

CREST OMC Working Group

**Internationalisation of R&D – Facing the Challenge of Globalisation:
Approaches to a Proactive International Policy in S&T**

**Country Report Brazil:
An Analysis of EU-Brazilian Cooperation in S&T**

Prepared on behalf of the CREST OMC Working Group by
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Preface

This report gives an overview of the existing cooperation in science and technology with Brazil at EU, Member States and Associated Country level. It is one of three country reports (Russia, India and Brazil) prepared in the frame of the work of the CREST OMC Working Group on *'Internationalisation of R&D - Facing the Challenge of Globalisation: Approaches to a Proactive International Policy in S&T'* in the year 2008.

The following 20 Member States of the European Union and countries associated to the EU Framework Programme for Research, Technological Development and Demonstration Activities participated in the OMC Working Group in 2008: Austria, Czech Republic, Cyprus, France, Germany, Greece, Iceland, Ireland, Italy, Lithuania, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, Turkey and the United Kingdom. Eight meetings of the OMC Working Group were held between January and November 2008.

The chair of the OMC Working Group was Jörn Sonnenburg (International Bureau of the German Federal Ministry of Education and Research at the German AeroSpace Centre); the rapporteur was Marion Steinberger (International Bureau).

The OMC Working Group was supported by Ales Gnamus from the Institute for Prospective Technological Studies at the Joint Research Centre of the European Commission (JRC-IPTS) and three external experts: Manfred Spiesberger, Jan Peter Wogart and José Luis Briansó Penalva.

Continuous assistance was provided by Sigi Gruber and Heiko Prange-Gstöhl from the European Commission, Directorate D, unit D2.

This report was prepared by José Luis Briansó Penalva on behalf of the OMC Working Group. The report sums up the results of the independent individual desk research and the analytical and empirical work (analysis of responses to several short questionnaires that were sent to the members of the OMC Working Group or to national CREST delegates), mutual learning exercises and thematic discussions of the OMC Working Group. It represents experts' opinions and not official positions of individual Member States, countries associated to the EU RTD Framework Programme or the European Commission.

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1. Executive summary

1.1. Summary of conclusions

Over the last years, Brazil has become an increasingly significant global player and emerged as a key interlocutor for the EU. However, until recently EU-Brazil dialogue has not been sufficiently exploited and carried out mainly through EU-MERCOSUR dialogue. Brazil will be the last “BRICS” to meet the EU in a Summit. The time has come to look at Brazil as a strategic partner as well as a major Latin American economic actor and regional leader. The first EU-Brazil Summit took place in Lisbon in July 2007, and will mark a turning point in EU-Brazil relations. A quasi-continent in its own right, Brazil’s demographic weight and economic development make it a natural leader in South America and a key player in Latin America. Brazil is now actively pursuing this role in the MERCOSUR framework and is at the forefront of the drive to promote the Union of South American Nations (UNASUR).

Several measures and instruments aimed at raising the level of R&D investments have been developed and implemented over the past few years, with an emphasis in the last couple of years. The near majority of the research policy instruments make use of competitive calls mechanisms. The second most important research policy mechanism is represented by the MCT (*Ministerio de Ciencia y Tecnología*) research funding unit CNPq, Brazil’s science council, and the oldest science policy agency in the country. Finally, over the last couple of years, several measures have been developed and implemented in innovation policy arena, making up a full range policy mix and a solid legal framework for innovation financing. In November (2007), the Brazilian government launched a National Science and Technology Plan: Action Plan in Science, Technology and Innovation for National Development (PACTI) which incorporated the strategic guidelines. The plan will cover activities for the period 2007-2010 and will invest R\$ 41 billion (about 15.7 billion Euros, at the end of January 2008 exchange rate) across all S&T areas. Funds will come mainly from the Ministry of Science and Technology (MCT).

Brazil’s innovation policy is beginning to focus on the potential synergies among science and technology promotion, R&D support and trade competitiveness. To be successful in boosting business innovation, these policies will need to be complemented by measures aimed at tackling the shortage of skills in the labour force; this shortage is among the most important deterrents to innovation in Brazil, particularly against the backdrop of a widening gap in tertiary educational. In relation to innovation policy, the emphasis has been on giving it a sector focus aligned with industrial policy priorities and on launching several measures to enhance the innovative behaviour of firms. Particularly to increase the number of companies involved in innovative activities, and to increase innovation-inducing resource deployment geographic capillarity (an important concern given Brazil’s continental dimension) and reach and scope (more flexible university-industry and inter-firm cooperative research grants and, more importantly, a new direct non-reimbursable research and innovation activities grant to companies).

1.2. Major recommendations of the OMC Working Group on Internationalisation of R&D

The following major recommendations are given by the OMC Working Group. They are addressed to the EU Member States/Associated Countries and the European Commission in order to have them strengthen S&T cooperation with Brazil. The recommendations are divided into those directly targeting S&T cooperation with priority partner countries in general and those that are specifically relevant for the Brazilian case only. A more elaborate and detailed version of the following recommendations can be found in Chapter 7.

I. Recommendations targeting at S&T cooperation with Brazil and other priority partner countries

Fostering knowledge based strategic agenda setting

It is recommended to:

- deepen the knowledge based dialogue between the EU Member States and Associated Countries on the prospects of the S&T cooperation with Brazil as a strategic partner of the EU.
- complement the ongoing S&T dialogue between the European Commission and Brazil with an S&T dialogue between the EU MS (and possibly AC) and Brazil. In view of the Communication of the European Commission on international S&T cooperation¹ and following the respective Council Conclusions of 2 December 2008² such a dialogue should aim at identifying joint interest beyond the themes of the EU RTD Framework Programme and at fostering coordination of concrete implementation measures building on MS'/(AC') instruments.
- make regular use and ensure a proper dissemination of results of completed or ongoing EC-funded coordination and support projects targeting Brazil.

Offering an optimum framework for S&T cooperation - removing barriers

It is recommended to:

- examine how well known existing good practices in funding schemes can be implemented at the individual EU country as well as the Community EU level for joint S&T of MS'/'AC' with Brazil and introduce advanced schemes where gaps are found on MS'/'AC' and Community level, aiming wherever possible at reciprocity.
- move towards a more flexible, simplified and harmonized cooperation framework through Community S&T agreements in order to overcome present barriers.
- stimulate an open but coordinated dialogue between European and Brazilian public and private S&T and innovation stakeholders on themes relevant for the framework of S&T cooperation.

Putting emphasis on the “human dimension” through brain-circulation

It is recommended to:

- increase the brain-circulation between the EU, the AC and Brazil through promoting the opportunities, advancing funding schemes and removing still existing barriers. New concepts should be developed at national, bilateral and Community level for enhancing outward mobility of researchers from EU-MS/AC towards Brazil.
- attract the interest of Brazilian students and researchers who are supported through European fellowship programmes at national or Community level to work in Brazilian branches of European industries through dedicated promotion campaigns.
- analyse the impact of the European Visa Directive in order to prepare the ground for a better access of Brazilian scientists to the European Research Area.

¹ Communication from the Commission to the Council and the European Parliament “A Strategic European Framework for International Science and Technology Cooperation, COM(2008) 588, Brussels, 24.09.2008

² Conclusions of the European Competitiveness Council concerning a European Partnership for International Scientific and Technological Cooperation, Brussels, 02.12.2008

II. Specific recommendations targeted at S&T cooperation with Brazil

Widening the strategic partnership with Brazil

It is recommended to:

- widen S&T policy dialogues at MS'/AC' and Community level by introducing advanced trans-sectoral dialogue schemes covering S&T, educational, industrial and (regional) development policies.
- Enhance coherence of Community policies relevant to/for Brazil through dedicated workshops, possible topics to be covered: sustainable agriculture – research – urban migration.
- analyse at MS'/AC' and Community level options for dedicated programmes supporting triangular cooperation involving S&T stakeholders from EU, Brazil – in its capacity as a bridge - and the rest of Latin America and/or Africa.
- increase the presence of Science Counsellors in the embassies of MS/AC in Brazil in order to provide additional political momentum to the S&T cooperation with Brazil.

Enhancing strategic S&T cooperation and advancing the instruments and institutions

It is recommended to:

- set-up at Community level a joint group of high level European and Brazilian scientists with expertise in priority areas to analyse the outcome and the scientific, economic and societal impact of previous EU-Brazilian S&T cooperation in order to provide strategic experts' guidance for future directions on topics and most appropriate formats of S&T cooperation.
- systematically include social and global social issues in the periodic S&T dialogue schemes both at MS/AC and Community level.
- build future bilateral S&T cooperation between MS/AC and Brazil on relevant S&T programmes and strong S&T systems at the level of the Brazilian States aiming at establishing – wherever appropriate - joint funding schemes with respective programme.
- launch at Community level “coordinated calls” with Brazilian programme owners either on Brazilian Federal level as well as on the level of Brazilian States.
- analyse options at MS'/AC' level for joint EU-Brazilian efforts to transferring science to innovation and to strengthen joint industry oriented research.
- analyse present practice at MS'/AC' level of establishing joint research groups/laboratories in target sectors of common interest and of high added value in order to introduce advance funding schemes for joint research groups – once appropriate jointly with programme owners at the Brazilian federal level as well as at the level of some Brazilian States.
- establish at Community level specific programmes of inter-regional S&T cooperation, both of Brazilian States and European regions.

Offering an optimum framework for S&T cooperation and removing barriers

It is recommended to:

- enhance the visibility of the EU-Brazilian cooperation and allow mutual learning, through disseminating good cooperation practice and concrete results of completed/ongoing activities at all levels via a dedicated webportal to be established at community level.

- provide optimum access at Community level to each others (EU and Brazilian) S&T infrastructures and to initiate a joint agenda setting for establishing joined S&T infrastructures in defined sectors of mutual high-priority and of high added value.

