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# The Lisbon Strategy in a Knowledge Society Without Borders: The Brazilian View

## Brazilian Development in Industry, Science and Technology

Brazil is currently in an unprecedented situation. It is experiencing macroeconomic stability, a reduction of external vulnerability, an exports boom, declining poverty and inequality, an increase in science production, and increase in the production of doctoral theses, the lowest inflation rates of the past 12 years (3.2% in 2006). In terms of its external vulnerability, the risk fell and has kept falling (from + 2.000 to 216). In terms of the boom in exports and trade surplus, this has gone from US$ 60 billion in 2002 to US$ 136 billion in 2006. In terms of the reduction of social inequality, these are at the lowest level in 30 years, with 70 per cent of the population experiencing increased incomes (2001-2004). In terms of poverty reduction, it is at the lowest level ever, with income of the poorest growing by more than 10 per cent in 2001-4 (although there are still 5 million people living in extreme poverty). And in terms of S&T development, there are more than 10.000 new doctorates every year, and as shown in Graph 1, science production is booming. Brazil made an extraordinary and successful effort over the past century to create a modern

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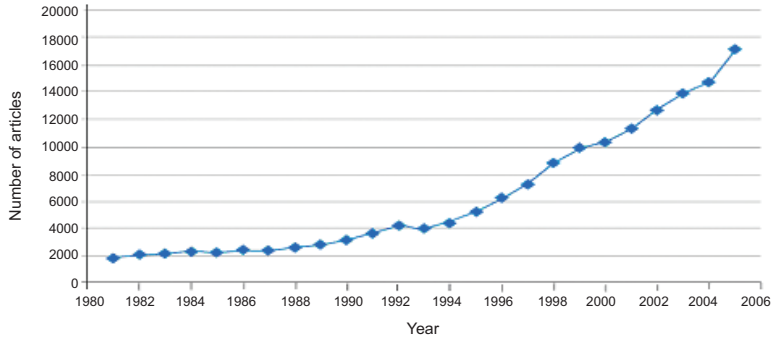
industrial basis. The country was one of the leaders of economic growth during the twentieth century and currently has a strong and diversified industry. In the 1970s Brazil intensified investments to develop structures to promote science, including the creation of post-graduation courses, the training of personnel abroad (PhD studies), and the creation of specific institutions for research. This policy was sustained until the present, and Brazil is rapidly increasing its participation in the global production of science.

However, the performance of technological indicators, such as patents, has not been the same. This is because of (1) the crisis of the Brazilian economy in 1981-2003, which was characterised by high inflation, irregular growth and problems coping with external debt. Although inflation declined dramatically from hundreds to less than 5 per cent between 1995–2001, external accounts and fiscal austerity were not a priority, and inflation returned again in 2002. The new government (Lula) introduced two main goals: fiscal austerity to control inflation and an exports boom to cope with external debt. The policy was successful – inflation in 2006 was down to 3,2 per cent, and exports rose from US$ 60 billion in 2002 to US$136 billion in 2006, and have kept growing. This virtually eliminated the bottleneck for growth of external debt; (2) an industrial base that is inward looking, and protected and led to less innovation efforts; (3) a lack of institutions to induce and support companies' investments in R&D and innovation.

**Graph 1**

**The Evolution of Brazilian Scientific Papers indexed by ISI**




2002: 12.681
2005: 17.155 (+35%)

Source: Ministry of Science and Technology

# Brazilian Contemporary Policy towards Innovation and Knowledge-Based Society

Clearly, the promotion of a knowledge-based society requires well coordinated policy at several levels – macroeconomic, education, infrastructure and science. In Brazil, the two main interconnected initiatives for a knowledge-based society are the Brazil Three Times[1] (Br3T) programme, and the Industrial, Technological and Foreign Trade Policy (PITCE). The first is conducted by the Strategic Unit of the Presidency of the Republic (NAE), and the second is multi-institutional and operates under the tutelage of the Brazilian Agency for Industrial Development (ABDI).

## *Brazil Three Times (Br3T)*

Br3T provides for long term strategic planning, defining national strategic objectives and providing for the creation of institutional conditions for strategic management. The knowledge dimension is the key[2]: "The knowledge dimension is tied in with the current world situation in which knowledge is a differentiation factor of national development levels. This dimension will affect more and more human activities and should provide: quality education; access to information for all; growing scientific, technological and innovation knowledge creation and capacities; and interaction between popular and scientific knowledge."

As part of the policy, studies on the future of nanotechnology, biotechnology, ICT, super computing, bio fuels, and climatic change were undertaken based on Delphi analysis and expert reports. These studies provided the basis for the elaboration and implementation of the guidelines and programmes of the PITCE. Br3T is coordinated by a Council comprised of the main ministers, and executed by the NAE Strategic Unit. Studies, analysis and debates

[1] The "three times" of *Brasil Três Tempos* refers to football (in which games are divided into two halves), and three important dates: the inauguration of the new government in 2007, the year of the United Nations Conference on Millennium Objectives (2015), and the commemoration of 200 years of Brazilian independence (2020).

