

The author replies

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I wish to begin by thanking the colleagues who kindly shared their comments on my article. The different views enrich the possibilities for analyzing this vast theme, namely the debate on the challenges of graduate studies in Brazil, while the critiques encourage both me and the readers to expand and perhaps correct the approach I chose. The following paragraphs aim to continue the dialogue sparked by their comments.

I

It is virtually a consensus today that science-based technological innovation plays a central role in the dynamics of developed economies. As a result, various theoretical models have been developed with the aim of understanding the political, economic, and social linkages that potentially spawn such innovations. Among others, I could cite the Triple Helix^{1,2} and National Innovation Systems³ models. With the usual delay in the peripheral countries, these models, built with a focus on the central economies – ended up spilling over to an understanding of technical progress and innovation in the developing countries. Viewed from another angle, they ended up searching for the reasons for the mismatches between the central and peripheral countries in the technology and innovation environment. In this path to expand the scope, the models also explored the possibilities for application to specific sectors of the economy, and the idea of a “sector-specific innovation system” was developed⁴. The human health sector has been particularly involved in this path^{5,6}, emphasizing in Brazil the contributions given by Health Industrial Complex model⁷, which, among other aspects, is being tested in the country’s public policy field.

I view these models as tools for understanding the object at hand, and the choice of the National Innovation Systems model responds in more than one way. First, it is the model that has been disseminated mostly widely in the international technology economy environment. Second, several Brazilian groups (including the public universities UFRJ, UFMG, and UNICAMP)

have been using the model to decipher Brazil’s possibilities in the field of innovation. Third, these groups have chosen to focus on human health as one of the key thematic sectors. Fourth, as Carlos Medicis Morel notes in his comments, the model fits the current debates in the global health field.

As for their conformation, National Innovation Systems have been allocated into three categories: mature, immature, and in an intermediate “catching up” situation, according to the degree to which they resemble the leading countries’ existing technology and innovation systems. In the Brazilian case, some specific sectors such as oil and gas and aeronautics technologies display an intermediate situation. In the health sector innovation system, my hypothesis is that Brazil is experiencing a situation in which the conditions may be projected for the transition from immaturity to “catching up”. I attribute this exciting situation to a virtuous marriage between health policies (the Ministry of Health’s Productive Development policy) and policies for health industry promotion (the Pro-Pharma policy at BNDES, the National Economic and Social Development Bank), an interesting conformation in the field of science and technology policy (the National Institutes of Science and Technology under the CNPq, about a third of which deal with human health), an important public market for industrial products in health, and a vigorously growing private pharmaceutical market. Finally, among these projections, I wager my hope that the graduate studies system in health can tackle and overcome its challenges, several of which are debated in the article. However, such dimensions are subject to political variables that lie outside the model, thus imposing conditions on achieving this “transition”.

The National Innovation Systems model does not establish a single, exclusive standard for maturation of national systems. Countries that now display mature systems have taken different paths to reach them. Comparing the Japanese, Korean, German, and American paths, for example, fundamental variables in the model have played very different roles. The role of universities and research institutes, the “science-push” and “market-pull” strategies, and the state’s role have varied greatly in the countries’ respective experiences. I see the relevance of the state’s role in all the mature systems (including that of the United States) and its absolute primacy in the development of innovation systems that have matured more recently, as in the case of South Korea. In the Brazilian case, I see this role as crucial, clearly exemplified in what I referred to as projections for the country to move

our health sector innovation system to a “catching up” position.

I thank Luis Eugenio Portela Fernandes de Souza for his emphasis on this point in my paper, at the very least calling attention to the need for the explanations that I am trying to provide now in this final commentary.

II

Fine-tuning the picture, I focus now on institutional and “microeconomic” issues raised by the commentators (and I agree with several of these issues). The most relevant ones are the archaic structure of Brazilian universities, the increasing external administrative constraints the universities now suffer, the internal corporatist pressures that never hesitate to destroy the university institution in order to guarantee their own immediate labor benefits, and the lack of administrative and financial autonomy (which Maurício L. Barreto highlights in his comments). I agree that overcoming these issues will greatly facilitate the necessary adjustments for Brazilian graduate studies to reach a higher threshold. In my view, the conservatism of Brazil’s academic and scientific elite is a key factor among the existing institutional obstacles, if not in the universities themselves, at least in the community’s representation in the top administrative agency for graduate studies in the country (Capes). The strength of this conservative pressure is one of the principal expressions of the supply side of knowledge in the organization of Brazil’s innovation system. For example, I hold this pressure accountable for the difficulties in implementing a significant number of executive courses at the graduate level. Rita Barradas Barata, emphasizing this point in her comments, calls attention to an aspect that is missing from my paper, and which I consider highly important, namely the “academicization” of the Federal Institutes of Technological Education, most of which were created in recent years. It would be hugely harmful to Brazil if these institutes lost their original characteristics and merely became miniature second-rate (or even first-rate) universities.