Strengthening brainpower attraction and circulation

It is recommended to:

- increase the number of individual fellowships at MS'/AC' level for Brazilian investigators and students in particular in engineering sciences and emerging technologies.
- introduce by MS'/AC' advanced programmes, which support joint training courses at masters and PhD level between high level universities and research institutions in Europe and Brazil.

2. Introduction

Brazil as an Emergent Economy ³

Over the last years, Brazil has become an increasingly significant global player and emerged as a key interlocutor for the EU. However, until recently EU-Brazil dialogue has not been sufficiently exploited and carried out mainly through EU-MERCOSUR dialogue. Brazil will be the last “BRICS” to meet the EU in a Summit. The time has come to look at Brazil as a strategic partner as well as a major Latin American economic actor and regional leader. The first EU-Brazil Summit took place in Lisbon in July 2007 and marked a turning point in EU-Brazil relations. A quasi-continent in its own right, Brazil’s demographic weight and economic development make it a natural leader in South America and a key player in Latin America. Brazil is now actively pursuing this role in the MERCOSUR framework and is at the forefront of the drive to promote the Union of South American Nations (UNASUR).

Based on powerful historical and cultural links, the EU enjoys broad relations with Brazil. Over the last few years Brazil has emerged as a champion of the developing world in the UN and at the WTO (World Trade Organization). Brazil is central to the success of the EU-MERCOSUR negotiations, an EU priority strategic objective, which have not come to a conclusion due to lack of progress in the trade chapter thus preventing so far the establishment of a wider strategic association between the EU and MERCOSUR.

The new economy of Brazil and its S&T system: an opportunity for the EU ⁴

Brazil is Latin America’s largest market, the world’s fifth-most populous country and the world’s tenth-largest economy. GDP growth will be sufficient to allow real incomes to rise in the forecast period, albeit at a more moderate pace than in 2005-07. Disinflation and income support programmes for the poorest families have contributed to a significant reduction in poverty rates and income inequality in recent years, but Brazil will remain one of the world’s most unequal societies during the forecast period.

Most large industry is concentrated in the south and south east. The north east is traditionally the poorest part of Brazil, but it is beginning to attract new investment. Brazil has the second most advanced industrial sector in the Americas. Accounting for one-third of GDP, Brazil’s diverse industries range from automobiles, steel and petrochemicals to computers, aircraft, and consumer durables. Brazilian and multinational businesses have invested heavily in new equipment and technology, a large proportion of which has been purchased from USA firms.

Modest improvements to Brazil’s business environment, mainly driven by the consolidation of macroeconomic stability and better domestic financing conditions, will keep the country’s position broadly stable in our global and regional rankings. But the tax system will remain complex and burdensome, the pension system will weigh on public-sector finances and vested interests will continue to distort productivity gains.

Key indicators	2008	2009	2010	2011	2012	2013
Real GDP growth (%)	5.3	2.7	3.9	4.1	4.0	4.1
Consumer price inflation (average %)	5.8	6.3	4.2	3.7	3.7	3.7
Total public-sector budget balance	-1.6	-2.3	-2.2	-2.0	-1.7	-1.6
Current-account balance (% of GDP)	-1.8	-2.0	-1.8	-1.7	-1.3	-1.2
Exchange rate Real/US\$ (average)	1.86	2.34	2.31	2.28	2.31	2.36

³ Source: OECD ECONOMIC OUTLOOK 83.

⁴ European Communities, 2008. <http://cordis.europa.eu/erawatch>.

In the next table we present indicators which show that the Brazilian economy is going to suffer a slow down in 2009 due to the world crisis, especially from the USA and the EU, but from 2010 it should start growing again at a sustainable pace, about 4% yearly with an inflation rate controlled. The deficit neither will be very high nor will be assumed by the Brazilian economy. The rate of the Real and the Dollar will not suffer big differences according to these previsions.

Private consumption continued to be the main driver, aided by improving labour-market conditions and still robust credit creation. Investment rebounded strongly, helping to alleviate emerging capacity constraints. Exports are performing well, despite a strong real. The trade surplus is shrinking fast due essentially to rising imports, especially of capital goods and intermediate inputs. Energy and food price hikes have pushed inflation up well above the 4.5% central target. The service sector is the largest component of GDP at 66.8%, the industrial sector represents 29.7% (2007 estimation) and the agricultural sector represents 3.5% of GDP (2008 estimation).

The Brazilian labour force is estimated at 100.77 million of which:

- 10% is occupied in agriculture (Mexico in comparison: 3,8%),
- 19% in the industry sector (Mexico: 26%),
- 71% in the service sector (Mexico: 70,2%).

The structure of the 3 economic components of the general economy of the country indicates to be quite near to the EU 27. The service sector is the highest component which corresponds to developed countries: USA, EU or Japan.

France	Germany	Greece	Hungary	Poland	Slovakia	Spain	% Gross Domestic Product (GDP) by sector
2.2	1.0	4.0	4.3	4.8	4.3	3.3	AGRICULTURE
20.9	29.4	19.4	30.6	30.6	35.7	29.3	INDUSTRY
76.9	69.7	76.5	65.6	64.6	60.0	66.5	SERVICES

Ratio to GDP	Total countries-Brazil's rank	Ratio to GDP	Total countries-Brazil's rank
<i>EXPORTS (2004):</i>		<i>IMPORTS (2004):</i>	
144 countries: 126 Brazil (18% of GDP)		144 countries: 143 Brazil (13% of GDP)	

The Brazilian exports are mainly based in industrial products of not very high technological level, with some exceptions. In the early years of the 21st century, Brazil's most important manufacturing export sector, by value, is the Aerospace industry: Transport equipment & parts, Metallurgical products, Chemical products... and Agriculture products: Soybeans, meal & oils... And the same with the imports.

In 2008, 34 Brazilian companies were listed in the Forbes Global 2000 list⁵ (an annual ranking of the top 2000 public companies in the world by Forbes Magazine). The 10 leading companies are:

World Rank	Company	Industry
21	Petrobras	Oil & Gas Operations
49	Vale	Mining
81	Banco Bradesco	Banking
101	Banco do Brasil	Banking
103	Banco Itaú	Banking
203	Unibanco	Banking

⁵ Forbes Global 2000 list (annual ranking of the top 2000 public companies in the world).

322	Eletróbrás	Utilities
514	Usiminas	Materials
519	Oi	Telecommunications & Services
606	Gerdau	Materials

3. Science, Technology and Innovation in Brazil

3.1. The Economy of Brazil and its STD system

From all the indicators of the exports/imports and the economical structure of Brazil we can conclude that at the present time it is a stable country as far as the economy, with sustainable growth, low inflation and a strong industrial sector as well as services. All this does that cooperation in STD with the EU is important as there are wide margins of manoeuvres in concrete sectors which correspond to new industrial areas:

- Motor Vehicles (motor vehicle manufacturing, with its related auto parts production)
- Aircraft and Aerospace Industries (construction of satellites and the launching of space vehicles)
- Manufacturing (high-technology goods such as computers, mobile phones, etc.)
- Service Industries (transport, communications, banking, finance, retail, etc.)
- Communications (communications satellites, television, radio and telephone systems).

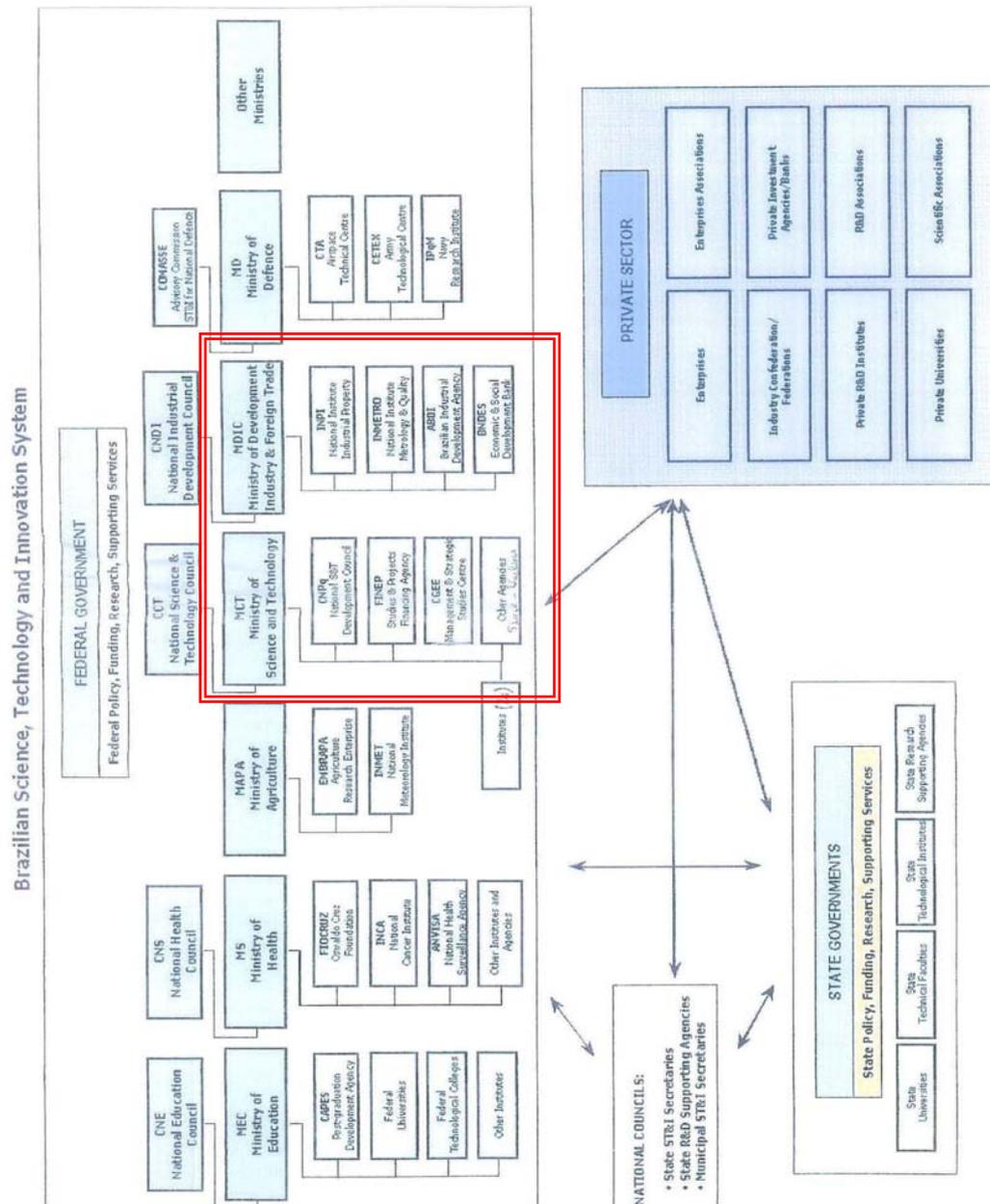
For these reasons some S&T and Innovation sectors are of special importance in the cooperation between the EU and Brazil, like:

- Advanced material
- Nanotechnologies
- Biotechnology
- ICT
- Food technologies
- Energy etc.

As Brazil needs to strengthen them to export products of major technological components and more added value, which is totally in agreement with the new policies regarding Science and technology and those of industrial development impulse by the government of President Lula.

3.2. The Brazilian system of Science and Technology and RTD organization

Structure of the Brazilian STI system⁶



Brazilian funding for research, development and innovation (Public and Private Sectors)

Brazil's RTD intensity of GDP in 2006 is quite low by OECD standards, although it exceeds that of Portugal, Turkey, Poland and Mexico (see next Table). Among some non-OECD countries, its R&D intensity is below that of China and Russia, but higher than that of Argentina. The weight of public and business R&D are similar, with business expenditure on R&D at 0.49% of GDP. Brazil is one of the leading non-OECD recipients of foreign direct investment, and around 60% of patent applications at the Brazilian patent office come from non-resident inventors.

⁶ MCT – Brasilia.

Gross domestic expenditure on R&D ⁷

As a percentage of GDP, 2006 or latest available year

Greece	0,50	Italy	1,10
Mexico	0,50	Spain	1,12
Poland	0,56	New Zealand	1,17
India	0,69	Ireland	1,32
Turkey	0,79	China	1,43
Portugal	0,81	Norway	1,49
Brazil	0,91	Czech Republic	1,54
South Africa	0,92	Luxemburg	1,61
Hungary	1,00	Netherlands	1,73
Russian Fed.	1,08	EU27 Total.	1,74

Brazil has six sources of funding:

Government (at federal, state and municipal level) sources. There are a number of state organizations which were created mostly in the 1950s specifically for directly promoting and funding Science, Technology and Innovation, such as the National Research Council (CNPq) and the National Agency for Financing Studies and Researches (FINEP).

There are multiple and overlapping institutions, but the National Council for Scientific and Technological Development (CNPq) is the central organisation that sets the tone for Brazilian policy. The Financing Agency for Studies and Projects (FINEP) is the lead agency offering support to innovation efforts within private industry, universities, and non-profits through loan and grant programmes. The FINEP current funding level is significantly lower than its counterparts' in other fast-growing developing countries, particularly the Asian tigers. Both are part of the Ministry of Science and Technology (MCT).

At state level, almost all states have founded their own public foundations for support of RTD and Innovation, following the pioneering (and highly successful) example of São Paulo state, which created the:

The **State of São Paulo Research Foundation (FAPESP)** is one of the main funding agencies for scientific and technological research in the country. It is linked to the Secretariat for Science, Technology, Economic Development and Tourism. In 1989, the new State Constitution raised the percentage set aside annually by the State for the Foundation from half of one per cent to one per cent of its total ordinary income, and established that this should be handed over monthly. In its 41 years of operation, FAPESP has awarded more than 45 thousand scholarships and 35 thousand financial awards to research. The balance of these years of continuous investment clearly show that the Foundation has made a decisive contribution to the expansion and strengthening of scientific and technological research in the State of São Paulo, with considerable impact on its economic, social and cultural development. Its revenues in 2006 reached US\$ 270 million, of which 78% from legally-mandated state treasury transfer and the rest from other sources, mainly its endowment.

The state of **Minas Gerais**, the country's third largest economy has also been developing over the past two decades a research framework, which recently also took a clear orientation towards technological innovation. In 1982, it was established the State Council for S&T Conecit (*Conselho Estadual de Ciência e Tecnologia*) to define basic guidelines for projects critical to the scientific and technological development and the re-structuring of the capacity of the state research institutes. It generates subsidies to S&T policy formulation and acts as a consultative body of the State S&T operational system. It is composed of representatives of ROs, private sector and labour.

⁷ <http://stats.oecd.org/wbos/Index.aspx?DatasetCode=KEI>.

The other five funding sources are:

- Indirect funding through the budgets of public and private universities, institutes and centres. Some universities, such as UNICAMP, have their own internal agencies, foundations and funds set apart and managed with the purpose of supporting RTD&I by their faculties and students.
- Public companies, such as Embrapa (Brazilian Enterprise for Agricultural Research). Their source of revenue is the government itself (via budgetary allocations by ministries and state secretaries) and investment of a part of products and services sold.
- Industrial, commercial and services private companies, usually for their own R&D&I centres, or via some fiscal benefit (tax exemption laws), such as the Informatics Law.
- National private and non-for-profit associations and foundations, via statutory mechanisms or donations by private individuals or companies. An example is the Banco do Brasil Foundation.
- Funding by other nations, international organizations and multilateral institutions, such as Rockefeller Foundation, Ford Foundation, Inter-American Development Bank, World Bank, UNESCO.

The expenditures on RTD between public and private sectors are very close: 50% for the business sector and 50% for the public sector, according with the indicators of the *Instituto Brasileiro de Geografia e Estatística - IBGE* (2006). But it's not clear if all the expenditures of the private sector are really oriented to the research (basic or applied), because there are contradictions with others sources of statistics.

Distribution of RTD expenditures between public and private sectors (2004 – 2006)⁸

Ano	PIB (em milhões de R\$ correntes)	Investimentos em C&T (em milhões de R\$ correntes)							% em relação ao total		% em relação ao PIB			
		Públicos <i>Public Sector</i>			Empresariais <i>Private Sector</i>				Total	Públicos	Empresariais	Públicos	Empresariais	Total
		Federais (2)	Estaduais (3)	Total	Estatais (4)	Privados (5)	Total							
2004	1.941.498,0	8.688,2	3.895,5	12.583,7	3.510,2	6.600,1	10.110,4	22.694,1	55,45	44,55	0,65	0,52	1,17	
2005	2.147.944,0	9.570,1	3.981,5	13.551,6	3.463,0	10.216,6	13.679,6	27.231,2	49,76	50,24	0,63	0,64	1,27	
2006	2.322.818,0	11.476,6	4.248,6	15.725,1	3.487,1	12.285,4	15.772,4	31.497,6	49,92	50,08	0,68	0,68	1,36	

RTD organization⁹

At the government level, the coordination of the research policy (research projects, scholarship programs, research institutions) is under the responsibility of MCT. In terms of definition and execution of the research budget, there is an involvement of other ministries: Energy ME, Education MEC, Telecommunications MINICOM, Planning MPOG, Trade, Economic and Industrial Development MDIC.

MCT and MDIC jointly define the industrial and technological policy priorities, based on the guidelines of the PITCE and, in partnership with the Ministry of Finance establish the percentage of the FNDCT to be directed to economic subsidies and the percentage directed exclusively to MSMEs. MCT also has two mission agencies: CNEN in nuclear energy and AEB in space (two strategic sectors).

⁸ PIB: Instituto Brasileiro de Geografia e Estatística – IBGE.

⁹ MCT – Brasília.

Stakeholders involved in public S&T policy making in Brazil

National Science and Technology Council: <i>High-level coordination bodies</i> <i>Government ministries Implementing agencies</i>		
Technology Council Ministry of Science and Technology • Research Units • CNPq • FINEP	Ministry of Education • Universities • Technical schools • CAPES	Ministry of Agriculture • EMBRAPA
Ministry of Industry	Ministry of Health • FioCruz	Ministry of Environment
Ministry of Defence • ITA	Ministry of Communications	

3.3. General policies of S&T and the New Research Policy and Innovation developments^{10 11 12}

Several measures and instruments aimed at raising the level of R&D investments have been developed and implemented over the past few years, with an emphasis in the last couple of years. The near majority of the research policy instruments make use of competitive calls mechanisms. Over the last couple of years (2007 – 2008), several measures have been developed and implemented in innovation policy arena, making up a full range policy mix and a solid legal framework for innovation financing.

At the end of March 2007, Sérgio Rezende, the Ministry of Science and Technology, presented to the Science, Technology, Communications and Informatics Committee of the House of Representatives of the National Congress, the main guidelines (*diretrizes*) of the Science and Technology Development Plan (*Plano de Desenvolvimento Científico e Tecnológico - PNCTI*), including the following objectives:

- Consolidate the National System of STI (*Sistema Nacional de Ciência, Tecnologia e Inovação*)
- Create a favourable environment for innovation in firms
- Strengthen innovation in the country's strategic areas and
- Promote the popularization and diffusion of Technologies to improve life conditions of the population.

