a sequential analytical model that considers values, facts and policies as a coherent whole. This allows us to go deeper into the question of how policies for promoting the production and use of knowledge able to foster different facets of social inclusion can be formulated and implemented. We propose to call such policies “democratization of knowledge policies”; they are one of the means to achieve inclusive development. We provide examples of how these policies work in practice, and explore how the university, a vital part of any national innovation system, can play a role in the emergence and consolidation of the democratization of knowledge. Universities that embrace that role may be considered developmental universities. They fulfill it in great part by providing effective incentives to include in their research agendas the kind of problems whose solutions can lead to an enhancement of social inclusion. However, developmental universities cannot function in isolation. It is argued that their effectiveness depends on the rise of a sustained and strong demand that is able to put knowledge at the direct service of shared social goals, among which diminishing inequality is particularly important. The paper presents a case in Uruguay that illustrates an ongoing transformation towards a developmental university.

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1. Introduction

The striking and persistent disparities in development between regions, countries and even regions within countries that we observe today have been thoroughly analyzed from various perspectives. The ways of measuring such disparities have evolved over time, with complex indexes substituting single-sided views of this or that salient

divergence. The reasons evoked to explain the development/underdevelopment divide are sometimes difficult to disentangle from the effects of such divide, in a sort of chicken-or-egg causality dilemma that complicates the identification of some “first prime movers” of development which absence can provide a main explanation of underdevelopment. Disciplinary biases, probably inevitable in present times when the Renaissance ideal of wholeness is simply unattainable, add to the difficulties to reach integral perspectives on the persistence of underdevelopment in a great number of nations.

All these varieties and complications notwithstanding, it is fair to assert that one of the structural roots of the processes of differentiation in the paths followed by

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developed and underdeveloped countries relates to the capacities of the former, weakly present in the latter, to produce new knowledge and, partly based on it, to produce new goods and services that lead, in Nathan Rosenberg's terms, to significant "technological convergences" [44]. Is producing knowledge important for developmental purposes or is the real challenge to be able to use the knowledge produced elsewhere without attempting to catch a too fast train with a consequence of misused resources and discouraging results? This issue fueled big policy discussions some decades ago. Today it seems better understood that being able to use knowledge and being able to produce new knowledge are not sharply separated, even if the relationship between the two is far from direct. It can be safely said that even if being able to produce new knowledge does not lead linearly to a capacity to use knowledge produced elsewhere, the inability to produce new knowledge makes nowadays such capacity almost impossible to achieve.

"Developing countries", even if they can be commonly characterized as being much less proficient than developed ones in the production and use of new knowledge, are nonetheless far from homogenous in this regard. Some developing countries have become first rate high-level knowledge producers, while others are struggling to build baseline capacities to start producing knowledge. A main point that "underdeveloped" countries seem to have in common, though, all differences notwithstanding, is the difficulty to combine harmoniously the indigenous capacities to produce knowledge, at whatever level achieved, with the capacities to put all knowledge available to achieve satisfactory goods and services. We can characterize satisfactory goods and services by three main traits: (i) their production process does not harm the people involved in it and do not severely damage the environment, (ii) their production incorporates to some extent advanced knowledge, and (iii) at least some of such good and services provide solutions for problems people face.

The National Innovation Systems (NIS) approach is particularly well suited for analyzing the difficulty mentioned above. As shown in the national cases included in Nelson's seminal book [38], the approach pays attention to history, to the configuration of power relations within a country and in international terms, to the evolution of the productive structure and particularly to the style of knowledge utilization that such productive structure has gone through. In the NIS theorization, the mismatch between being able to produce knowledge as well as to understand knowledge produced elsewhere, and not being able to exploit such capacities to their full extent, relates to failures in the system. The check list of such failures reveals the preferences or emphases of the users of the NIS approach, which can be quite diverse. Ref. [31] for instance, stresses that under some circumstances user–producer relationships led to unsatisfactory (for the user) innovations due to "knowledge problems" of different kinds. The "Aalborg school", more generally, indicates that knowledge policies should give more importance to the doing-interacting-using (DIU) mode of innovation, which such policies usually overlook,

particularly so for small countries with a productive structure not based on high-tech production. From this comes the hypothesis that the way work is organized can be of utmost importance to understand the dynamics of innovation; this hypothesis was tested recently with quite convincing results [5].

For those with a special interest in the situation of developing countries, failures can be found everywhere. The useful challenge that the NIS approach proposes is to go beyond each of these failures as if they bear weak or no connection to one another and to look into relationships between parts of the system that should be there to smooth a systemic and self-reinforcing behavior but in fact do not exist or are too weak to be effective. From this inspiration we posit that the mismatch between knowledge capabilities and the capacities to put knowledge at work to achieve a reasonable production of satisfactory goods and services derives from the structural weakness of market knowledge demand stemming from production in developing countries [3]. If this is so, the consequences for knowledge policies are clear: pushing further R&D efforts is as important as it is insufficient.

