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# Brazil's Innovation Challenge

## EXECUTIVE SUMMARY

The proven creativity and capacity of Brazilian companies for technological and managerial innovation has brought a new set of challenges to the country's policy thinkers and policymakers. In the first installment of a two-part conference, a distinguished eight-member panel discussed how public policies, governmental institutions and the adoption of intellectual property rights affect efficacy and the use of innovation throughout Brazil's economy. Panelists also analyzed the dynamics of knowledge-based business models and the role of capital markets in advancing innovation-driven development strategies. The second conference will be held this fall in Brazil.

Companies like Petrobras, a pioneer in off-shore, deep-water oil exploration, and Embraer, the world's leading producer of regional jet aircraft, exemplify the benefits of adopting innovation-oriented business strategies. On June 27, 2007, the Woodrow Wilson Center's Brazil Institute and the Program on Science, Technology, America and the Global Economy (STAGE) convened a group of business leaders, prominent scholars and an influential government official in the first installment of a two-part conference in order to address the growing impact of innovation on Brazil's economy and assess how the country's Intellectual Property (IP) system is evolving to meet these new business needs.

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## BRAZIL'S INSTITUTIONAL FRAMEWORK

*Jorge Ávila*, president of Brazil's National Institute for Industrial Property (INPI), discussed the role that his organization, the equivalent of the U.S. Patent and Trademark Office, plays in developing a business environment that promotes innovation in Brazil. He defined Intellectual Property (IP) as an intangible product of knowledge that has commercial value, encompassing copyrighted property such as literary or artistic works, and ideational property such as patents, appellations of origin, business methods and industrial processes. The IP system operates on essentially three platforms, explained Ávila. On the broadest level, there is the institutional framework (INPI) which manages the structuring of markets for these intangible assets. Stemming from this



institutional framework are the legal standards that regulate these asset-based transactions. On the most specific level, policy tools and service mechanisms serve to identify, individualize and evaluate these knowledge-based goods.

Innovation and entrepreneurship has played a pivotal role in the growth of internationally competitive Brazilian firms and helped the Brazilian economy diversify beyond the dominant agricultural and commodity-based sectors.

Before assessing the current status of Brazil's innovation system, Ávila stressed the importance of contextualizing the country's IP foundations. Between the 1930's and 1980's, Brazil carried out its IP policy based on an Import Substitution Industrialization (ISI) strategy—a protectionist development strategy focused on replacing industrial imports with domestic production—which sought to acquire IP and technological knowledge at the lowest possible cost. All innovation and technological progress was appropriated from and created abroad; as Brazil attached little value to knowledge-based innovation and IP rights, it deliberately established a weak IP system.

Ávila defended Brazil's ISI strategy by positing that, at least within this timeframe, it yielded consistent economic growth: with growth ranging from five to seven percent each year during this fifty year period. Furthermore, the ISI strategy enabled the country to foster a set of institutions that made it possible and attractive to develop a diversified set of industries; as a result, Brazil has one of the strongest industrial parks in Latin America. Despite these benefits, Brazil's ISI strategy bottomed-out in the 1980's as the economy began to slump. Under Brazil's first civilian government after military rule ended in 1985, a set of new industrial policies was implemented—opening the economy and encouraging greater foreign investment. As high tariffs and industrial subsidies could no longer sustain economic growth, Brazilian companies were forced to face

international competition and turn to knowledge-based innovation as a central pillar to improve the competitiveness of Brazilian industries.

To encompass this growing focus on innovation, INPI has assumed a much broader role in Brazil's IP system since the early 1990's. With increased government funding, the organization has improved efficiency and quality of services. Ávila explained that INPI now plays essentially three basic roles: 1) helping government and business build a strong IP system that fosters innovation and competitiveness throughout the economy by improving IP rules in international agreements and strengthening domestic IP-related laws and regulation; 2) promoting the IP system by making it well-known to potential beneficiaries; and 3) operating the IP system itself; ensuring the system's efficiency, efficacy and quality. INPI has established IP as the central mechanism to promote innovation and innovation policies within the economy; the institution also coordinates national networking by developing joint initiatives and guiding other institutions to value IP as a positive growth strategy; and conducts seminars and leads research programs on IP through the Academy of Intellectual Property and Development.

To maximize the potential gains of a strong IP system, Ávila underscored the need for businesses to actively pursue product differentiation and patent protection. Furthermore, more innovative firms need to consolidate in order to expand resources and better utilize economies of scale. He concluded that firms need to diversify their IP portfolios; increase R&D investments, seek to partner with other firms, and develop new products through cross-licensing.

## **INNOVATION IN BRAZIL'S ETHANOL INDUSTRY**

"Fossil fuels, which changed the world in the 20th century, do not have a bright future," said *José Goldemberg*, full professor and a former rector of the Universidade de São Paulo (USP). Instead, he argues that renewable energy sources are "the wave of the future." Fuels such as ethanol derived from sugarcane in Brazil—which he stressed should *not* be confused

with the corn-based product of the U.S.—are promising alternatives because they are not restricted by the limitations of carbon-based fossil fuels, such as the irreversible depletion of resources, environmental degradation, and the geopolitical problems associated with access to such fuels.