[2] The other dimensions are: institutional, economic, socio-cultural, territorial, environmental, and global.

are carried out under the technical supervision of the Centre for Management and Strategic Studies (CGEE), which is linked to the Ministry of Science and Technology.

## *Brazilian Industrial and Technological Policy (PITCE)*

In November 2003, the Lula government presented its "Guidelines for Industrial, Technological and Foreign Trade Policy,"[1] or the PITCE. It is the first document to present a new policy in this domain in the last 25 years (the previous government produced some policy documents in the late 1990s, such as Brazil World Class, but they were vague statements about the need to achieve international competitiveness rather than programme or policy statements. During the Collor and Cardoso presidencies, there was no official industrial policy as it was believed that industrial policy was "the way of the 1960s" based on a closed market, high subsidies for companies, and massive projects to establish a whole industrial sector.[2] The Cardoso government goal was to put "an end to the national developmental policy" or abandoning active policies to induce development, mainly industrial development.

During the 1990s there was a strong and successful attempt to improve quality in Brazilian companies, inspired by so-called Japanese methods for quality management. Currently, quality management in Brazilian companies is common, virtually all managers are familiar with modern quality techniques, and the quality of Brazilian products is comparable to that of key competitors in the US, EU or Japan and South Korea. However, the focus was on cost reduction. The dominant perception of government at the time was that industry needed a competitive shock to reduce prices and so it was necessary to reduce costs. There was no strategic thinking about the need to upgrade industrial structures to promote innovation and product differentiation.

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[1] Diretrizes de Política Industrial, Tecnológica e de Comércio Exterior, at: www.desenvolvimento.gov.br or www.abdi.com.br.

[2] This kind of policy was also adopted simultaneously by most developing countries like Japan, South Korea, or India. Although there are policy differences the general guidelines were very similar.

The PITCE changed the focus. It emphasises the need to increase the innovative capabilities of the Brazilian economy, and to create programmes, instruments and institutions to induce innovation in companies. Thus, the development strategy of Brazilian industry is governed by a vision of the future focused on changing the threshold of industry through innovation and the differentiation of products and services, to achieve insertion in and recognition by the main world markets. The policy is sustained by in-depth analysis of the structure of Brazil's industrial fabric and of the impacts of innovation and product differentiation on the Brazilian economy.

Although there is much literature on innovation and development, existing analyses tend to focus on the most advanced countries of Europe or the US. It is fundamental to understand the relationship between innovation and development in less developed countries. Policies must be realistic and suited to local conditions, specific societies and economic and industrial realities, specific capital structures, income distribution, levels of regional and social inequality, and specific economic and social policy priorities. Most studies have been conducted by the Institute of Applied Economic Analysis (IPEA) in close cooperation with the main Brazilian universities, and debated abroad with European and North American experts. The most relevant study has illustrated the gains of a policy focused on innovation and product differentiation for Brazil. It is a quantitative analysis based on the main national databases, covering the period 1996-2002, and involving 72.000 industrial companies, 5.000.000 workers, more than 95 per cent of Brazilian industrial added value[1]. In the study, firms were divided into three categories according to competitive strategies and results as follows:[2] (a) firms that innovate and differentiate products; (b) firms specializing in commodity products but

[1] For information about this research see, J. A. De Negri, and M. S. Salerno (2005) which can be downloaded for free at: www.ipea.gov.br.

[2] Innovation is measured according to international standards in the Oslo and Bogotá handbooks. The Brazilian survey is compatible with the Community Innovation Survey (CIS3) of the EU, but much more reliable and covers a much greater universe of firms. The measure of differentiation is complex, involving several databases, but briefly, it is measured by premium price: for a company to be included in this category it must have launched an innovative product in the market and have obtained a price 30% higher than the average price of the market for similar products.

with high productivity; (c) firms that do not differentiate products and have lower productivity.