The NIS approach cultivated by the "Aalborg school" has always put strong emphasis on the issue of learning. As early as 1994 Johnson and Lundvall proposed, in a vastly cited paper, the concept of learning economies, "in which knowledge is the crucial resource and learning is the most important process" [32]. From this emphasis came a new acronym, LICs, for "learning, innovation and competence building systems", a sort of broad term containing the specific NIS focusing device. As a consequence, this school of thought points out that R&D cannot be equated to learning, particularly when innovation is at stake. Lundvall indicates that the concept NIS suffered a "distortion" during its diffusion, focusing excessively on science-based innovations and pushing knowledge policies towards R&D, paying scant attention to other fundamental dimension of learning [35]. On the other side, he also states that universities, important actors of LICs, have been pushed somehow too much in the opposite direction, with the result that long-term R&D efforts are challenged by short term demands, both from industry and for academic productivity, the latter driven by "the accelerating rate and mass production of more or less trivial articles published in periodicals" ([34]: p. 6).

The concept of a "developmental university", understood as an institution which academic mission is to foster development, has been presented elsewhere [1,11]. Such universities are committed specifically to social inclusion through knowledge and, more generally, to the democratization of knowledge along three main avenues: democratization of access to higher education, democratization of research agendas and democratization of knowledge diffusion. In line with the NIS and the LICs approach, we posit that developmental universities are those involved in the promotion of processes of learning and innovation for fostering inclusive development. This idea will be put forwards in the paper. In doing this, we aim at contributing to an expanding body of research linking development policies with innovation systems theory and social inclusion concerns [9,13,15,25,28,42,47].

To better explore the relationship between knowledge and development, we propose a sequential analytical model that considers values, facts and policies as a coherent whole. This allows us to delve deeper into how policies for promoting social demand of knowledge and inclusive development can be formulated and implemented. These issues will be addressed in the next two sections. In Section 2 we present two main approaches for studying the relationships between development and knowledge, the value-based normative approach and the evidence-based factual approach and we discuss how they relate to each other. Section 3 addresses a third approach to those relationships, the policy approach, paying special attention to knowledge policies and the prerequisites for them to support the above mentioned democratization of knowledge. As an example of how these knowledge policies can work in practice, Section 4 presents briefly the case of inclusive access to ICTs. Then, in Section 5, some of the obstacles facing the emergence and consolidation of developmental universities are analyzed. In Section 6 a different example of how knowledge policies work in practice is presented, related to how steps towards building a developmental university were taken in the Universidad de la República, Uruguay. Finally, Section 7 offers some concluding remarks.

2. Development and knowledge

2.1. On development: normative, factual and policy approaches

Development is a very complex issue that includes descriptive and prescriptive aspects. But that does not mean that descriptions of situations and prescriptions for action in relation to such situations should not be differentiated. On the one hand, prescriptions do not stem directly from descriptions; they need at least to be combined with ethical options. On the other hand, descriptions need to be combined with explanations in an attempt to elaborate a factual approach that includes empirical and theoretical elements. A minimum understanding of facts is necessary for acting in ways that are at least to some extent rational both with respect to instruments and to ends. Perhaps the most fundamental trait of development as a field of human concerns is the purpose to be knowledge-based and action-oriented. That poses the obligation of considering facts, values and policies; it also generates the risk of confusing them with each other, with detrimental consequences both for theory and for practice. In particular, many discussions about development policies are quite sterile because their factual assumptions and normative aims are not clearly stated. Discussions between different ethical perspectives can be illuminating for everybody, if such perspectives are clearly assumed and stated.

The previous remarks suggest the convenience of considering normative, factual and policy approaches to development issues. They also suggest starting by the normative approach and ending by the policy approach. Policy proposals need to be based on some way of combining an interpretation of facts with a choice of ends.

2.2. The normative approach

This paper does not attempt to discuss the fundamental and difficult ethical aspects of development thought and practice. But it is oriented by a normative approach that can be very briefly summarized by referring to the well-known and widely quoted elaboration of Amartya Sen [45]. We understand it to be an agency-based notion of development as the expansion of individual and collective freedoms and capabilities with an egalitarian orientation. Its fundamental feature is that the expansion of freedoms and capabilities characterizes not only the ends of development (that is, the normative approach) but also the fundamental means of development: this is the leading light of the policy approach. The essential link between the normative approach and the policy approach is Sen's assertion that development means first of all seeing people not as patients but as agents.

Sen's conception inspires the notion of human development. Such notion includes economic development but it is not reduced to it. In turn economic development requires economic growth but should not be equated with it; following the Schumpeterian insight, economic development can be seen as growth plus innovation. Since the expansion of freedoms and the quality of life are hampered by environmental damage, we may say that the normative approach we adopt points to human sustainable development.

2.3. From the normative approach to the factual approach

The core of our factual approach to development problems is characterized by the increasing role of knowledge as the main resource of power relations. That is the fundamental process that must be described and explained in order to understand possibilities and obstacles for development normatively defined as the expansion of capabilities and freedoms.