Brazil's ethanol industry—which produces more than 33 percent of the world's ethanol—provides an interesting case study for how IP can advance the industry's growth. Currently, the majority of ethanol plants only yield 8,000–8,500 liters per hectare, with only a few producing above 10,000. Goldemberg asserts that if all ethanol plants increase output yields to 10,000 liters per hectare or more by adopting new technologies and better species selection, the industry could increase productivity by 25 percent. Even if current productivity remains constant, Goldemberg calculates that by 2012 ethanol production should increase by 50 percent. The next step in expanding ethanol production lies in genetic modification of sugarcane: developing a higher-yield strain of sugarcane could double production without increasing production inputs (i.e., land, labor, and infrastructure). This type of innovation is already being pursued by companies like Dedini in Brazil, but needs the support of government policies that reward entrepreneurial initiatives.

### **AMERICAN PERSPECTIVES ON INNOVATION IN BRAZIL**

*Christopher T. Hill*, professor of Public Policy at George Mason University, reflected on the status of the Brazilian innovation system. Hill cited a recent study by Dr. Glauco Arbix, professor of sociology at the Universidade de São Paulo and past president of the Research Institute on Applied Economics (IPEA), which analyzed a sample of about 1,200 industrial firms in Brazil in comparison with similar firms in Argentina and Mexico. The study found that these Brazilian firms have become competitive in the international export market for medium and high-technology goods. Their success is a significant development in Brazilian business because it signals the

diversification of the Brazilian economy beyond the dominant agricultural and commodity-based sectors and highlights the pivotal role innovation and entrepreneurship play in the growth of these medium and high-tech firms. In the paper, Arbix contends the success of these firms is “rooted in their improved innovative capacity.” In order to survive global competition, these companies must adapt their business strategies to the more open and liberalized Brazilian economy and place greater emphasis on R&D, marketing, as well as quality and brand management.

To understand how the innovation system in Brazil operates and subsequently design appropriate innovation policies for the country, Hill stressed the need for more extensive analyses of these 1,200 companies to determine why this group of firms has succeeded in niche markets where so many firms fail or avoid entering altogether. He noted that unlike the entrepreneurial and innovative firms in the US, EU or Japan—which tend to be small, high-tech companies—these 1,200 Brazilian companies are much larger. If this is the case, Hill asked, “Why hasn't the public policy model of the US, EU or Japan,” which encourages risk-taking, venture capitalists and promotes small businesses and ‘spinoff’ firms, “worked in Brazil?”

Hill asserted that a detailed empirical analysis of these firms would answer this question and help dispel certain misconceptions about innovation. Such an analysis requires studying the entire profile of these companies. Characteristics that must be identified include: age of these companies; the organizational structure of the firms; how they were founded and initially capitalized; how technology was acquired; what were the founders' prior professional experiences, fields of study, level of education, and cultural backgrounds. Assessing these characteristics will help emerging economies—especially those like Brazil, rising from a previous era of protectionism—design appropriate innovation-oriented public policy. Hill also cautioned emerging economies against the prevailing tendency to replicate innovation strategies from the US, EU or Japan; focusing resources solely on creating the strongest govern-

ment laboratories and the best higher education system is a generally misguided approach to innovation policy development that diverts attention away from real opportunities and needs.

Additionally, Hill stated that a strong IP system is not necessarily a good one. For example, the US, EU and Japan have begun to focus on the *contrariness* of the IP system. From an industrial perspective, a strong IP system can also impose costs; there is growing interest in open-source networks that encourage collaboration among individuals. Furthermore, an effective IP system must balance between IP *protection* on the one hand and *dissemination* of knowledge on the other; ensuring that consumers and future producers have access to advancements in innovation is as important as rewarding innovators with patent protections.

*Robert Atkinson*, president of the Information Technology and Innovation Foundation (ITIF), applauded Brazil's move to strengthen its IP system. He cautioned Brazil against orienting its economy towards production of high-technology and value-added goods, a development strategy common amongst emerging market countries. Instead, Brazil should focus on raising productivity levels in sectors such as manufacturing and agriculture, where it has a comparative advantage. This can be done by distinguishing innovation policies that are "win-win," such as those aimed at expanding Brazil's ethanol industry, from policies that "unfairly" discriminate in favor of domestic industry at the expense of foreign competition.