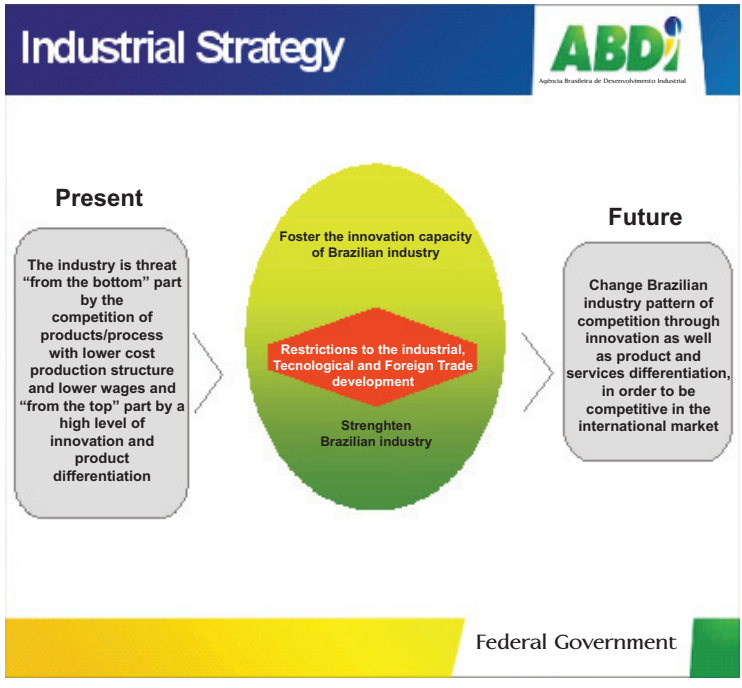
The results are impressive. The study shows that firms that innovate and differentiate product pay average wages that are 60 per cent higher than firms specialising in commodities, and three times greater than firms that do not differentiate products and are less productive (Ceteris paribus: 11% and 23% higher). It also shows that firms that innovate and differentiate product have higher income growth than those that do not. And firms that innovate (even if without product differentiation) also showed higher income growth compared to non-innovative ones. Further, the study showed that firms undertaking technological innovation have a 16 per cent higher probability of becoming exporters than non-innovative firms, and that firms that innovate and differentiate product employ a more qualified and stable workforce (stable in the sense that workers remain more time employed in the company). It also showed that Brazilian owned firms invest more than foreign-owned in R&D internal activities as a percentage of their income. Finally, the study showed that an industrial and technological policy based on innovation can help increase wages, produce higher industrial and economic growth rates, more exports, and employ more qualified workers.

## *The PITCE Guidelines*

The name PITCE makes sense in the context of Brazilian history. It is not a traditional protectionist industrial policy bur rather a policy to induce the development of industry. It is technological because there is a close link between innovation and technology. It is not a foreign trade policy as the guidelines, programmes and institutions involved do not deal with foreign policy or international negotiations. The words "foreign trade" were added to the official name only to make it clear that the policy is meant to improve international competitiveness. The aim is to foster innovation in industry; to improve innovative capacity on services, products and processes; to enhance the country's technological base in areas that show potential for growth; to create a favourable environment for private and public investments; to value national and regional resources; to improve the image of

Brazil abroad; to stimulate projects aiming at mass consumption; to foster employment and income generation; to promote a regional development policy regarding to industrial actions; and to coordinate actions with national institutions, states, metropolitan regions and local governments to achieve policy coherence.

The main guidelines are: to reach a new level of competitiveness through innovation and differentiation, increasing efficiency in production and in overall business; to stimulate the interaction between public institutes and companies; to establish an export oriented pattern of development (international competitiveness); to stimulate the development of company R&D, design, international logistics and distribution, and brands and not just physical production; to aid industrial modernization, and equipment; to promote the organisation and management in companies in clusters; to invest in activities that will shape the future of production systems (bio and nanotechnology, biomass and renewable energies); to modify the institutional panorama (to address fiscal restrictions (debt), a complex and inefficient tax system, the difficulty of coordination, and redirect public agencies).




The policy is articulated along three main lines. The **horizontal guidelines** include: innovation and technological development (fi-

nancial tools, tax facilities, and simplification of the bureaucratic measures for the relationship between public universities and private companies); incentives (innovation law); the promotion of insertion in the global economy, of exports and of the internationalisation of Brazilian companies; and the organization of clusters of companies to open distributions centres abroad); industrial modernisation (the improvement of traditional machinery substitution, programmes to ensure product and quality certification among SMEs; investments in scientific metrology to set standards for Brazilian products, like the national spirit cachaça and ethanol (with the NIST in the US), and to develop chemical, biotechnology and nanotechnology metrology. There is a focus on institutional improvement and the expansion of institutional capacities, which includes: innovation & biotechnology laws; the creation of the Brazilian Agency for Industrial Development (ABDI) linked to the President of the Republic to coordinate policy (the board is named directly by the president); the creation of formal arenas to debate PITCE strategy and management with social actors such as the National Council for Industrial Development (CNDI), composed of 13 ministers, 10 CEOs, and 3 trade unionists. (ABDI is the executive secretary of the Council. Among others, the Council launched the Brazilian Initiative for Innovation); to redirect the Brazilian Development Bank to finance innovation and capacity expansion instead of privatization; to eliminate taxes on investments and exports; to simplify the measures to start up and close companies; to pass a new law on SMEs simplifying fiscal procedures; and to invest in the National Institute of Intellectual Property (INPI) to simplify procedures and quicken the time it takes to register a patent or trade mark. Second, the strategic options include: semiconductors (application of specific SOCs and Asics); software; capital goods; pharmaceuticals. And third, there is the development of special activities, notably biotechnology, nanotechnology, biomass and renewable energies, and Kyoto protocol based activities.[1]