A transition to a knowledge-based and innovation-driven economy [19] is taking place or has already been consolidated in some regions of the world that can be called the "centers" of the globalized economy. That is the fundamental structural change of our time. "Centers" may be old, new or just emerging; they are the sites of such structural change. That change is not really taking place in most regions of the world; according to their relation to knowledge and innovation processes, they can be called "peripheries", "semi peripheries" or marginalized regions. Some big countries include marginalized regions, peripheries, semi peripheries and even emerging centers. In any case the whole planet is deeply influenced by the transition to a knowledge-based and innovation-driven economy shaped by capitalist-type relations.

Let us recall some telling figures of the global capitalist knowledge economy: "The share of imports and exports has increased from 38 percent of GDP in 1990 to 57 percent in 2005. Multinational corporations account for 27 percent of global value added, two-thirds of world trade (half of which is intra-firm) and more than 50 percent of global R&D. They are the main agent of globalization and integration of global markets. Because knowledge is not

consumed in use, for the producers of knowledge there is a strong incentive to exploit it over the largest possible market in order to amortize the costs of producing it." ([16]: p. 328).

The structural change we are considering has as a major prerequisite the incorporation of highly qualified people and first level knowledge to a wide set of activities related to the production of goods and services. This scarcely happens in peripheries and marginalized regions or among deprived sectors. In such contexts, relatively few people access to higher education and less people work in conditions that foster advanced learning; new science, technology and innovation are scarcely relevant for productive activities; incomes and productivity are low; high quality jobs are not abundant; informal occupations tend to prevail. That phenomenon may be termed the problem of knowledge for development. It means that the benefits and possibilities of knowledge are mainly concentrated in some regions and some social groups. Such problem lies at the heart of actual inequalities as well as of social exclusion. It poses a main challenge for the expansion of capabilities and freedoms of people.

2.4. Some clues stemming from the factual approach

One of the main roots of the problem of knowledge for development is the weakness of knowledge demand stemming from internal economic dynamics and addressed to internal suppliers of knowledge [3]. This characterizes under development today in Latin America (see for example Ref. [8]: p. 63–66). Weak knowledge demand stemming from market dynamics was already presented more than forty years ago as a major trait of under development by the Sussex Manifesto: "the 'need' for science and technology in the developing countries is unlikely to take the form of a commercial demand coming from individual producers." ([46]: p. 20).

This fetters the construction of advanced indigenous capabilities, which are needed today even more than yesterday: "we believe that the development of indigenous capabilities in research and advanced training now are much more important in enabling catch-up than used to be the case, and their importance will grow." ([36]: p. 384). Since development as freedom is not the same as catch-up, but more difficult, the relevance of indigenous capabilities can hardly be over-stressed.

If market demand of knowledge is weak in underdevelopment that does not mean that social demand of knowledge is weak; this quite elementary remark is a first clue for the policy approach. A second clue stems from the National Systems of Innovation approach, particularly in its more "actor-centered" versions, as the one built by the Aalborg school. In such version, innovation is a systemic and socially distributed process related with research generation, public policies and innovative firms but potentially at least also with a broader set of actors and links between them; cooperation between different actors appears to be relevant, for example in "user producer interactions"; social cohesion is considered a fundamental aspect of a "well behaved" innovation system, as for instance the Danish one [10,31,33].

Such theoretical framework shows that innovation policies should consider usually neglected groups as potential actors of innovation processes. Thus it suggests ways of fostering social inclusion in the emergent knowledge-based and innovation-driven economy.

2.5. Towards the policy approach

As already recalled, the main connection between the normative approach and policies is given by the assertion of Sen that the expansion of capabilities and freedoms not only characterizes the ends of development but is also its fundamental tool.

Since the factual approach stresses the increasing role of knowledge concerning social power as well as inequalities and social exclusion, specific knowledge policies are needed to redress this trend and foster social inclusion: in this sense, democratization of knowledge appears as a major aim of the policy approach.

The factual approach also stresses that, in many regions of the world, commercial demand of knowledge and innovation is weak while social demand of knowledge and innovation is potentially big. Policies are needed to detect and foster such social demand, to connect it with research of the highest quality available, and to transform research results in effective innovations that solve the original problems. When successful, such socially oriented or inclusive innovations are ways of democratizing knowledge.

The innovation systems approach shows that inclusive innovations must be fostered by means of interactive processes where different actors play effective roles. Related policies must include as relevant actors the deprived sectors with pressing problems, who must participate in the whole process, from the detection of such problems to the implementation of solutions.

In developing countries inclusive innovation can be a successful strategy to expand usually weak indigenous capabilities by connecting them with solving social problems. The idea, in short, is to consider learning and innovation policies as a part of a type of social policies where people are seen not as patients but as agents. This implies that social demand of knowledge can be strong even if market demand of knowledge is weak in underdevelopment; as already stated, this fundamental observation is the starting point of a policy approach.