The key is to advance innovation policies that attract new-technologies and allow market demand—not state intervention—to diffuse the technology throughout the economy. Governments that neglect such strategies and attempt to spur innovation in specific industries through the use of subsidies and the application of external tariffs fail to realize the negative consequences of such policies. While producers of the selected industry may benefit from these anti-competitive policies, such measures artificially inflate import prices, discouraging the diffusion of technology and hampering the country's economic growth. Furthermore, Atkinson

maintains the greatest threat to the global IP system is posed by countries that simply don't respect the system's rules; selectively abiding by the WTO's IP regulations only serves to undermine the system's efficacy and worth.

Brazil has a strong supply-side research base from which to produce innovative products, but weak capital markets limit product development.

#### SPURRING INNOVATION IN BRAZIL'S IP AND IT INDUSTRIES

The second panel switched the focus of the debate; panelists assessed the state of innovative business strategies in Brazil and prospects for further growth of the country's IP system. *Ricardo Camargo Mendes*, director of Prospectiva Consulting, bridged the topics of both panels in his analysis of the macro-institutional aspects of Brazil's innovation policies. Despite the infancy of Brazil's IP industry, the country has some distinct competitive advantages: a strong local scientific base, sizeable industrial capacity, large domestic market, biodiversity, well-developed telecom infrastructure, a substantial presence of multinational corporations, and significant purchasing power. Additionally, Brazil has comparative advantages in certain sectors such as pharmaceutical, software/IT and capital goods, as well as in specific areas of research including biotechnology, nanotechnology and renewable energies. Mendes emphasized the importance of prioritizing innovation within these areas of comparative advantage. Conversely, Brazil also suffers from major disadvantages, including low R&D investment, poor quality primary education, limited capacity for commercial innovation and a discrepancy between supply-oriented innovation and market-driven demand. Mendes maintained that the struggle for the Brazilian IP system is to remedy these shortcomings by involving innovative companies in the design of innovation policies, with the ultimate goal of enhancing and exploiting the country's competitive advantages.

# Brazil's Innovation Challenge

Moreover, if Brazil wants to be considered a player within the global IP industry it must be more responsive to international IP regulations, improve IP-oriented institutions, encourage technology transfer (both internally and from abroad), as well as work towards the harmonization of regional and international IP standards. Mendes observed that the Brazilian government has taken positive steps to promote innovation throughout the economy by legislating (U.S.-style) innovation laws that protect property rights. Additionally, Brazil has expanded and created new government agencies tasked with coordinating the disparate IP applications—although a welcomed initiative, these agencies have yet to connect and harmonize Brazil's national IP strategy. In fact, Brazil's national strategy still suffers from contradictory and inconsistent policies, inefficient allocation of resources and an unconsolidated regulatory framework.

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*Flavio Grynszpan*, director of the National Association for R&D of Innovative Companies (ANPEI) and former president of Motorola in Brazil, evaluated the role innovation policies play in the IT industry from an “insider's” perspective. To understand how IP works in Brazil, Grynszpan asserted that one must understand that “innovation is driven by market demand.” This is an important point neglected in most discussions concerning Brazil's IP system, which mistakenly portray government policies as the principal factor driving a country's innovative capacity—government policies should only serve to *support* innovation.

Grynszpan added that even though Brazil has a strong supply-side research base from which to

produce innovative products, few innovations ever become tangible goods. This is a result of deficient capital markets; unlike in the U.S., where capital is abundant, Brazil lacks a solid foundation of venture capitalists or private equity markets that spur innovation and product development. Despite the lack of capital, Grynszpan believes national and international IT companies operating in Brazil can still succeed, if they follow certain principles. He discouraged firms from pursuing narrowly focused cost-cutting innovation strategies, favoring instead production of value-added goods. Firms should aim to specialize in niche markets; attract R&D resources from global companies and integrate these resources into local initiatives and ventures; and promote greater international insertion through subsidiaries of global companies in order to gain competitiveness and decrease costs.

## STRATEGIES FOR BIOPHARMACEUTICAL INNOVATION

*William Marandola*, executive manager of the Brazilian Consortium of Pharmaceutical Companies (COINFAR), discussed innovation initiatives and challenges in Brazil's biopharmaceutical industry. Given the risk involved in producing biopharmaceutical drugs viable for human use, he advocated for greater inter-firm partnering. Additionally, as a result of the growing complexities in the industry's drug discovery, development and regulatory process, Marandola asserted that biopharmaceutical companies should consider outsourcing certain services in order to reduce costs and gain access to specialized resources, technology and expertise. Agreeing with Grynszpan's analysis, Marandola noted that insufficient capital markets hinder the biopharmaceutical industry's ability to innovate since biopharmaceutical companies rely on available cash flows to finance R&D investments. As a remedy to such “system failures,” Marandola suggested expanding the reach of current tax incentives and recalibrating the tax system to encourage greater R&D investment.

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STAGE also focuses on the growing importance of innovation, science, and technology policy in three complementary ways: exploring how technology can help achieve key national and global goals including health, energy security, and economic progress; assessing policy implications of emerging technologies; and examining the building blocks of long-term economic growth— including investment, life-long learning, global engagement, and innovation.

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