[1] "Brazil is a great success story, as the country's National Alcohol Program dates back to 1975, when the government first introduced the policy to reduce dependence on petrol imports and enable the country to produce renewable and environmentally friendly energy. From 1985 to 1990, around 90% of all automobiles manufactured in Brazil were powered by ethanol. To date, more than 6 million ethanol and flexible fuel vehicles have been manufactured in Brazil." Ford Motor Co., 10 May 2005, available at: http://media.ford.com/print_doc.cfm?article_id=20825

To take the example of policies to develop SMEs and clusters, there is a programme for industrial extension (organisation & management systems) for clusters of companies. The first task undertaken is a diagnosis, after which instruments are used according to targeted needs, such as finance, design support, research centres, commercialization, export promotion assistance, or others. For low tech companies the goal is to stimulate product innovation by facilitating machinery substitution, and greater access to credit (research has revealed that these companies used to launch new products as they acquired new machinery). For high tech-based small companies, the goal is to redesign of financial support through special lines for R&D, to aid product certification process and to assist with the relationship between large and small companies. The policy is based on an articulated set of measures that aim to improve efficiency with focus on innovation and integrating action by the government, the private sector, the scientific community and trade unions. One of the aims is to promote the scientific basis of production (growing in size and quality) of the large and diversified industry, promote engineering skills, biodiversity, design and the "Brazilian lifestyle" to improve innovation, competitiveness, as well as economic and social development. Obviously, the policy respects international agreements such as those established within the WTO.[1]

## *PITCE Governance*

A characteristic of states as well as large companies is their functional-bureaucratic organisational structure. Because of it, each organisational unity (section, department, direction, ministry, or agency) tends to develop its own approach and methods. Normally, the result is duplication and superposition of activities, contradictions, and difficulty with coordination. Thus, the first challenge that must be met is to realign State agencies and private sector so that they work according to a single policy guideline. To achieve this, the government chose to publish a formal docu-

[1] For instance, during a meeting at the Embassy of the European Union to present PITCE in 2004, economic advisors of some countries showed us their analysis of the PITCE, concluding that it presented no problems for foreign companies or in terms of international agreements.

ment on Industrial and Technological Policy in November 2003. The Ministerial Chamber of Economic Policy named a task force to propose the guidelines, which were discussed by the Ministers in depth and approved by the President.

After the PITCE Guidelines became public the task force was unable to manage its implementation – every participant pursued its separate activities within their organisation (ministries, agencies, and institutes). Since there was a clear understanding that coordination was one of the main problems it was decided that a special agency should be established, independent of any ministry, to undertake broad coordination, namely: aligning different agencies; designing inexistent tools; smoothing inter-institutional relations; and articulating with the private sector. The Brazilian Agency for Industrial Development (ABDI) was created by law at the end of 2004 and began operations early 2005. Its purpose is to promote the implementation of the Industrial, Technological and Foreign Trade Policy in close cooperation with the public and private sectors. Its board of directors (3) is nominated directly by the President of the Republic, and its Deliberative Council is composed by ministries, agencies, the private sector and trade unions. Three main activities exemplify the articulation and coordination efforts of the Agency: its role within the National Council of Industrial Development (discussed above); the promotion and coordination of a monthly meeting involving persons from key ministries and agencies to evaluate the implementations of the policy, its problems, difficulties, and improvements; and a monthly delegation report to the President on progress with the PITCE.

## Vertical Governance: Federal Government, States, Municipalities, and Private Sector

Brazil is a Federal Republic, so that states and municipalities have some freedom to formulate policy in some areas. Basic education (9 years), for instance, is under municipal control; secondary education is the responsibility of the states; and higher education is under federal charge, although there are state universities (like the University of São Paulo) and even municipal universities. States and municipalities also have the freedom to formulate science, technology and innovation policies. The state of

São Paulo, for example, the richest and more industrialised in Brazil, created the FAPESP foundation years ago to support scientific and technological research, and other states have followed that example. Some states also have development banks and local development agencies. Clearly, there coordination is a must.

All the states' Secretaries are brought together by the Forum of Science, Technology and Development States' Secretaries.[1] It is a non compulsory Forum in which the Minister of Science and Technology participates. General guidelines and best practices are discussed or promoted. The Forum played a key role in the adoption of the winner model of FAPESP in other states. This kind of 'vertical' coordination has some similarities with the so-called Open Method of Coordination utilised by the European Union. A similar but much weaker (the level of participation is lower) Forum congregates the municipalities.

Diffusion of information is crucial in a decentralised political system. The ABDI initiated a programme of seminars and 16-hour courses on PITCE guidelines and instruments, most of them in partnership with industrial associations. The Minister of Science and Technology formulated an innovation site, which is managed by ABDI,[2] and which facilitates searches of the Brazilian science and technology competence database that brings together almost one million researchers from all over the country. The system is designed to help companies find competences in universities, in public institutes as well as in private institutes and private companies. It also helps to organise special meetings, on a local or federal basis, and meetings between companies and researchers on specific issues.