3. Knowledge policies

3.1. Looking for a democratic strategy for structural change

Prevailing knowledge policies do not counter and can even foster trends towards increasing inequality that stem from structural change. This occurrence is a global phenomenon. The inequalities are growing also in the "centers" of the globalized economy where the democratic shortfall stemming from structural change has tended to be overlooked because traditional distributive policies were thought to mitigate the unequal results of policy. Knowledge is a resource with increasing returns to use. The more knowledge you build and use, the more knowledge you have and demand. Market-dominated innovation policies

match commercial demand of knowledge and thus tend to favor countries and social sectors that are already knowledge-strong. Consequently, they increase the differences concerning social power that stem from knowledge. Since knowledge is already the main power resource in contemporary social relations, prevailing knowledge policies are not democratic.

The levels and paces of structural change depend on the intensity and scope of the incorporation of highly qualified people and first level knowledge to the production of goods and services. Democratizing policies for structural change aim to foster such incorporation in ways that focus on the most pressing collective problems. Detecting and promoting social demand of knowledge can help both to expand advanced knowledge capabilities and to solve relevant collective problems. The ensuing legitimization of investing in knowledge and of expanding knowledge supply may in turn help to incorporate highly qualified people and first rate science and technology to a wide gamut of productive activities. This can be seen as an element of a democratic strategy towards structural change [4].

3.2. *On the scope of knowledge policies*

We don't assume that the so called high tech sectors are the only "engines of growth" or that primary and low-tech production activities are necessarily condemned to low knowledge levels. If such assumptions were indeed corroborated by facts, the actual possibilities of democratizing knowledge policies would be slim, especially in the world of underdevelopment. Consequently, the point deserves some attention.

The increasing production and prices of primary products in recent years does not imply that primary producers are locked in low knowledge levels or in low productivity. A longer view opens other possibilities. "Exporting primary products is not a road to underdevelopment. Most of the richest developed countries have been exporters of primary products." ([6]: p. 173). Up to circa 1950, productivity in industry grew quicker than productivity in agriculture, but in the following forty years there was a reversal. "The total increase in the Western world's agricultural productivity over the last 40 years has been greater than during the preceding 900 years." (Idem: p. 151).

For several countries, being rich in oil has been indeed something of a curse. But, as it is happening for example in Brazil, the expansion of oil production can go hand in hand with its increasing knowledge content. Concerning this issue, the case of Norway is telling: "The size, importance and technical complexity of the Norwegian oil and gas system is reflected in the data on people with higher education. As of 2003, the largest share of people with higher education in the labor force was found within oil, gas and mining, where 16 per cent of all employees had a higher education, as compared to less than 5 per cent in manufacturing. It is also within oil, gas and mining that we find the highest share of people educated within technology and natural sciences [...]" ([24]: p. 295).

The scope of knowledge policies should be widened well beyond the traditional realm of scientific and technological policies. All the activities of "symbolic analysts" as

described by Ref. [43] include advanced learning and innovation. Again, this is backed by telling examples: "A supplementary explanation of the overall performance of the Danish NIS could be that innovations flourish in industries not usually regarded as traditional engines of growth, the so-called 'creative industries'. These include, for example, the music industry, the film industry, leisure, sports and arts." ([10]: p. 408). Innovations in creative industries have often been perceived by policy makers as having only marginal effects on competitiveness and employment and have, thus, not been a primary target for market-dominated innovation policies. On the contrary, as the case of the Swedish music industry illustrates, such innovations can result in substantial commercial as well as other socio-economic benefits. At its peak between 1990 and 2003 – with music exports valued at 7.0 billion Swedish kronor (one billion USD) in the latter year – the Swedish music industry was the largest exporter of pop music per capita in the world and number three in absolute terms after USA and Great Britain [29].

3.3. *The problem of stakeholders*

Who are the stakeholders for democratic knowledge policies? Such policies are essentially based on the cooperation between several individuals and different collective actors. If facts give an affirmative answer to the question discussed by Ref. [27] – "Is the market destroying cooperation?" – , those policies will not succeed.

It can be said that democratic knowledge policies are a necessary element for the expansion of "coproduction" and, conversely, that if the latter does not happen, such policies will fail. "By coproduction, I mean the process through which inputs used to produce a good or service is contributed by individuals who are not 'in' the same organization. The 'regular' producer of education, health, or infrastructure services is most frequently a government agency. Whether the regular producer is the only producer of these goods and services depends both on the nature of the good or service itself and on the incentives that encourage the active participation of others. All public goods and services are potentially produced by those who are frequently referred to as the client. The term 'client' is a passive term. Clients are acted on. Coproduction implies that citizens can play an active role in producing public goods and services of consequence to them." ([41]: p. 1073).

The stakeholders of prevailing knowledge policies are strong networks of organized power, connecting firms, academic teams and public organisms. The stakeholders of democratic knowledge policies are at best potential networks that need to be effectively organized by connecting and even promoting actors.