The document also collects the main action for the period 2007-2010, including the establishment of regulatory procedures of the National Fund for Scientific and Technological Development (*Fundo Nacional de Desenvolvimento Científico e Tecnológico - FNDCT*), the main funding source of innovation in the country. On the occasion, the ministry announced the Executive would soon send to Congress a Project of Law to regulate the FNDCT operation. The Plan emphasis is on enlarging the scope of activity of the Ministry towards firms, the greatest challenge to the system according to the Minister Rezende. The Plan is composed of (12) actions, many already underway, each with a set of programs:

1. Legal framework improvement.

¹⁰ Ministry of Development, Industry and Foreign Trade.

¹¹ Ministry of Science and Technology (MCT).

¹² Erawatch Research Inventory: Brazil.

2. Enlarging the human resources capacity programs in science, technology and innovation areas with emphasis in engineering areas focusing on the strategic sectors for the country based on the PITCE.
3. Continued support to infra-structure and foster science and technology research.
4. Promote innovation at firms.
5. Information technology and communication with microelectronics, digital TV, and software.
6. Build a state, federal and private technological institutional network in supporting the industrial development.
7. Biofuels and energy for the future.
8. Brazil Space Program (*Programa Espacial Brasileiro*).
9. Brazilian Nuclear Program (*Programa Nuclear Brasileiro*).
10. Science and Technology in the Amazon Region Program (*Ciência e Tecnologia na Amazônia*).
11. Climate Changes and
12. Promote the popularization and diffusion of technologies to improve life conditions of the population.

Next, at the beginning of the year (2007) the newly-elected second Lula government launched the Growth Acceleration Programme (*Programa de Aceleração do Crescimento - PAC*) a multi-billion dollar/EUR program, to be mainly financed by public-private partnerships, aimed at taking the country to a higher plateau of economic growth. The programme has several measures to promote technological development in priority industrial sectors. In March 2007 the Ministry of Education MEC launched a Plan for Development and Education. The plan is the country's first policy effort to integrate basic, middle, higher, professional and continuing education which proposes a joint action by the federal, state and municipal government spheres. However, the plan's main objectives and programs have to do with a reform and improvement of basic and middle education.

Finally, in November 2007 the Brazilian government launched a National Science and Technology Plan: Action Plan in Science, Technology and Innovation for National Development (PACTI) which incorporated the strategic guidelines and orientations presented above. The plan will cover activities for the period 2007-2010 and will invest R\$ 41 billion (about 15.7 billion Euros, at the end of January 2008 exchange rate) across all S&T areas. Funds will come mainly from the Ministry of Science and Technology (MCT) own budget, but budgetary and other financial resources from other ministries with significant research expenditures and institutes will also be important sources of funding for the Plan

Two major challenges cited by the Ministry of Science and Technology at the time of the plan's announcement were:

1. to make Brazilian enterprises to do more research, development and innovation.
2. to promote research in strategic areas such as biofuels, advanced materials, biotech, environmental technologies and others.

The plan's main priorities are enhancement of business innovation and consolidation of the national STI system. In order to meet these, the plan has established 4 strategic priorities composed of 21 action lines and 88 programmes and policy initiatives. Furthermore, the plan will integrate its actions with the industrial policy phase II (PITCE phase II) and the corresponding development plans of the Health, Education and Agriculture areas.

On the occasion of the PACTI launch, the government signed several decrees with impact on research policy:

- First, it created a new regulatory framework for the FNDCT (*Fundo Nacional de Desenvolvimento em Ciência y Tecnologia*).
- Second, another decree set the framework for the establishment of a Brazilian Technology System (SIBRATEC - *Sistema Brasileiro de Tecnologia*) with the objective of supporting the technological development of national firms through activities of R&D of products and processes for innovation and provision of services in metrology, extension and technology assistance and transfer.
- Third, a decree allowed firms investing in the execution of R&D in science and technology institutions to deduct such expenditures from the calculation of net profit for the purpose of assessing the value of the federal corporate income levy.

The decrees are implemented through:

1. PNCTI (National Plan for Science, Technology and Innovation)

The aim of the PNCTI is to transform ST&I in a national development instrument, in a sovereign and sustainable manner.

Research policies are identified in the PNCTI, which comprises strategic axes and orientations and both measures already implemented as well as to be implemented in the near future. Two specific objectives are made explicit:

- Establishment and consolidation of a new institutional framework for the promotion of science, technology and innovation, with the adoption of new legal and regulatory frameworks and the strengthening of mechanisms, instruments and programs that add greater consistency to actions towards this goal and
- Increase the volume of resources for the National System of Science, Technology and Innovation (SNCT&I), as a critical condition for its development.

The PNCTI general objectives are:

- Improve the institutions, the management and governance policy of Science, Technology and Innovation.
- Enlarge and strengthen the country's scientific and technological research capacity, expanding substantially financial support to science and technology in general and to training and fixing human resources, giving priority to engineering and those areas related to the Industrial, Technology and Foreign Trade Policy (PITCE).ⁱ
- Widen support for business innovation and technological development, accelerating the development of advanced technologies and those future-builder industries and deepening programmes for extension and technological training, with emphasis on the management of micro, small and medium-size businesses.
- Strengthen R&D activities and innovation in strategic areas for the country's growth and development, stressing Information and Communication Technologies, Health Basic Inputs, Biofuels, Agribusiness and the Nuclear Program.
- Contribute to regional development and social equality, particularly the Central-West, North and Northeast Regions.
- Popularize science and promote the generation, dissemination and use of knowledge for the improvement of living conditions of the population.

In relation to innovation policy, the PNCTI emphasis has been on giving it a sector focus aligned with industrial policy priorities and on launching several measures to enhance the innovative behaviour of firms. Particularly to increase the number of companies involved in innovative activities, and to increase innovation-inducing resource deployment geographic capillarity (an important concern given Brazil's continental dimension) and reach and scope (more flexible

university-industry and inter-firm cooperative research grants and, more importantly, a new direct non-reimbursable research and innovation activities grant to companies).

2. PACTI (Action Plan in Science, Technology and Innovation for National Development)¹³

In November 2007, the Government launched the Action Plan 2007-2010. This Plan expresses the new configuration of the National Policy of Science, Technology and Innovation, reflecting the expectation that the MCT act in a more intense and crucial way to the economic and social development of the country.

There are 4 strategic priorities in the 2007-2010 Action Plan (PACTI) announced in November 2007, which are linked to the 4 strategic axes of the National STI Policy (PNCTI):

- a) Expansion and consolidation of national STI system (SNCTI).
- b) Promotion of technological innovation in firms.
- c) Development of STI in strategic areas and
- d) Development of STI for social development.

In strategic priority 1 there are three action lines with a generic focus:

- a) Institutional consolidation of SNCTI;
- b) Human resources for STI and
- c) Infrastructure and funding for scientific and technological research.

In strategic priority 3 (Development of STI in strategic areas) there are 12 areas with a thematic focus:

1. Future building areas: Biotechnology and Nanotechnology
2. Information and Communication Technologies
3. Health Basic Inputs
4. Biofuels
5. Electric Energy, Hydrogen and Renewable Energies
6. Oil, Gas and Coal
7. Agrobusiness
8. Biodiversity and Natural Resources
9. Amazon and Semi-arid areas
10. Meteorology and Climate Changes
11. Space Programme
12. Nuclear Programme
13. National Defence and Public Security

The five most important ones (and their respective research programmes), in terms of share of research budget are:

- Competitiveness in Biotechnology and Nanotechnology (1)
- Biofuels (4)
- Oil, Natural gas and Coal (production and clean use) (6)
- Space Programme (11)
- Nuclear Programme (12).

¹³ European Communities, 2008. <http://cordis.europa.eu/erawatch/index.cfm>.

Main challenges for research policies^{14 15}

Joint initiatives will be strengthened between the MCT and other ministries, states of the federation, municipalities and the business sector, still counting with the participation of other relevant government agencies, such as the MILLIONDES or EMBRAPA.

In part, the national research system has not fully kept up with the dramatic changes in the policy particularly in regard to the new required set of institutional arrangements among key players and organisations, to monitoring and evaluation needs, innovation specialized human resources and sharing of accountability.

The key research policy institution is the MCT (Ministerio de Ciencia y Tecnología), with its innovation agency FINEP, its basic research arm, the National Council for Scientific and Technologic Development (CNPq) and its network of PROs. Graduate education financing policy is also set by CAPES, an agency of the Ministry of Education – MEC. Finally, there is the MDIC, responsible for the leading the definition of Brazil's industrial policy through the recently created policy organization, Brazilian Agency for Industrial Development (ABDI).

RTD and Innovation

Brazil's main challenge in innovation policy is to encourage the business sector to engage in productivity-enhancing innovative activities. At 1% of GDP, R&D spending (both public and private) is comparatively low by OECD standards and is carried out predominantly by the government. Most scientists work in public universities and research institutions, rather than in the business sector. Output indicators, such as the number of patents held abroad, suggest that there is much scope for improvement. Academic patenting effort is being stepped up and should be facilitated by the easing of restrictions on the transfer and sharing of proceeds of intellectual property rights between businesses and public universities and research institutions. Innovation policy is beginning to focus on the potential synergies among science and technology promotion, R&D support and trade competitiveness. To be successful in boosting business innovation, these policies will need to be complemented by measures aimed at tackling the shortage of skills in the labour force; this shortage is among the most important deterrents to innovation in Brazil, particularly against the backdrop of a widening gap in tertiary educational.

In another area, a noticeable trend is the increase in the number and scope of innovation policy instruments for firms with a venture capital (VC) funds covering more stages of a technology-based firm growth trajectory (pre-incubation, incubation, seed, regular VC); reduced interest loan programs which can reach close to zero for innovative SMEs and more flexible university-industry cooperative mechanisms. An indirect consequence of the previous trends has been a greater flow of risk capital (MILLIONDES) for start-ups and emerging firms (seed and small), enlarging the previous scope of the existing risk financing programs hitherto focused on established SMEs (expansion).