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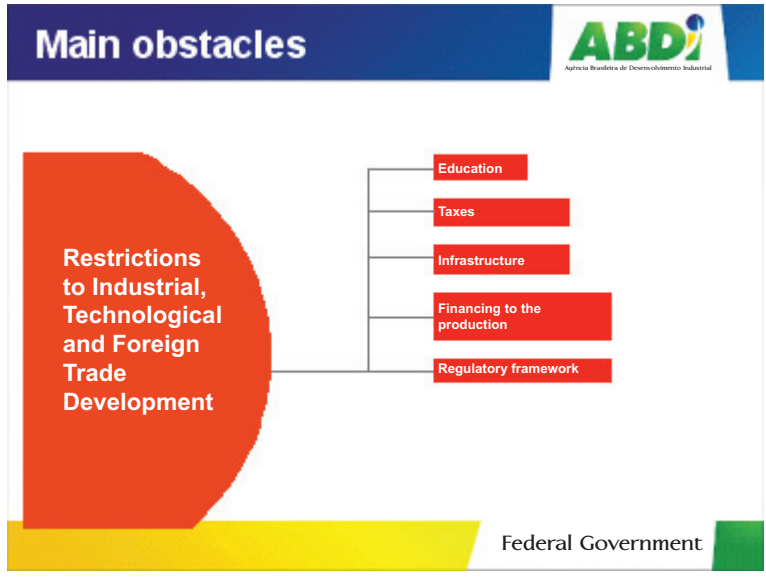
[1] A Secretary is similar to a Minister at the state level. They are designated by state governors. Some states have S&T secretaries and others development secretaries that oversee S&T.

[2] See Innovation Portal at www.portalinovacao.mct.gov.br.

ernment. Although there are contentious issues, such as interest rates, exchange rates, and taxes, there is convergence on the need of innovation policies. In 2005, for instance, the National Association of Industry promoted its first congress on innovation; some industry associations in key states have promoted seminars, fairs and business on biotechnology, nanotechnology, and bio-fuels, among other topics. ABDI initiated specific dialogues with some key national, state and sectoral industrial associations, in some instances resulting in formal agreements with sectoral development goals; these agreements involve almost no money but are very helpful in mobilizing companies and in disseminating best practices on innovation strategies and management. Some sectoral associations have launched technological institutes in order to engage in a more qualified dialogue with state officials at all levels, to prepare different sectors to take advantage of new approaches, regulations and general instruments of the PITCE.

## How Brazil is Facing Challenges and Obstacles

During strategic planning process of ABDI five main obstacles were identified as listed in the picture below:



## Taxes

Taxes rose after the Real Plan (which controlled inflation due to an indexation of the Real to the US dollar but cost a lot and was financed by rising taxes) to deal with fiscal restrictions. The tax system is complex and the federal political system makes it difficult to reform it. But there is a consensus on the need to reform the tax system and cut taxes. There is a bill under discussion in Congress that would simplify the system significantly, introducing a national value-added tax and annulling many current taxes. In the meantime, the federal government is reducing taxes on capital goods, civil construction and popular consumption goods. The main taxes are state taxes, however, and they still apply (with some exceptions) to capital goods. Thus, the approval of a new law is essential.

## Infrastructure

The infrastructural bottleneck is logistical. Roads are the main logistical channel but they were abandoned in the last 12 years. Harbours are reaching their limits due to the boom in external trade. Although these logistical bottlenecks are not directly linked to the theme of this paper, they are important as they can either assist or block private investment impetus. The federal government launched an urgent (and controversial) plan to conserve main roads and is preparing to regulate private concessions, after launching the rules for public-private partnerships. In 2004 investments in railroads boomed after the resolution of some regulatory problems created by the privatisation process of the late 1990s–early 2000s.

## Energy

Energy does not present a problem. In 2001 it was solved by investments in line transmissions to strengthen the integration of different production facilities all around the country with a view to South American integration. It is important to note that Brazilian energy is mainly (more than 80%) hydroelectric, some nu-

clear power (2 facilities). Electricity is also generated with the sugar and ethanol producing process. There is a thermal back up system based on natural gas; there is virtually no thermal coal or oil based electricity. In 2005 the government proposed a new law (which was approved) to facilitate private investments in energy.

## *ICT*

Brazil has a nationwide and reliable telecommunication system. Taxes on personal computers were eliminated leading to a boom in production and consumption. There is also a public programme of tele-centres that aims to popularise high speed internet access. The National Council for Industrial Development approved a programme inspired by that of South Korea to introduce an extra-large IP connection (20M) for public schools. Brazil developed a very robust and interactive system of digital TV and established an association with Japan to adopt their system of modulation (which has obtained the best scores in independent tests undertaken by a consortium of Brazilian universities mainly due to the strength of the signal, a crucial feature for large cities with high electromagnetic and physical interference – mountains, buildings, tropical tempests, among others).

## *Environmental Control by Companies*

According to IBGE official data, environmental investments by companies increased 83.9 per cent from 1997 to 2002 for the whole country.