We shall come back to the above remark further on, when considering the tasks of "developmental universities". Here we want to stress that this issue challenges the prevailing mode of knowledge production and utilization: let me recommend that the bridging of the gulf between the analysis of private activities apart from those of government agencies needs to be high on the agenda of development theorists and activists. No market can survive without extensive public goods provided by governmental

agencies. No government can be efficient and equitable without considerable input from citizens. Synergetic outcomes can be fostered to a much greater extent than our academic barriers have let us contemplate.” ([41]: p. 1083).

Generally speaking, we dare repeat that collaborative agency is a main issue for inclusive innovation systems as well as for democratizing knowledge policies.

4. Knowledge policies in practice: democratizing access to information

A basic element in an inclusive and democratizing innovation system is a free flow of information and knowledge-sharing opportunities. In this sense, the spread of information and communication technology (ICT) has provided a double-edged sword. On the one hand it has been instrumental in the emergence of supply-driven knowledge networks run by powerful groups aiming at capitalizing and commercializing knowledge. Definitions have widened for what constitutes intellectual property and what type of knowledge can be owned and traded. Broadened patenting regimes in chemistry and biology have allowed ownership of gene sequences, creating “anticommons” by precluding a wider use of the new knowledge [26]. On the other hand we can also see counteracting forces using ICT as a means to democratize knowledge through intellectual commons, open source, wiki-initiatives, telecenter movements, etc.

The unprecedented global speed of proliferation of ICT has meant for most countries of the world at least the potential for inclusive and knowledge-sharing systems. ICTs vastly change the ways in which problem solving as well as generation and application of knowledge can take place in an organization [12] or a country. Typically, traditional knowledge systems existing in developing countries evolve slowly over time and are locally bounded [7]. With adequate access to ICT, a community can – irrespective of its geographical location – tap into a knowledge system immensely larger than the existing traditional knowledge system. We still have scant evidence on what happens when traditional and indigenous knowledge systems are extended to reach global knowledge systems as well as other local knowledge systems, but the evidence so far suggest an important potential for inclusive development [18]. There are many ways to organize such interactions between knowledge systems also in ICT-poor regions. One much preferred way is through community telecenters or knowledge centers, providing affordable access to information-deprived areas.

In discussing the proliferation of telecenters [23], asserts that “the most important reason for telecenter establishment, and their most enduring legacy, is the ‘diffusion effect’ which telecenter services and the people who run them have on the communities and the regions which they serve. In every place where successful telecenters have been established there is a visible and identifiable change in the skills and capacities of the people and institutions.” Moreover, “(S)uccessful telecentres alter this paradigm [the trickle-down theory of innovation and diffusion]. They bring ‘state of the market’ technologies and skills to ‘back of the market’ communities. This transforms

the human, organizational and commercial capabilities of marginal communities and peripheral areas to participate in the Information Society” [23]. This observation is valid for the telecenter experience not only in developed countries, but also in developing countries.

Another example of “digital inclusion” is the “one laptop per child” project implemented in Uruguay, labeled “Plan Ceibal”; the program distributed for free a laptop to hundreds of thousands public schools’ pupils since 2012. Several initiatives accompanied this world pioneer exercise; one of them was the program “Flor de Ceibo” (the flower of the ceibo tree, the Uruguayan national flower), at the Universidad de la República, trying to help children, teachers and families in “appropriating the technology”. Several hundreds of university students and tens of university teachers have been involved in these activities that are slowly starting to combine learning, research and extension.

Most technological, institutional or social innovations arise from a combination of organized knowledge and interactions among a wide variety of individuals and institutions. Such interactions take place not only among scientific disciplines, but also among various types of practical experience and traditional or local knowledge. As discussed above, new technology has dramatically enhanced the opportunities for knowledge accumulation and interaction between individuals and institutions. Under appropriate conditions, disenfranchised groups previously excluded from global or local knowledge flows can have access to resources for innovative and capacity-building purposes through the appropriate use of ICT. As we have argued above, such an inclusive development model would require that appropriate framework conditions are in place and, above all, that policies detecting and promoting social demand of knowledge are implemented.

What role can universities, as the preeminent knowledge producer and disseminator, play in such a development? This is the topic of the next section.

5. Developmental universities

The normative approach presented so far emphasizes the importance of democratizing knowledge as a way of redressing progressively but firmly the ongoing trend towards “inequality through knowledge”. This type of inequality is built-in in the interplay between knowledge policies and social and economic structures, particularly so in developing countries. Advances towards democratizing knowledge need to proceed along several paths. One of such paths is the raising of public awareness and participation in issues where knowledge plays a central role: we can call this “knowledge direct democracy”. Another path involves efforts oriented to produce knowledge and to use knowledge in such a way that people usually marginalized from most of the problem-solving possibilities opened-up by knowledge become increasingly included: we can call this “democratization of research and innovation agendas”. Advancing along this path implies making room for new interests in those places where producing knowledge is a main activity and where people acquire the competences to become knowledge producers. Universities are part of such

places; they have the particularity of bearing responsibility for building competences in relation to young people as well as building “cultural capital” in general. In this sense, depending on what interests they take on board in their agendas, universities can become efficient engines for democratizing knowledge.