The enlargement in the number of and the scope of research policy mechanisms and instruments was in part made possible by recent fundamental changes in the legal framework, with the introduction of new areas of allowable intervention and the qualification of new recipients of resources disbursed by old and new research policy instruments.

Public- private collaboration

In Brazil, there is an inefficiency of the national innovation system to translate already R&D investments into commercial applications, namely: poor collaboration between private firms and researchers at universities and quality of research institutions. In this context, there is increased policy awareness that firm's efforts to innovate have a positive impact on competitiveness and propensity to export. Thus a policy aim is to create a large fund to support to business RDI toward long term innovation. The goal is to establish a R\$ 8 billion Reais (€ 3050 million Euros) fund

¹⁴ Ministry of Development, Industry and Foreign Trade.

¹⁵ Ministry of Science and Technology (MST).

(financed at the tune of R\$ 1 billion Reais per year, € 381 million Euros, by the huge Workers Support Fund – FAT).

Two related goals are:

- Increase the share of business R&D.
- Double the number of undergraduates and graduates in business R&D in 8 years.

At the end of 2006, completing a research policy shift in the division of labour towards research for the private sector, the government implemented a new research funding mechanism exclusive for enterprises, managed by FINEP. For the first time companies can receive non-reimbursable funds for R&D activities.

3.4. The new industrial policy and industrial innovation ^{16 17}

In Brazil, applied research, technology and engineering is largely carried out in the university and research centres system, contrary-wise to more developed countries such as the United States, South Korea, Germany, Japan, etc. The reasons for these are many, but the main ones are:

Few Brazilian private companies are competitive or rich enough to have their own RTD&I. They usually develop products by outsourcing from other companies, usually foreign ones.

The high-technology private sector in Brazil is dominated by large multinational companies, which usually have their RTD&I centres overseas, and, with a few exceptions, do not invest in their Brazilian branches.

However, there is a significant trend reversing this now. Companies such as Motorola, Samsung, Nokia, Telefonica and IBM have established large RTD&I centres in Brazil, starting with IBM, which had established an IBM Research Centre in Brazil since the 1970s. One of the incentive factors for this, besides the relatively lower cost and high sophistication and skills of Brazilian technical manpower, has been the so-called Informatic Law, which exempts from certain taxes up to 5% of the gross revenue of high technology manufacturing companies in the fields of telecommunications, computers, digital electronics, etc.

Brazil's new industrial policy

The new policy for the industrial sector (*Políticas de Desenvolvimento Productivo*) was presented by President Lula da Silva in Rio do Janeiro (May 2008), including new sectors of General Interest for Brazil in relation with the new industrial policy. This plan covers the period 2008 – 2011, with 21.435 million of Reales equivalent to 8.500 million of Euros. The focused thematic sectors and the main objectives are:

Six strategic areas:	And five main objectives:
<ul style="list-style-type: none"> • Health • Energy • ICT • Nanotechnology • Biotechnology • Defence 	<ul style="list-style-type: none"> • Increase the competitiveness of the Brazilian enterprises • Increase the exports of Brazil (from 1.18% in 2008 to 1.25% in 2011- in the world context of the economy) • Transform the six strategic sectors in more competitive sectors • Enlarge the access of the Brazilian citizens to new goods and services • Increase, in the international markets, the level of acceptance of the Brazilian's goods, products and services

¹⁶ European Communities, 2008. <http://cordis.europa.eu/erawatch/index.cfm>.

¹⁷ Ministry of Development, Industry and Foreign Trade.

The Brazil's new innovation policy¹⁸

Brazil is Latin America's largest and most innovative economy. However, globally, Brazil ranks low in terms of both overall competitiveness and innovativeness. R&D funding has been repeatedly and severely impacted by the economic crises of the 80s and 90s. 80 percent of Brazilian researchers carry out their activities within public institutions (universities or research centres), concentrating on the production of scientific papers. As a result, the country has managed to consolidate strong scientific capabilities and produce a considerable volume of scientific publications representing 1.5 percent of the worldwide total in scientific fields. However, the comparatively low number of patents awarded is a reflection of the low commercialisation of innovation.

But Brazil has posted strong growth recently and hope that a robust innovation system can help them grow even faster, many new laws are oriented to this way. The biggest areas of concern for Brazil are the low investments in R&D and the poor record of commercialisation of innovations. The key innovation challenge faced by the Brazilian innovation system is to encourage greater private investment in R&D and foster networks between their public research institutions and private industry. While Brazil has laid down detailed plans aimed at fostering innovation, the question is whether Brazil will be able to implement these plans and resource them adequately.

The Brazilian policy trends emerging across the group aim at the following:

1. Strengthening collaborations among universities, federal laboratories and industry.
2. Building entrepreneurial and innovative companies.
3. Creating and attracting quality manpower in S&T.
4. Building capacity in R&D and Innovation, both in public and private sectors.
5. Creating regional innovation clusters.
6. Redefining intellectual property.
7. Generating innovations in the service sector.
8. Creating popular understanding of and support for innovation, especially in the case of new technologies such as biotechnology and nanotechnology.

Major new innovation policy-relevant developments have taken place in recent years, including the ratification of the Innovation Law which creates the legal framework needed to improve Brazil's capacity to generate and commercialise technology. Under Lula da Silva's presidency, the country has embarked on an innovation strategy that aims to combine scientific and economic development with socially-responsible initiatives. The country's strategy is seemingly favoured by numerous developing countries and Brazil has thus achieved a prominent role in international relations.

Interaction between Innovation and Research Policies (firms and public sector)

The Innovation Law (Law 10973 of 12/02/2004; regulatory framework approved 10/11/2005): Besides creating the subsidies for innovation research, the Innovation Law also established a series of measures to stimulate R&D&I in firms and ROs (Research Organisms), particularly federal research institutes and universities, facilitating cooperation among them. Among the main provisions are:

- Provision of direct RTD&I subsidies to firms;
- New regulatory framework for investment funds for technology and innovation;
- Government R&D procurement;
- Special support to strategic innovative firm (industrial policy priorities);
- Special conditions for provision of RTD&I subsidies to SMEs;
- New venture incubation;
- Creation of TTOs in public ROs;
- Public researcher mobility in public ROs;

¹⁸ European Trend Chart on Innovation Annual Innovation Policy Trends Report for United States, Canada, Mexico and Brazil 2006.

- Economic incentives for public researchers in universities and ROs;
- Administrative flexibility for technology transfer for public ROs, allowing them to sign technology transfer agreements;
- Support to strategic alliances between public universities/ROs and firms; and
- Enhance flexibility for sharing public universities/ROs R&D infra-structure with firms;
- Impel the creation of Incubators and Technological Parks.

The National Programme to Support Incubators and Technological Parks (PNI), is developed by the MCT, in collaboration with MDIC (Ministry of Development, Industry and Trade) and aims to build capacity for creating new enterprises and support the formation of regional and state networks of incubators.

3.5. Higher Education in Brazil ¹⁹

Higher Education and student exchanges

Brazil's higher education is provided in Federal, State, Municipal, Private Universities and other institutions, federations and independent establishments. The two main bodies responsible for postgraduate education, science and technology are the *Fundação da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES)* and the *Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)*.

CAPES is the foundation of the Ministry of Education which is responsible for the consolidation of postgraduate studies in Brazil.

Graduate studies in Brazil have always been linked to research. Research is clearly at the centre of the process of the internationalization of higher education. The number of students in Master degree or PhD remains stable for the past 10 years.

Brazil: Master's and Ph.D. degree scholarships in the country financed by federal agencies (1997-2004) ²⁰

Anos	Total		Capes		CNPq	
	Masters Degree	Doctoral Degree	Masters Degree	Doctoral Degree	Masters Degree	Doctoral Degree
1997	21.113	13.291	13.349	8.258	7.764	5.033
1998	19.153	13.449	12.897	8.244	6.256	5.205
1999	17.703	13.137	12.010	7.810	5.693	5.327
2000	16.466	13.484	10.906	7.839	5.560	5.645
2001	16.973	13.950	11.177	8.110	5.796	5.840
2002	16.900	14.211	11.296	8.472	5.604	5.739
2003	17.687	14.417	11.740	8.482	5.947	5.935
2004	18.807	14.322	12.163	7.991	6.644	6.331

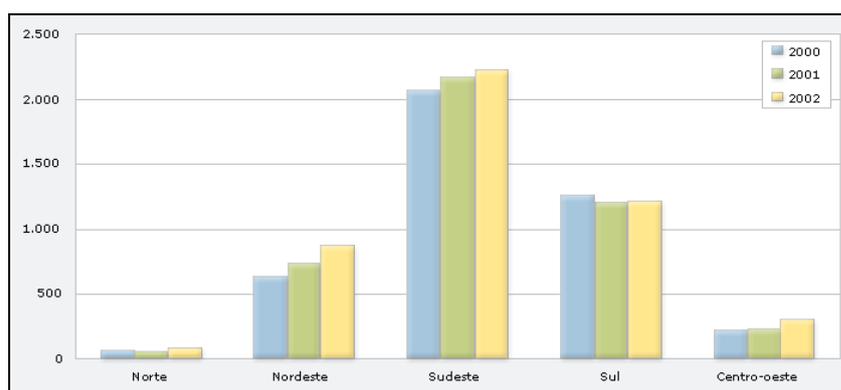
¹⁹ Higher Education in Latin America The International Dimension: H. DE WIT, I. C. JARAMILLO, J. GACEL-ÁVILA, J. KNIGHT, Ed.