## *Finance*

There are two main problems with finance: interest rates and access. Although falling consistently, Brazilian rates are still very high, an inheritance of the inflationary period that shaped a banking system focused on the negotiation of public debt and overnight operations instead of investments and credit for consumers and companies. The National Development Bank (BNDES)

provides long term credit for investment with lower rates than private banks. Nowadays, private banks do not offer long term credit. The main problem was – and still is – institutional. BNDES is a large and solid institution, one of the biggest development banks in the world. But it was designed to finance plants, physical capital (machinery and buildings), and developed procedures and a strong culture to that effect, leaving aside R&D, innovation, services for industrial companies, or branding. Indeed, these important issues were excluded from BNDES financing. In the 1970s a new agency (FINEP) was founded to finance technological projects. In the first years, FINEP financed mainly the expansion of the post-graduate system: aiding universities to hire researchers, financing university projects. Then it began to finance joint projects between universities and companies. It is important to remember that until 2005 private companies were not allowed to compete for resources for science and technology projects, and the only possibility was a joint project with a public research institution, with FINEP financing the public partner and the company financing its own participation. The situation changed with two new laws, the so called innovation law and the so-called "goodness law". They allow public bodies to finance science and technology projects in companies, and make it easier and simpler for public institutes to make contracts covering intellectual property rights with companies in joint projects. In 2006, inspired by a proposal of the IPEA, BNDES launched a finance programme for innovation in companies and special lines of credit for bio fuel development among others connected to PITCE guidelines. But it is still a traditional bank looking at physical guarantees and results. FINEP on the other hand, is still university-oriented. It takes time to change this focus.

One critical gap in the financial system is the absence of seed money for technology-based innovation projects by small companies. Indeed, the whole system of venture capital should be strengthened. Another general problem is difficult access to credit for SMEs. In order to gain access to public financing lines, companies cannot have a fiscal debt with the state, and even if the company contests a debt it cannot gain access to credit until any pending judicial action is over. This problem has immense proportions because credit as a percentage of GNP is low in Brazil, many SMEs faced tremendous problems surviving the period of

currency overvaluation (R$1,00 was worth US$1,00 under the Real Plan), which promoted imports, and increased taxation in 1996-2002 and interest rates to control inflation, because many companies financed their current activities by delaying or not paying fiscal contributions, and because the Real Plan led to a period of fluctuations in the economy (stop and go growth, fluctuations in the interest rates so that they went from being negative to among the highest in the world, and exchange rate fluctuations) that weakened the financial structure of companies. Thus, many companies have no access to public credit. There is obviously a strong argument for not financing companies in debt with the state, but equally credit to SMEs must increase to allow the development of industry.

## *Regulatory Framework*

The main regulatory obstacles and possible solutions are being discussed, including rules for finance private projects of ST&I; the reform of the tax system; a law to simplify the bureaucratic procedures to open and run a company; and how to overcome the difficulties in public-private relationships in R&D (the innovation law facilitates the relationship). The framework is quite new, however, and it is necessary to monitor implementation. One critical gap that has yet to be addressed is the framework for science and technology parks.

## *The Educational Paradox*

Brazil has a dual educational system. Its public universities are quite good, but the quality of pre-university public schools is poor. There are no short term bottlenecks at the graduate or post-graduate level, with companies finding what they need, so the main issue is how to improve basic education. In Brazil, access to basic education (9 years) is universal, and there is a strong post-graduate system that produces most of the country's science and research. The first 9 years of school ("fundamental education") are under the aegis of municipalities, while middle school (3 years of high school) is under state aegis, and univer-

sity education is primarily under federal aegis. Thus, federal norms do not govern the location of schools, their management, and teacher wages. There is also a large private school sector (the Brazilian elite normally studies at the top private schools and at public universities).

In the last three years, the federal government launched three main initiatives to expand the system of universities (stagnant for a long time), the establishment of a national assessment of basic education (the national test) and the dissemination of best practices, and the creation of a special fund to support quality improvement in basic education (teachers wages, ongoing education for educators, improved physical facilities).[1] The government also launched a big e-learning programme with the creation of the Open University of Brazil, initially focusing on retraining teachers. In accordance with PITCE guidelines, the Ministry of Education (MEC) and the National Council of Scientific and Technological Development (CNPq) launched a programme to finance doctoral students in microelectronics, nanotechnology, biotechnology and engineering, while the Ministry of Science and Technology launched a programme to modernise facilities at engineering schools and laboratories, and the Ministry of Labour launched a programme to train technical workers in software development (programming and analysis). In March 2007 the government launched the Plan for the Development of Education. It includes provisions for a minimum wage for teachers all over the country, national tests to assess the learning of children between 6 and 8 years old (mainly alphabetization), attributing federal resources to the municipalities with the lowest levels of learning, and ongoing teacher education (with each teacher associated to a specific university where they must undertake courses every three years). A synthetic indicator was created to evaluate the performance of municipalities on basic education. Finally, the government also launched a programme in 2003, the Zero Hunger Plan, to reduce poverty and ensure food security. One of its main

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[1] Fund for the Maintenance and Development of Basic Education (FUNDEB).

instruments is the "Bolsa Família" or Family Grant, which provides a monthly stipend to families whose children are attending school regularly (obviating the need to put children to work to supplement family incomes). This policy thus has a dual goal: to increase incomes and access to school. Research conducted by several analysts shows that the Family Grant has had a direct impact on poverty and inequality reduction.