The literature indicating that this is not the prevailing trend is overwhelming. The issue of “research systems in transition” was forcefully put forward in the early nineties [14]. Such a transition signaled a trend, at least in developed countries, towards academic survival strategies based on increasingly accessing external funding; under this imperative the communalism part of Mertonian ethos evolved towards proprietary knowledge [49], research groups' leaders tended to become “quasi-managers” [21], and the old motto “to publish or to perish” was accompanied by a new one, “to apply or to die” [49]. At the same time, in the realm of normative guidance, universities were presented with the duty to collaborate tightly with the economy, something to be achieved through a closer connection with business firms. Some voices of alarm were raised, arguing that the golden eggs of research, precisely those that emerge from classic academic work, could be endangered by the short term pressures stemming from economic imperatives [17]. Some studies advocate that this not the case, and that high rates of publishing can be achieved while collaborating with industry [20]. Be that as it may, the above depicted transition has not weakened the importance that publishing has for academic workers. On the contrary, publishing is more important than ever. Global university rankings have become a significant tool in the relatively new trend towards the internationalization of higher education services and they have publications as an important indicator; several universities relate directly department budgets and individual salaries to the rate of publications; even policies at national level in many parts of the world provide bonuses to researchers mainly as an incentive and as a premium for publishing.

In the absence of stakeholders able to raise a voice for other type of social commitments for universities, the current combination of a normative bias towards a stronger relationship between universities and businesses and the trend towards tighter measurements and assessments in terms of publications as a main measure of individual achievement seems to give credence to the scenario of an emerging “university of calculation”, foresighted “... 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”. ([37]: p. 21). As a consequence, “participants in (the university's) 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.” (Ibid).

Universities have rightly been seen as fundamental providers of talented people, as “the most important

incubator of the next generation of researchers” ([39]: p. 91). This is particularly important for the promises of innovation, to such an extent that assuring the long-term supply of talented people “(i)ncreasingly (...) becomes one of the most essential, and indispensable, contributions that universities are expected to make”. (Ibid). Committing universities to the democratization of knowledge implies, particularly so in developing countries, to find ways through which such long-term supply of talented people could steadily include more young people coming from all strata of society. Moreover: “Improving the education system is also important from the point of view of preventing social segmentation and social exclusion. This problem has become severe in the context of rapid structural change which is accelerated by the application of high technology in production. It has both saved labor and shifted labor demand towards high-skilled labor. A part of the labor force is thus in danger of being excluded from the labor market.” ([30]: p. 398).

Committing universities to the democratization of knowledge implies as well diversifying the research agendas and the academic reward system to give an opportunity to the involvement of faculty and students with research and innovation related to different types of social and developmental problems, even if they lack commercial demand or are too specific to be easily published in main stream journals. This might be seen as wishful thinking given the above mentioned prevailing trends. To assess its possibilities a main question needs to be addressed: why and how can the material and spiritual interests of faculty and students foster developmental tasks and partnerships? It is conjectured that developmental tasks may attract both faculty and students, by combining professional and ethical concerns. This can always be the case for isolated endeavors, but to speak of a university's developmental and democratizing role implies far more. In the first place, it is the university as a whole that needs to open up, to support and to legitimize such endeavors. This can and has been done in quite different ways. In the Uruguayan case, for instance, extension work has recently become part of the curricular students' activities; in Denmark, the Project Based Learning system allows for a direct connection between community problems and student and faculty concerns [22]; in MIT, the D-Lab gathers an important number of students and faculty around the development of technologies apt to address several difficult problems taking into account the prevalent conditions in poor regions in developing countries. This diversity seems closely related with the following remark: “Universities may in the future tend to adopt a more holistic perspective, predicated on the synergies between their scientific and social missions. This should translate into a greater diversity and diversification of curricula, with the aim of becoming more attuned and responsive to the combined, yet diverse, social and scientific needs and expectations of different groups of their students” ([39]: p. 91).

Important as all this is, it may leave untouched the hard core of the research agendas. Faculty as well as students, particularly postgraduate students, need to feel backed for devoting time and efforts to pursue research directions that may take more time than average to show progress

because, among other reasons, they are like small roads transited by few people where difficult and pioneering work needs to be done. Developmental universities can be partially characterized as those where the social involvement of student and faculty receives formal academic status and where room is open for research agendas to pursue roads directly linked to problems of development. However, this too is far from enough at the level of a given society to act as a lever to countervail the prevailing trends towards “inequality through knowledge”. In the same way that developmental universities back students and faculty willing to challenge the “university of calculation trend”, developmental universities strategies need to be backed by the system of innovation in which they are immersed.