²⁰ Foundation for the Coordination of Improvement of Higher Education Personnel (Capes) of the Ministry of Education (MEC) and the National Council for Scientific and Technological Development (CNPq) of the Ministry of Science and Technology (MCT).

Number of students in Masters (*Mestrado*) and PhD (*Doutorado*)²¹

	dependência administrativa	2002		2003		2004	
		mestrado	doutorado	mestrado	doutorado	mestrado	doutorado
Total	Federal	33193	16778	36.160	18.754	35895	18984
	Estadual	19170	17160	19.872	17.694	19047	16251
	Municipal	125	0	383		591	0
	Privada	12556	3462	15.609	3.765	16641	3885

PhD new students (Brazilian regions)
(SE and South regions are the most developed regions of Brazil)



Bilateral Received Technical Cooperation ²²

The principal actors in the internationalization of higher education in Brazil are the Ministry of Education, the Ministry of Science and Technology, and the Ministry of Foreign Relations. Many minor actors also play important roles. Brazil's relations with other countries traditionally focused on Europe and the United States. However, in response to the new direction of foreign policy since 2003, priority has been placed on developing cooperation with developing countries, including China, India, South Africa, and countries in Latin America.

The principal cooperation partners are: Japan (52%), Germany (18%), United Kingdom (13%), France (9%), Canada (5%), Spain (2%), Netherlands (2%), and Italy (1%). Active projects are mainly in the areas of the environment, agriculture, industry, health, social development, public administration, energy, transport, education, and town planning.

Brazilian Scholarships for Study Abroad, by Mode of Study, 2003 ²³

Mode	Number of scholarships	Percent of total
Sandwich undergraduate	115	7.7
Specialization	18	1.2
Master's	3	0.2
Sandwich doctorate	426	28.4
Doctorate	719	47.9
Post-doctorate	219	14.6
Total	1,500	100.0

²¹ <http://ftp.mct.gov.br/estat/ascavpp/Default.htm>.

²² <http://www.mre.gov.br>.

²³ <http://www.capes.gov.br>.

The countries where there are more Brazilian students in Universities are the following (2007):

- | | |
|-------------|--------|
| 1. USA | (8388) |
| 2. Portugal | (1842) |
| 3. Germany | (1801) |
| 4. France | (1759) |
| 5. Spain | (1699) |
| 6. Norway | (47) |

3.6. Conclusions and analysis

Brazil is an emerging economy that will, over the course of the next ten to fifteen years, enjoy significant economic and social improvements. This will, in turn, allow it to make great advances in the fields of science, technology and innovation. If it continues to enjoy stable government, an economy growing at rates of around 4.5 to 5.5% per annum in combination with relatively low inflation and consolidation of planned investment in RTD, we will be able to speak of Brazil as a new power – not only at a regional, but also at a worldwide level.

The main conclusions reached in this chapter on Brazil's science and technology system and its new industrial and education policies can be summarised as follows:

Socio-economic conclusions

1. Brazil has a relatively modest starting point in terms of RTD investment as a proportion of GDP. Additionally, the country is split into two very different parts: the south, with its high degree of development (close to that of Europe) and the north/north-east, with significant underdevelopment (closer to the rest of Latin America). One can therefore speak of two Brazils: one advanced, and the other underdeveloped.
2. Socio-economically speaking, these regional disparities come to the surface regularly, causing tensions between the north and south of the country.
3. The government of President Lula has backed science and technology as one of the key driving forces behind Brazil's economic and social development.
4. The country's sustained economic growth, combined with relatively low inflation rates and a high *real* in comparison with the dollar and Euro have allowed it to promote the new policies, which began to be implemented in 2007.

ST&I conclusions

5. The country needs to boost its exports significantly, progressing from low to medium-tech product to others of greater added value. RTD and innovation will play a key role in this. The new policies of Brazil are oriented to this direction.
6. It must be noted that the Brazilian Science and Technology system is structured at two main levels: Federal (Ministries) and the "*Estadual RTD*" system developed by some states.
7. At Federal level, the system's organisation is fairly complex, but there are two main ministries involved: the Ministry of Science and Technology and the Ministry of Development, Industry and Foreign Trade.

²⁴ Project Atlas 2007 data from partner organizations, UNESCO/OECD 2005 data and Open Doors 2007: Report on International Educational Exchange.

²⁵ IAU, World Higher Education Database (WHED).

²⁶ OECD.

8. One consequence of the disparity in development is that some of the Southern States (Sao Paulo, Minas Gerais, Rio, Santa Catarina, etc.), which are the most advanced from an industrial and economic viewpoint, have developed their own RTD and innovation plans, which makes collaboration between the EU and this group of federated states particularly important.
9. This point is very important in order to promote relationships between the EU and Brazil at regional level.
10. Despite these evident disparities, Brazil is the leading Latin American country in terms of scientific and innovation-related development, ahead of the two next most important economies in the region (Argentina and Mexico).
11. In terms of publications and patents (both individual and together with the EU and other countries), both the total number and that of those in strategic sectors greatly exceeds those of Mexico and Argentina.
12. Nevertheless, current government policy is based on a significant increase in investment in RTD and innovation to increase productivity in the industrial and service sectors, whilst at the same time strengthening its science and technology system.
13. The entire Brazilian RTD system is receiving a new boost in the aim of reaching the figure of 1.5% of GDP by 2010. To this end, Brazil has implemented a number of strategic plans (e.g. PNCTI and PACTI) to achieve this objective, increase its industries' competitiveness, boost innovation and orient, in part, its university education system towards value-added, technologically-advanced sectors: different kinds of engineering and high technology.
14. The government has chosen 12 strategic thematic areas in which it is to concentrate available economic resources. However, absolute priority is given to only five specific sectors, all of high added value: biotechnology, nanotechnology, biofuels, fossil fuels and nuclear energy.

Industrial policy conclusions (related with RTD and Innovation):

15. The new industrial policy, based around specific sectors and innovation, began to be implemented in May 2008.
16. From the industrial point of view the priority sectors are: Health, Energy, ICT, Nanotechnology, Biotechnology and Defence.
17. The main challenge for innovation policy is to stimulate the transition of enterprises towards new, innovative activities and to encourage in companies a spirit of research, which is currently basically being carried out in universities and research centres.
18. Few Brazilian enterprises have their own research and innovation centres. It is generally multinationals that have these.
19. To achieve this, the government has developed a number innovation support programmes, in both the public and private sectors. These include tax incentives for R&D, support for technology-based companies, venture capital etc.
20. Technological training is of great importance in this phase of the Brazilian development.
21. The mobility of the Brazilian students to Europe is of great interest for the MS and the AC. The number of students in the USA universities or ROs is greater than in the EU.

Given these conclusions, for the EU, Brazil is a country offering a wide range of collaboration opportunities, especially in the following areas:

- High-tech sectors and those of greatest added value.
- Innovative products and processes, at both pilot and industrial development level.

- Cooperation based on the science-industry system in target sectors of mutual interest.
- Cooperation at Federal level, focusing upon those sectors defined by the Lula government as priorities.
- Cooperation with certain states (those with their own RTD programmes).
- Training-related cooperation, seeking out the country's best universities.
- Given Brazil's priorities, training should be partially aimed towards different types of engineering and high-tech fields: biotechnology, nanotechnology, ICT, etc.

4. Internationalization policy of Brazil^{27 28}

4.1. Brazil's S&T relation with Europe: Major trends

The special priority accorded by Brazil and the EU to cooperation in Science, Technology and Innovation should be one of the dimensions that highlight the strategic nature of the Partnership. The EU and Brazil share the conviction that a strong science and knowledge based society is a major prerequisite for sustainable and equitable socio-economic development.

The bilateral cooperation in Science and Technology of the past two decades shows the immense potential of our relations in this domain. The Agreement for Scientific and Technological Cooperation, in force since 2006 between the EU and the Federal Republic of Brazil, provides the main framework for action. In the context of the Agreement, the Parties reaffirm the value they attach to the work of the Steering Committee on Cooperation in Science and Technology (SCC) and their interest in pursuing a balanced partnership based on mutual benefits through criteria and modalities defined in common, including dedicated working groups.

Commission President José Manuel Barroso welcomed the Agreement, saying: "Brazil is an important partner for the EU. We not only share close historic and cultural ties, values and a strong commitment to multilateral institutions, we also share a capacity to make a difference in addressing many global challenges such as climate change, poverty, multilateralism, human rights and others. By proposing stronger ties, we are acknowledging Brazil's qualification as a 'key player' to join the restricted club of our strategic partners".

Brazil, as an Emergent Economy, is now donor of development aid to Portuguese-speaking countries in Africa (Angola, Mozambique, East Timor etc.) and to countries such as Haiti. Official development aid to Brazil was equivalent to around 0.06% of its GDP in 2003, while inward FDI (Foreign Direct Inversions) flows represented around 2% of its GDP during the same year.

To address Brazil's development challenges, the EC will build on existing sectoral dialogues, and support small-scale initiatives or "soft" measures that could have a positive multiplier effect. Existing sectoral dialogues can roughly be classified into three categories, on:

1. Social issues (including the sectoral dialogues on social and global social issues)
2. Economic issues (including the dialogues on bilateral trade and trade-related issues, air and maritime transport, nuclear cooperation, science and technology, including Galileo and information society issues)
3. Environmental issues.

²⁷ Communication from the Commission to the Council and the European Parliament: Towards an EU-Brazil Strategic Partnership. Brussels, 30 May 2007 COM(2007) 281.

²⁸ ec.europa.eu/external_relations/lac/index_en.htm.