## Initial Results

There is insufficient data to engage in an in depth quantitative assessment of the policy since it was launched in late 2003 (in practical terms March 2004), namely on the impact of PITCE and Br3T (including all measures adopted by agencies, development banks, ministries, regional and local agencies, and other institutions). However, existing data and quantitative analyses suggest that this policy has been positive. Brazil faces huge problems in advancing towards a knowledge based society, most of them macroeconomic, but the Brazilian economy is getting stronger, external restrictions have virtually disappeared given the yearly US$ 40 billion trades surplus, poverty and inequality are declining, and inflation is low and under control. Brazilian history shows that for a change to occur a long maturation process is necessary, because the country is like a big ship that is not suited to fast manoeuvres but rather to long journeys. The PITCE has more public visibility than Br3T and has been subject to more criticism. This section focuses on three particular issues: institution building; private sector perceptions; the commitment of state agencies and key civil servants.

Institution building is of utmost importance. Brazilian development institutions were established to serve goals that are no longer relevant. There have been important improvements since 2004, but there is still a long way to go, and institutions must be adapted to serve twenty-first century goals. As regards the private sector, apart from criticising taxes and asking for greater incentives, it has traditionally followed government policy. The PITCE was welcomed. Although private sector leaders have criticized the speed of implementation (they want faster action) they support the general guidelines. In effect, it is difficult to distinguish criti-

cism of taxes, interest and exchange rates, and criticism of PITCE because they invariably go hand in hand. The private sector has followed the increased focus on innovation by state agencies, officials, and governors brought about by PITCE. The National Confederation of Industry (CNI) held its first conference on innovation, and some sectoral entities promoted various kinds of meetings on applied nanotechnology, biotechnology and other forward looking issues. The press has acted similarly. Major newspapers, magazines and TV networks reported extensively on IPEA research on innovation, including findings that firms that innovate and differentiate products are more productive, pay higher wages and are more likely to be exporters (the topic was the focus of a Sunday front page in the *O Estado de São Paulo*, one of the main Brazilian newspaper, and of all the main national newspapers, including the business papers), and many regional newspapers have reprinted related news. There have been live interviews on *Rede Globo*, the main Brazilian TV network, and on major radio shows and magazines. In the academic sphere, the engineering and hard science communities warmly welcomed the idea of an industrial and technological policy. Initially, the more liberal economists were somewhat wary, but since the policy is based on innovation and not on 1970s protectionism, criticism has tended to focus on the need to quicken the pace of reform. In effect, most criticism fails to distinguish short from long term goals. For instance, some industrial leaders consider that industrial policy should follow tax and interest rate reductions. Obviously, macroeconomic and meso-economic industrial and technological policies cannot be entirely separated, but macroeconomic policy alone cannot drive innovation and technological development forward in less developed countries and in Brazil in particular.

## The Lisbon Strategy and Brazil: Perception, Impact and Evaluation

The relationship between Brazil and Europe is based on solid historical and cultural ties, democratic values that orient common actions for economic development, social justice and the promotion of world peace. The EU is the main source of foreign investment in Brazil, and there is a strong and diversified trade part-

nership. The EU is the main destination for Brazilian industrial, agricultural and service goods, and the second main source of Brazilian imports. Recently the relationship has being strengthened, with the visit to Brazil of the President of the European Commission, José Manuel Barroso, the first one by a Commission President. Cooperation is being undertaken in various fields with a strong impact on Brazilian public policy, including poverty reduction, social inclusion and development, support for the external insertion of Brazilian SMEs (with the ABDI as the Brazilian partner), the modernisation of public administration, climate change and global environmental governance, and education, science and technology. It is helpful to remember that Brazil has a long relationship with European educational institutions, including universities. For instance, the Ministry of Education (MEC) and the main Brazilian university, São Paulo state university have agreements with French, Italian, German, British, Portuguese, and Spanish universities, among others; the Polytechnic School of the University of São Paulo has an agreement covering double honours degrees with the French *Ecole Polytechnique* and the other Engineering *Grands Ecoles* (*Ponts et Chaussées*, *Mines*, and the *Centrales*), as well as with the Milan Polytechnic, among others. There is also enormous potential for cooperation in the field of energy since EU is the major importer and the second major worldwide consumer of energy, depending on external sources to supply around half of its needs. Brazil is in a unique position in this field because it is a producer of renewable energies like ethanol and bio-diesel.[1]

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For Brazil, the relationship with the EU is much more than economic, and has a strong political and strategic component. There are two areas for which relations with EU institutions or countries have been of the utmost relevance for Brazilian public policy making for a knowledge-based society: the definition of an industrial policy based on innovation (PITCE) and the building of the Strategic Unit (NAE). During the elaboration of the PITCE there were