Developmental research agendas, unlike purely academic research agendas, require a rich variety of stakeholders; such stakeholders have to build together the problems that those research agendas will contain; this leads again to Ostrom's idea of coproduction. The fulfillment of “coproduced research agendas” cannot be achieved without a strong public policy determination to give them a chance to be pursued and to be applied. With another wording, Helga Nowotny backs the idea of coproduction by introducing three concepts: integration, contextualization and implication. “If joint problem solving is the aim, then the means must provide for an integration of perspectives in the identification, formulation and resolution of what has to become a shared problem”; “Actually, we should go beyond value-added; we should start to speak about value-integrated. There is something of a societal value that needs to be integrated into the definition of good science”; “Contextualisation means bringing people into knowledge production by asking one question: ‘where is the place of people in our knowledge?’”; “Asking the question about the place of people in our knowledge also implies an additional dimension, namely that researchers move not only in the context of application, but that they need to start thinking about the context of implication. What are the implications of what we are doing, of formulating problems in this particular way?” [40]. These ways of presenting normatively the making of research agendas show clearly the scope of the systemic challenge, in any setting.

The “Humboldtian vision” of universities opened the road for professionalizing research and for transforming studying at university level into a creative activity where room was opened for making students true protagonists of the learning process, an attitude encouraged by the teachers, many of which were active researchers as well. Such vision led too to what [39]: p. 93 call an enduring function of universities: that of a generator of cultural norms. Such norms are not only related to codes of conduct for the university demos; they can be seen as having epistemological significance as well: “Perhaps the epistemological core, the source of reliable knowledge, is to be found more in these general rules of conduct than in detailed methodologies.” (Ibid) If we link this idea of reliable knowledge resulting from general rules of conduct with the above depicted characteristics of democratizing knowledge production processes, associated to coproduction, integration, contextualization and implication, all leading to a radically opening-up in the making of research

agendas, then the developmental university can be seen as the heir of the best tradition of the academic university. In the next section, we provide an example of efforts made in this direction.

6. Knowledge policies in practice: the case of the Universidad de la República

In the Universidad de la República, in Uruguay, several attempts have been made in the last decade to bring into practice the aim of democratizing knowledge. Some have to do with an effort to expand the university to other regions of the country: the importance of this comes from the fact that it was the only public university in the country up to 2013 and has been historically concentrated in the capital city. Other attempts relate to the aim of fighting the early exit from the university, an important phenomenon due to a complex mixture of factors but always affecting more those with less cultural capital. This is attempted particularly through a “peer tutorial” consisting of advanced students taking care, academic and also socially, of new students. As already mentioned, extension activities, that used to be accomplished as a moral commitment with academic guidance but without academic rewarding, have become curricular activities, that is, they are considered an integral part of what a university student requires to graduate. “Contributing to the public comprehension of problems of general interest” is one of the duties of the university, according to its Organic Law. Since 2008, the University Research Council implemented a call for proposals with the aim of offering plural visions and plural analyzes around complex issues currently debated in the country. Drug consumption and the way it is tackled, legalizing abortion, the nuclear option as a way of widening the energetic matrix, “mega-mining” at open sky for profiting from vast deposits of iron ores, are some of the issues taken by teams usually formed by researchers of different areas. In the case of nuclear and mega-mining, the way of “contributing to the public comprehension” took the form of a “citizen trial”, introduced for the first time in Denmark under the name of consensus conferences. The exercise was not related to policy decisions; its aim was to offer to a wide public the opportunity to follow the presentations of the “witnesses” – experts, policy makers, NGO's, organization from the civil society, stakeholders – and the “judgment” of 15 citizens, the “jury”, carefully selected from those that volunteered to assure diversity and ex-ante neutrality.

Addressing problems affecting the quality of life of the most deprived sectors of the population through academic research constitutes a relatively new direction for the university's research policy. It was implemented for the first time through a call for projects in 2003 and re-installed as a regular program since 2008, the program “Research and Innovation Oriented to Social Inclusion”. The elaboration of the call was marked by the challenge of attracting a new type of research projects, with two distinctive characteristics: first, the problems hampering social inclusion to which the projects were directed should need new knowledge as part of their solution; two, the project would need to identify those stakeholders able to integrate the knowledge produced into workable solutions.