4.2. South – South Cooperation activities carried out by Brazil²⁹

In accordance with foreign policy directives and priorities established by the Government, Brazilian technical cooperation has increased, intensified and strengthened the country's presence in the context of South – South. The emphasis on cooperation between developing countries, also known as horizontal cooperation or South – South cooperation, not only results in a great inclusion of countries benefiting from Brazilian government actions in different continents such as Africa, South America and the Caribbean, Oceania, Asia, but also in the diversity of national partners involved. These include, not only traditional cooperation institutions, such as EMBRAPA, FIOCRUZ, SENAI, SEBRAE etc., but also representatives from private sector, civil entities, in particular, Non Governmental Organizations (NGOs).

In addition to traditional areas of interest, such as agriculture, education, technical training and qualification, the environment and health etc., Brazil has increasingly provided cooperation in issues which have become of pressing contemporary importance, such as prevention of children labour and other areas involving social violence, as well as in matters related to the restoration of citizenship, with projects developed in the area of digital inclusion. During last years (2005 – 2007) new issues, such as biofuels/ethanol, are now included in the cooperation activities offered to developing countries.

During the last few years, and without neglecting other regions, the Brazilian Cooperation Agency (ABC) has concentrated its efforts in Latin America and, in particular, in South America. To this end, there are presently 119 projects (July 2007) being carried out in different areas of interest in Argentina, Bolivia, Colombia, Ecuador and others countries of South America. With Central America at the present moment 22 projects are in phase of development in Costa Rica, El Salvador, Honduras etc. and other 58 different activities being carried out between Barbados, Cuba, Haiti, Jamaica etc. In Africa, Brazil is involved in 125 cooperation projects in different areas, covering a wide range of issues: malaria, tropical agriculture, environment etc. And in the Middle East, 7 initiatives have been developed with the Lebanon involving projects to reconstruct the country.

4.3. Foreign Direct Investments (FDI) and Trade³⁰

General Overview of Brazil's FDI^{31 32 33}

According with the statistics of 2006, FDI inflows to South and Central America and the Caribbean (excluding offshore financial centres) remained more or less stable, at \$45 billion and \$25 billion respectively. In contrast, FDI into offshore financial centres soared from \$6 billion to \$14 billion, reversing the decline in 2005 following the adoption of the Homeland Investment Act in the United States.

Focusing FDI in Latin America, Mexico and Brazil, with inflows of \$19 billion each, remained the region's leading FDI recipients, followed by Chile, the British Virgin Islands and Colombia. FDI inflows as a percentage of gross fixed capital formation fell from 16% in 2005 to 15% in 2006. Regarding the outflows, Brazil was the most attractive location in Latin America for FDI in the period 2005-2006, with \$ 28 billion in FDI outflows (2006), the country's highest level ever and, for the first time its outflows were higher than its inflows. The United States is expected to remain the leading source of FDI in Latin America and the Caribbean, but Spain, Brazil (according with his new status of emergent economy), China and Canada are also expected to

²⁹ The Brazilian Ministry of External Relations (ABC Agency - 2007).

³⁰ Prospects for Foreign Direct Investment and the Strategies of Transnational Corporations, 2005-2008 UNITED NATIONS New York and Geneva, 2005.

³¹ Patrick J. W. Egan Department of Political Science UNC Chapel Hill Midwest Political Science Association Annual Meeting, Chicago, IL April 3-6, 2008.

³² <http://www.brazzilmag.com/content/view/9086/1/> Kelly Oliveira, 28 January 2008.

³³ http://www.unctad.org/en/docs/wir2007_en.

provide investment, though on a significantly smaller scale. Latin American and Caribbean IPAs expect growth in investment from Asian sources, such as China, the Republic of Korea and Japan.

In the case of Brazil, more than 80% of TNCs (Transnational Corporations) and 90% of FDI experts believe that the country will be one of the region's five most attractive investment locations in the short term. This may be due to a recent upturn in the economy, led by the dynamically expanding export sector. Mexico's high ranking is unsurprising given that it has been the major recipient of investment over the last four years.

Brazil's share of foreign direct investment (FDI) stood at US\$ 886 million last December (2007), having totalled US\$ 34.616 billion in 2007. FDI reached US\$ 2.487 billion in December 2006, and US\$ 18.782 billion in the whole of 2006. The data were disclosed by the Brazilian Central Bank (January 2008). The annual FDI (2007) was below the estimate presented three weeks ago by the United Nations Conference on Trade and Development (UNCTAD), which was US\$ 37.400 billion, but still it was almost twice as much as the total for 2006 (18.782 billion). The figure was also slightly lower than the projection of the Central Bank, which was US\$ 35.000 billion.

FDI, Industry and impacts on innovation activities in Brazil^{34 35 36}

Brazil has recently been quite successful in advancing outward-oriented investment of its own. This outward FDI often demonstrates high levels of technological sophistication and profitability. Brazil has developed world leaders in short-haul aircraft, its agribusiness industry is quite sophisticated, and Petrobrás is the recognized authority on deep-sea oil exploration. The outward flows of FDI from Brazil have been concentrated in natural resources, and are beginning to attract a great deal of governmental and scholarly attention. It would be therefore unwise to link disjointed and uncoordinated policies towards incoming FDI with similar frameworks for home-grown multinationals.

In Brazil a large part of the FDI flows (2006) are oriented to the following industrial sectors: Resource-based manufacturing, sugar production and refining, refining, metallurgy, petrochemical, crude steel production, pulp and paper industry, automotive industry and auto parts. Regarding the research sectors, related to industrial activities, the main important areas are: genetics, forestry and biotechnology. In the period 2007 – 2009, 47% of foreign companies indicating plans to increase their investments, 2% to decrease them, and 50% to maintain them at the same level.

Multinationals occupy an increasingly central role in the economies of Latin American states, and in the developing world as a whole. They account for an ever greater share of production and profits, and while they do not contribute significantly to employment they can have important benefits for the current account and for domestic partners. Multinationals tend to lead domestic firms in productivity, technology, and profitability. However, the benefits of multinational production for host countries are not automatic, especially given the global mandates of foreign firms. The investment promotion policy framework within host countries can be quite influential in influencing firm strategy and therefore the potential for ever-greater benefits to host economies. Brazil has encouraged large inflows of FDI in recent years, but has done little to influence the composition and character of that investment. In adopting largely indirect investment promotion policies, the country has not attracted much export-oriented or technology-seeking investment. The new policies the country has put in place have not been particularly effective for instance.

FDI may affect innovation and R&D expenditures in host economies. According to UNCTAD (2005), the United Nations Conference on Trade and Development, TNCs (Transnational Corporations) have been adopting strategies to decentralize R&D activities, to both reduce their associated costs and monitor technology advancements generated outside the home country. Although the internationalization of technology activities occurs primarily among high-income countries, this decentralization has reached developing countries as well.

³⁴ Celio Hiratuka April 2008: Foreign Direct Investment and Transnational Corporations in Brazil.

³⁵ <http://ase.tufts.edu/gdae/WGOverview.htm>.

³⁶ World Investment Report 2007: Transnational Corporations, Extractive Industries and Development.

In the Brazilian case, TNCs tend to introduce innovation more rapidly than domestic companies, even controlling for their sectoral distribution. According with recent studies (2004), 67.9% of foreign companies in Brazil introduced innovations from 1998 to 2000, compared to 30.6% of domestic industrial companies. Foreign corporations, instead, rely on methods developed at their headquarters or by other affiliates. Of all foreign corporations that introduced innovations, 68% stated that they had used, as a source of information, another firm, located abroad, in the same corporate group.

4.4. Conclusions: Brazil's internationalisation policy

Brazil is today a great country in terms of both size and population, and one which is quickly shedding its status as a developing country to become one with a certain degree of development, although it still remains at some distance from EU-15 countries. It currently occupies tenth place in the ranking of the world's largest economies. Like China and India, it will continue to improve its position over the coming years, to find itself in 6th or 7th place relatively quickly. This progress will allow Brazil to play a role on the world stage and internationalise its policies.

The country is a member of the G-20 and is therefore part of the group of countries that take decisions at worldwide level, as seen in the recent G-20 meeting in Washington (2008), where Brazil was the spokesperson for all Latin America and, alongside India and China, one of the most noteworthy emerging economies.

Brazil's new leading role means that it can broaden cooperation with both the EU and other non-community countries, such as Russia, South Korea, India and China, as well as cooperation with the countries of the South, by implementing new formulas.

For the EU, Brazil is a strategic partner and is considered to be the leading country in both Latin America and MERCOSUR. This new position on the world geopolitical and economic map allows for the implementation of new cooperation formulas between the EU and Brazil that could not be imagined even 10 years ago. Mutual cooperation between advanced scientific and technology sectors and the associations between Member States and Brazil to carry out cooperation actions with South countries are new developments.

As far as trade and investment is concerned, Brazil is the EU's largest customer in Latin America in terms of both exports and imports. Nevertheless, the ratio of goods and services exported and imported as a proportion of its GDP is low compared both with EU countries (such as Germany, France and Italy) and Mexico, whose export/import rates are much higher. This negative factor will stimulate Brazil to invest in RTD and innovation to be able to infuse its industrial and service sectors with innovation and thereby export more products of greater added value. We must therefore hope that, over the course of the next five years, RTD and industrial innovation policies bear positive fruit by expanding the country's economy and internationalisation.

The following conclusions related to Brazil's new internationalisation process can be drawn from this chapter:

1. The EU-Brazil RTD Agreement had led to a significant leap forward in relations between the EU and Brazil. Nevertheless, the agreement can be implemented more efficiently, both quantitatively and qualitatively, given Brazil's current world position and its recent internationalisation process.
2. Brazil's strategic importance to the EU means that negotiations are currently under way on new agreements in important sectors such as space navigation and telecommunications (with the GALILEO system), nuclear energy (EURATOM) and nuclear fusion (ITER).
3. Given its leading position in MERCOSUR and in Latin America in general, Brazil is a preferred partner for the EU in that it is a vehicle for interregional cooperation.
4. The low level of Brazil's exports compared with its GDP is slowing down the country's international expansion, but opens up possibilities for cooperation and specific

opportunities for the EU in very concrete sectors, almost always linked to innovation and the country's industrial capacity.