Another side of Brazilian academic researchers’ conservatism is the obsession with a turf war over the so-called “knowledge tree” practiced in the country’s research funding agencies. There are huge difficulties in modifying the knowledge tree to keep pace with the epistemological and disciplinary shifts under way in the world in recent decades. By the way, I do not propose to “abolish” the knowledge tree, as mentioned by Luis Eugenio Portela Fernandes de Souza in his

commentary. Such “trees”, which exist elsewhere in the world, are important tools in the field of administration and planning. What I suggest is the tree’s modification, a redefinition of territorial power capable of adjusting it to this new conformation with a greater role by demand for knowledge in orienting graduate training for researchers and professionals. For many years I have followed the efforts by successive administrations in Capes and CNPq to implement such changes, but what I perceive thus far are very shaky results in this undertaking’s success.

III

I mentioned Eunice Durham’s article at the beginning of my paper for two reasons. The first was to emphasize her primacy in diagnosing relations between research and graduate studies in the first 25 years of the latter, which I had not done in another paper published in *Revista de Saúde Pública* in 2011. Eunice had her eyes on the permanent objective of maintaining the academic quality of graduate studies as the fundamental pillar for their healthy development. Her correct assumption was that without a command of research, the tendency would be towards lower quality of professionals trained in graduate studies programs. My second reason, besides maintaining quality, was to strengthen demand as another pillar of graduate studies, from the perspective of better adjusted integration within the national innovation system. Moisés Goldbaum questions this hypothesis of the dominance of graduate studies over research, arguing that ever since the early days of Capes, its periodic evaluations have acknowledged the scientific competence of the professors involved. Therefore, scientific research activity has predominated in graduate studies ever since the beginning.

My point is not the existence or absence of scientific competence in graduate studies, but rather the institutional ascendancy in the creation of graduate courses over the organization of research groups. Reversing the order of the quote by Carlos Chagas Filho, it would read something like, “Research is done here, because graduate studies are done here.” And this environment prevailed during a research funding policy (in the 1970s and part of the 1980s) which absolutely prioritized institution-building centered on the creation of graduate courses, or rather, on funding research projects that had graduate courses coupled to them. The most striking examples of this involved institutional support from FINEP throughout the years, as well as the projects in

the Program to Support Scientific and Technological Development (PADCT).

I do not refute the relevance of the place assigned to human resources training by the Brazilian Plans for Scientific and Technological Development formulated by the military regime during the 1970s. This objective was relevant at the time, and still is. The problem arose when the research projects, in order to improve their credentials for receiving financial support, were oriented to be “packaged” inside graduate courses or programs. In the early days, this attitude definitely involved considerable tactical maneuvering by the best research groups in order to ensure their specific activities. However, this approach ended up shaping a “culture” which I believe took hold in the system as a whole. Schematically, I would say that at some moment, projects submitted by less qualified research groups (but “wrapped” in graduate courses) enjoyed better odds of being funded when compared to more highly qualified research groups without a graduate studies “cover”.

Further evidence for my interpretation emerges from examining the experience of non-academic research institutions in Brazil. With the exception of EMBRAPA (the Brazilian State-owned Agricultural Research Company), which was created under exceptional and late conditions (in 1973) as compared to the other research institutes located outside of universities, practically all the others – both Federal and State – took one of three variations on the same path: (1) they created graduate courses and made progress (e.g., Fiocruz, the Institute for Pure and Applied Mathematics, and the Brazilian Center for Physics Research); (2) they did not create such graduate courses and experienced major problems (the National Institute of Technology, Evandro Chagas Institute, and some traditional São Paulo State institute); or (3) they changed their focus, becoming production units (the Butantã Institute, for example).

I do not want to leave the impression that I see Brazil’s national graduate studies policy as a problem for research or for the country. This policy can be considered the most successful in the educational field in all our history. However, as Gaston Bachelard said, “Knowledge of reality is light that always casts some shadows”⁸. My paper is about these shadows. I realize that I may have overlooked all the light that graduate studies have shed on education in Brazil.

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