

**INNOVATION POLICIES IN BRAZIL DURING THE 2000S:
THE NEED FOR NEW PATHS****Fernanda DeNegri**

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Over the last few years, the Brazilian government has been very active in implementing a broad range of new policies to foster innovation in the country. Despite these efforts, outcomes have been modest. The question is why?

First, we argue that there are systemic conditions – factors related to competition and the institutional environment – that reduce the Brazilian economy's capacity to innovate. Second, both the design and the implementation of Science, Technology and Innovation (ST&I) policies lack the necessary efficiency to transform scientific potential capacities into private innovation.

Regardless, it can certainly be said that Brazil has a diversified set of innovation policies and programs, from tax incentives and low-cost lines of credit to grants for firms and researchers. Brazil has also adopted a number of regulatory measures, as well as a few demand-side innovation policies (DSIPs).

Taking into account all federal and state government investments in addition to the public tax waiver and compulsory R&D, the government sector infused (and not invested) in the Brazilian ST&I system (directly and indirectly) more than R\$ 52.2 billion (around US\$ 28.2 bi) in 2015. It is important to mention that not all R&D investments from Petrobras are included in these figures, although the private compulsory investment controlled by the National Oil Agency (ANP) includes Petrobras' contribution.

Despite the efforts of the last decade, nothing has really changed in terms of the R&D structure and intensity of the Brazilian economy. In fact, business participation in R&D has decreased between 2000 and 2014. Business R&D intensity – which had been quite stable over the entire period – did increase slightly in 2014. However, this was due to the low growth

of the Brazilian GDP and uncommon expenditures on external R&D by telecom service companies (possibly related to the FIFA World Cup and the Olympic Games). Therefore, in general, there seems to have been little or no change in private behavior with respect to R&D efforts.

This stable pattern in BERD consolidates Brazil's peripheral position regarding R&D intensity on the international stage. In the last 10 years and in terms of the total number of patents in the United States Patent Office (USPTO), the Brazilian situation is still unchanged. In other words, Brazil is still a peripheral country, even when compared to developing countries like India and particularly China. Taking into account total R&D investment, each patent granted to a Brazilian firm or individual by the USPTO in 2015 cost, on average, US\$ 109 million, which is much more than the Chinese cost of US\$ 43 million per patent in 2014 and the Indian cost of US\$ 37 million per patent in 2011 (MCTIC and OECDstat, ppp).

As a result, Brazilian productivity – although still higher than the Chinese productivity – is losing ground fast. In 2009, Chinese productivity was US\$ 14.7 thousand per person engaged, and in 2014 it reached US\$ 21.5 thousand, an increase of 32%. On the other hand, Brazilian productivity was US\$ 26.5 thousand in 2010 and US\$ 29 thousand in 2014, an increase of just 18%.

Through the gathering and analysis of many papers, reports and gray literature from academics, policy analysts and technicians we were able to identify seven major actions to deal with this low input-output relation and to foster innovation in Brazil.

1. Recalibrating the policy mix for innovation

There is an excessive concentration of effort on tax exemptions. International consensus suggests that this instrument, although relevant, is not the most adequate measure to support high-risk activities, especially for projects in the early stages of development.

2. Diversifying the Brazilian S&T system

One of the factors for the success of state-of-the-art innovation systems (for instance, the North American example) is the diversity of policies, agents and institutions forming the system. This diversity allows for the type of dynamism and competition that are essential for innovation. From this perspective, we are referring to new policies and instruments, but also new institutions and institutional models.

3. Investing in large-scale and open research facilities

Most of Brazil's research infrastructure consists of small laboratories. Brazilian science needs a high-tech infrastructure in order to become more competitive internationally. In this case, creating a high-tech infrastructure means more than having modern and updated equipment. It means the existence of multidisciplinary and open laboratories that are large enough to take advantage economies of scale and scope in scientific production.

4. Increasing public investment in mission-oriented R&D

One of the biggest differences between public investment in R&D in countries such as the USA and Brazil is that, in the former, the main objective of public investments in R&D is to foster science per se rather than solving concrete problems. In Brazil, most public R&D is not mission-oriented. For instance, only 30% of Brazil's R&D resources are connected to institutions and ministries whose mission is to solve problems in the areas of health and agriculture. In the North American case, more than 90% of publicly funded R&D is results oriented.

5. Building a more open and competitive economy

Brazil is not only a "closed" country in terms commerce. It is also a country that is closed to ideas. The number of Brazilian students and researchers living abroad is quite small, even though this number has risen, mainly

among undergraduate students, as a result of the CsF Program. The number of foreign students, researchers and industrial technicians in Brazil is even smaller. This lack of openness has implications that affect the Brazilian economy's innovation capacity.

6. Improving the business environment for innovation

A complex and bureaucratic institutional environment discourages investment, especially investment in innovation. Estimates made by Ipea's team show that the impacts of an improvement in the World Bank's Doing Business publication on investments and productivity would be substantial. From the perspective of innovation, these difficulties manifest themselves in many areas, including the follow: *i)* the time required for a patent to be granted; *ii)* the time and requirements necessary for approval of research or new medications by the National Health Surveillance Agency (ANVISA); *iii)* the existing restrictions on opening and closing companies; *iv)* the regulation of investments made with venture capital funds; *v)* the difficulty associated with importing inputs and research equipment; *vi)* the operational difficulties involved in funding research institutions using public resources; *vii)* the difficult relationship between universities and companies; and *viii)* the time spent on due diligence.

7. Improving the monitoring and evaluation of all innovation policies

Ongoing evaluation and monitoring of public policies is a key strategy for improving them. Therefore, all information regarding public expenditure needs to be transparent and public. Knowing how and where public funds are being used and who the beneficiaries are should be the right of every citizen.

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