[1] The original bio-diesel producing process with ethylic route is Brazilian; the ethylic route uses ethanol, and the methylic route uses methanol obtained from oil refinery, not from biomass.

important exchanges with the EU. In addition to the inspiration derived from the analysis of documents, programmes and institutions, several contacts were made with experts and different agencies, among them the frequent contacts between Professor Maria João Rodrigues and IPEA, the biggest Brazilian government think tank. EU-Brazilian relations also became more effective after the activities of the NAE began in 2003.[1] As noted above, the mission of the NAE is to establish the key themes affecting Brazil's future, offering quality information to the presidency to assist with strategic decisions. The main issues already being addressed are biotechnology and bio assurance, bio fuels in general and biodiesel in particular (due to the link with regional development), climate change, political reform, nanotechnology, ICTs and supercomputing, and the quality of education.[2] Finally, when Br3T was being developed, links were established with the United Kingdom Strategic Unit (under the Prime Minister) and with EU Strategic Commission.

## Cooperation and Exchange of Ideas and Projects

Effective cooperation means respecting different national agendas. The most important from the Brazilian point of view is arguably to sustain and to improve the initial push of Brazilian companies to innovate and develop a knowledge-driven business strategy. Thus, cooperation with EU could address: (1) Networking among companies, R&D activities, and supply chains, among others. Brazilian companies are investing abroad, as in the two collective logistical centres in Europe (Frankfurt and Lisbon),[3] and productive investment abroad is growing as well; (2) Promoting knowledge to prepare SMEs to adopt more consistent innovation practices; (3) Regional development promotion based on innovation technological parks; (4) Institutional building on a national and international basis; (5) Bio energy and environmental issues; (6) Improving university exchanges; (7) Developing methodological

[1] President Cardoso made an important contribution by creating the Secretary of Strategic Issues (SAE) but it lost importance during his tenure.

[2] For all policy documents, see: www.nae.gov.br.

[3] This does not include centres in the US and other countries.

knowledge about indicators and to evaluate innovation policies.[1] Brazil is undergoing a transition from traditional industrial development heavily sustained by state investments in plants, and by huge subsidies and a highly protected environment (the so called national developmental strategy), to another more flexible, world integrated model, reducing social and regional disparities. In that sense, the goals of the Lisbon Strategy have and continue to inspire Brazilian public policy. The Lisbon Strategy aims to promote economic and employment growth and turn the European economy into the most competitive globally in the long term, something that has led Brazil to rethink its development strategy. The Lisbon Strategy promoted the idea that learning and innovation strategies connected to knowledge generation and scientific and technological capabilities are at the root of the superior performance of some countries. Rather than copying foreign models, however, it is necessary to analyse long term processes and understand how they became fundamental for social and economic development. The European approach does generate some tensions in diplomatic relations. European efforts to increase knowledge generation and knowledge-value creation have inspired Brazilian policy, but there are fears of a new protectionism based on technical standards and technological transfer restrictions. This perception has increased during bilateral EU-Mercosur and WTO negotiations at Doha. Europe resists opening up its agricultural markets while tries, at the same time, to open up the service sector. Fortunately, however, diplomatic negotiations are likely to recommence at a more mature level.

## Concluding Remarks

Brazil has some assets in the race to establish a knowledge-based society and economy. It has a diversified and integrated industrial sector, a dynamic service sector, leadership in key areas like re-

[1] There is an initiative to build up the Observatory of Innovation and Competitiveness, based at the University of São Paulo, in partnership with the IPEA and the ABDI. The main projects are to establish a set of indicators to manage innovation in service activities, and of development (current indicators have been criticised extensively); monitor IPR news and developments; create a site for discussion, learning and diffusion of information; understand the gaps between policy initiatives and actual implementation.

newable energies (hydroelectricity and bio fuels), parallel super computing, oil extraction in deep sea, and others, and a booming scientific sector, which grew six times faster than the world average. More than 10.000 new doctors (PhDs) graduate every year, a number that is increasing. It has a stable economy in a stable region, with stable democratic institutions. The government produced explicit policy documents to promote a knowledge-based economy, notably the PITCE and the Br3T. But a low wage economy cannot sustain Brazilian development, particularly as there will always be another country with lower wages to compete on commodity products. A competitive strategy based on low wages and no technical progress is a bad choice in the long run, making national development strategy harder to implement. Moreover, since markets are more open and integrated, a non-innovating economy cannot keep up and actually begins to lag further and further behind due to a relative loss of competitiveness. Brazilian policy makers need to overcome the problem generated by a slow definition and regulation of programmes, instruments and initiatives that bring knowledge-based development to life, and to the difficulties of coordination among government agencies. However, Brazil is combating these problems and critical analyses as well as alignment with initiatives like the Lisbon Strategy will help Brazil to increase its technological effort to speed up growth, improve its position in knowledge-based markets, and reduce inequalities and to improve peoples' standard of living.

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