Several difficulties came to the fore along the different calls. One main difficulty was related to the identification of demands for knowledge associated with social inclusion problems: it takes time to detect and to characterize such demands and, moreover, this task can be far removed from the daily experience of most researchers. The involvement of stakeholders may be taken as a bureaucratic requisite to be fulfilled by presenting a duly signed letter, but this is not enough to assure that such stakeholders are really interested in the kind of solution the project is aiming to achieve, and even less that they are willing to contribute to see it implemented. Some of the funded research projects resulted in workable solutions, and can be considered successes in terms of the aims of the program. However, it became clear that isolated projects, even if successful, were not able to offer a systemic understanding of some complex problems and a systemic approach to strategies to tackle them. These difficulties were taken into account in the successive calls, as a result of an ongoing learning process that led to changes in the program [2]. Two symmetric difficulties persist, though. The first one is related to the fact that researchers find it hard to see how they can contribute to the solution of problems of social exclusion through the knowledge they are able to produce. Even if they are inclined to shift or to widen the focus of their research agendas to include such problems, they usually do not imagine how to do it. The symmetric difficulty can be observed in organizations committed to tackling problems stemming from social exclusion: it is hard for them to identify the “knowledge leg” of possible solutions and so they find it hard to express demands that researchers could recognize as challenges to their capacities. The University makes systematic efforts to overcome these difficulties, by organizing workshops with diverse groups of researchers to promote informal exchanges around what they do and the type of problems they could address, and by organizing wider gatherings with policy makers, faculty and all type of organizations and possible stakeholders to present the program and to foster dialogs between them around possible projects. The last of such gatherings, the III “Jornada” of Research and Innovation Oriented to Social Inclusion, took place on May 2–3 2012 in the Universidad de la República, with the active participation of the President of the Republic (who spoke of the “social fighters of knowledge”) and the Ministers of Education and Culture, Industry, Energy and Mining, and Social Development in a discussion on the role of the state.

Shifting research agendas is necessary to put the might of knowledge at the service of its own democratization. Research agendas are built around interests and incentives, academic as well as monetary; the long range programs as well as the concrete problems they include can thus be seen as the outcome of the influence that diverse research related issues can exert over institutional as well as individual decisions. The academic reward system is one powerful issue of that sort; others are the money put at the disposal of some directions of research, the prestige associated with some discoveries, the public and moral rewards dispensed to those that work for the good of the nation, or the good of some people, the intimate satisfaction of battling against challenging problems. From a research point

of view, developmental universities can be seen as those that provide effective incentives to include in their research agendas the kind of problems whose solutions can lead to the democratization of knowledge. However, developmental universities cannot continue to be such in solitude. Its effectiveness depends on the rise of a sustained and strong demand able to put knowledge at the direct service of shared social goals, among which diminishing inequality is particularly important. Expressions of such aim need to find a place a bit everywhere, in big issues of national reach, in small decisions taken at public and private organizations, and even in individual choices.

7. Concluding remarks

One main structural change of our time is the emergence and consolidation, in some places of the world, of a transition towards a knowledge-based and innovation-driven economy. Most developing countries do not belong to those places. In such countries the capacities to produce and to use knowledge, particularly advanced knowledge, is structurally weak. Since knowledge is the main power resource in contemporary social relations, such a situation fosters “inequality through knowledge”, paraphrasing Charles Tilly’s remark that “knowledge-based inequality prevails in the contemporary world” ([48]: 123). Prevailing knowledge policies, driven by commercial demand, mainly favor those countries and sectors that are already knowledge-strong, neglecting the problems and challenges hampering development for a vast part of the global population. Thus, they do not counteract inequalities in access to and use of knowledge.

Consequently, policies to foster democratization of knowledge are needed, particularly in underdevelopment. A central aspect of this process is the interaction with usually neglected actors to identify the huge demand for knowledge stemming from social problems and concerns. Developmental universities are characterized as universities that provide effective incentives to include in their research agendas problems whose solutions can lead to the democratization of knowledge. In so doing, they help to connect the innovation system approach with social inclusion.

A main question related to social inclusion is what kind of knowledge is being produced and diffused in the innovation system and for whom. Supply-driven knowledge networks tend to focus on catering for industry’s needs by transfer of technology rather than on social demand which is often un-articulated. Universities tend to forge strong ties to industry by emphasizing natural sciences and technology, by co-publications with industry partners and by setting up offices for technology transfer to industry. Developmental universities are perceptive to demands also from other segments of the population, particularly marginalized groups with weak or un-articulated demand for innovation.

To support the receptiveness of developmental universities to recognize social demand for innovation from excluded groups, there are a number of measures to be taken, not least expanded access to higher education, enrollment of under-represented groups, and curriculum

reform. New technology also offers new ways of including the excluded in education and research. For example, distance education specifically targeting least developed regions and under-privileged groups provides possibilities for universities for enhancing relevance and establishing a basis for research targeting previously excluded issues.

What is stopping universities from moving away from the possible trend towards a “university of calculation” discussed above and repositioning themselves as more inclusive institutions in the form of developmental universities? Some obstacles are related to the academic realm itself. One of them, quite formidable and challenging, is the academic incentive structure that in many cases rewards only technology transfer activities, penalizing third mission or extension activities leading to social innovation. On the other side, democratizing knowledge policies to become systemic require that developmental universities become embedded in systems of innovation that fosters inclusive development in order to become effective actors of change. The difficulties surrounding this path do not need to be stressed. But highlighting the need for such a path to achieve democratic knowledge policies may help it to persevere.

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