5. In specific scientific areas, such as biodiversity, climate change, new renewable energies, ICT etc. the EU has in Brazil an interlocutor of the first order, with whom it is in the EU's interest to establish strategic alliances, some of which are of interest to other countries in the region.
6. The existence of centres of excellence with great skills in key areas of the economy, trade and industry (such as advanced materials, biotechnology, space, renewable energies, etc.), added to the fact that these centres have made internationalisation a core factor in their expansion, should encourage EU research centres to form alliances with such Brazilian universities and research centres.
7. Elite –not to mention highly-internationalised– universities, such as those of Sao Paulo, Campinas, Rio, Brasilia, etc., and research centres like EMBRAPA, Fio Cruz, etc., facilitate the exchange of researchers and students between Brazil and Europe.
8. Brazil's internationalisation can also be seen in the number of its postgraduate students in foreign universities. Nevertheless, the main recipient of these is the USA, followed at great distance by a number of EU countries: Portugal, Germany, France, Italy and Spain. In light of this, the EU must make a special effort to attract skilled students, offering them grants to study and research in Europe.
9. Brazil's great development over the last 10 years means that the country is no longer considered as a beneficiary of development aid (*viz.* Canada and other developed countries) but rather as a partner for triangular cooperation actions, where Brazil, together with other EU countries (or Japan) carries out projects whose beneficiaries are the poor countries of Africa, the Caribbean, Latin America or Asia. This North-South-South type of cooperation is also accompanied by exclusively South-South cooperation.
10. These triangular agreements already form part of cooperation agreements between Brazil and some individual EU countries (e.g. UK, Germany or Spain).
11. FDI: In 2007, the flow of investments from the EU towards Brazil increased significantly in comparison with 2006, at 7,100 million euros compared with only 5,400. Spain was the leading EU investor in Brazil in 2007 (2,500 million euros).
12. The increase in FDI in Brazil and its impact upon the country's production structure calls for economic impact studies and progress in innovation processes.

5. Cooperation with Brazil

5.1. S&T cooperation between Brazil and Europe at Community level^{37 38}

Over the last years, Brazil has become an increasingly significant global player and emerged as a key interlocutor for the EU. However, until recently EU-Brazil dialogue has not been sufficiently exploited, and carried out mainly through EU-MERCOSUR dialogue, opens the communication. Science, technology and innovation will be among the areas of cooperation strengthened.

The Commission believes that the recent entry into force of the EU-Brazil Science and Technology Cooperation Agreement, along with the new opportunities for international participation in the EU's Seventh Framework Programme for research (FP7), provide a sound basis for increasing existing cooperation in S&T. EU and Brazil should facilitate researcher mobility, and also increase the visibility of cooperation in this area. The EC proposal outlines just

³⁷ http://ec.europa.eu/external_relations/brazil/intro/index.htm.

³⁸ http://ec.europa.eu/external_relations/brazil/intro/index.htm, Document Reference: Based on the Commission communication COM (2007) 281.

how the Commission plans strengthening current ties. Firstly, dialogue should be strengthened, and joint planning improved, so that priorities can be set that address areas of common interest:

1. The Commission also suggests establishing an agreement between Brazil and EURATOM, the European Atomic Energy Community, along the lines of agreements already in place with other countries. The agreement could either focus on the specific field of fusion, promoting Brazil's accession to the International Thermonuclear Experimental Reactor (ITER) project, or on broader areas of nuclear research.
2. The proposal also addresses space. Brazil is already a partner in Galileo, the EU's satellite navigation system project (for example in the project CELESTE). Cooperation within this framework should be further intensified through a new cooperation agreement based on information exchanges and contacts, suggests the Commission.
3. Other areas selected by the Commission for closer collaboration are information and communication technologies (ICT), the Millennium Development Goals, protecting the environment, energy, trade and economic relations, transport, higher education, culture, and justice, freedom and security.

Traditionally, the main areas with priority of cooperation between Brazil and the EU are:

- Global challenges (including poverty and inequalities)
- Environment
- Energy (including renewable energies)
- Stability and prosperity.

Environment is the sector that has absorbed the main financial resources, in particular promoting cooperation in specific and target sectors:

- Biodiversity
- Tropical forest
- Bio safety
- Emissions of greenhouse gases
- Capacity building and training
- Protected areas
- Dissemination activities

The Commission believes that the recent entry into force of the EU-Brazil S&T Cooperation Agreement, along with the new opportunities for international participations in the EU's Seventh Framework Programme for research (FP7), provide a sound basis for increasing existing cooperation in S&T.

In addition to the last areas with priority, there are two significant programs, on socio and economic sectors, of great interest for the Brazil and the EU cooperation:

This program is oriented to the urban development. The objective of the **Urb-AI** programme of the European Union, is to develop networks of decentralised cooperation between local authorities on concrete topics and problems of urban local development. Urb-AI plays a leading role in the strengthening of the relations between the members of the European Union and the 18 Latin America countries by encouraging direct experience exchange between territorial representatives and technicians of both continents. In Brazil are located some of the biggest cities of the world: Sao Paulo, Rio de Janeiro or Bello Horizonte (megacities) with enormous social and economic disparities. In this thematic (and in Biodiversity or Global Climatic Change) Brazil can act like a "Natural Laboratory"

AI-Invest is an economic co-operation programme that aims to support the internationalisation of small and medium enterprises (SMEs) in Latin America, in collaboration with their European partners in order to contribute to reinforce social cohesion in the region.

By directly funding projects for organisations that represent and promote private sector development (PSD), such as Chambers of Commerce, Trade Associations, Export-Promotion

Agencies, etc., the AI-Invest Programme facilitates the process of internationalisation of LA SMEs.

Statistical information on Brazilian and Latin-American participation in the 6th Framework Program can be found in the following table.

Country (LA)	Participations from country (FP6)			EC financial contribution (FP6)	
AR	Argentina	95	0,13%	7.837.123	0,05%
BO	Bolivia	15	0,02%	959.809	0,01%
BR	Brazil	155	0,21%	14.397.318	0,09%
CL	Chile	69	0,09%	6.708.837	0,04%
CO	Colombia	17	0,02%	1.560.599	0,01%
CR	Costa Rica	13	0,02%	1.129.280	0,01%
EC	Ecuador	14	0,02%	1.895.358	0,01%
GT	Guatemala	4	0,01%	184.780	0,00%
HN	Honduras	2	0,00%	46.200	0,00%
MX	México	59	0,08%	5.865.667	0,04%
NI	Nicaragua	6	0,01%	465.835	0,00%
PA	Panamá	1	0,00%	0.0	0,00%
PE	Perú	28	0,04%	2.876.722	0,02%
PY	Paraguay	8	0,01%	430.405	0,00%
SV	El Salvador	6	0,01%	210.540	0,00%
UY	Uruguay	25	0,03%	2.257.971	0,01%
VE	Venezuela	11	0,01%	1.518.861	0,01%
<i>In comparison:</i>					
<i>RU</i>	<i>Russian Federation</i>	<i>454</i>	<i>0,61%</i>	<i>49.843.528</i>	<i>0,30%</i>
<i>IN</i>	<i>India</i>	<i>136</i>	<i>0,18%</i>	<i>11.877.892</i>	<i>0,07%</i>

Two specific EU-funded projects support the cooperation between Latin-America and the EU:

- The **EULANEST** project intends to promote and co-ordinate research co-operation among EU Member States (MS) and Latin American countries (LAC), thus contributing to strengthen the impact of their national programmes on international cooperation in science and technology (S&T) with Latin America. EULANEST is intended to network European policy-makers and programme managers involved in promoting research co-operation with Latin America in all fields of science. This ERA-NET will prepare its partners towards the preparation, design, implementation and development of joint transnational research activities. EULANEST will first map and benchmark the cooperation activities in S&T among MS and LAC, identifying best practices and preparing the ground for a Joint Action Programme with the final goal of the launching of a joint call between the partners. Through these activities EULANEST will contribute to the building of the European Research Area (ERA) and, particularly, to strengthening the international dimension of the ERA by co-ordinating bilateral programmes of research co-operation with Latin America, both within and between European countries. In addition EULANEST intends to help to develop a more coherent approach of the EU towards scientific cooperation with emerging Latin American countries, like Chile, Argentina, Brazil, in the present Framework and INCO programme where no specific treatment adequate to the characteristics of these countries is available.
- **EULARINET** (Co-ordinating Latin America Research and Innovation NETwork) goal is to strengthen bi-regional dialogue on S&T between EU Member States (MS), Associated States (AS) and Latin American Partner Countries (LAPC) at policy, programme and institutional (research entities) level, thus contributing to a threefold objective:
 1. Promote the joint identification, setting up, implementation and monitoring of mutual interest priorities of future work programmes across the Specific Programmes of FP7.

2. Joint definition of S&T co-operation policies
3. Support and stimulate the participation of LAPC in FP7

5.2. S&T cooperation between Brazil and Europe at Member State level

The most intense cooperation brought about during the last five years has been with a reduced number of countries from the EU, the main countries are: Germany, France, Italy, Spain, United Kingdom and Holland. With some of them the cooperation is done through official channels (Bilateral Technical Cooperation), as the first five countries mentioned, as with Holland there is a decentralized cooperation, in which ABC follows the negotiations.

Germany

Brazil is Germany's most important cooperation partner in Latin America in the area of education and research. The two countries jointly support large-scale environmental and sustainability research projects as well as numerous projects in the areas of biotechnology and health research, to name but a few. Scientific and Technological (S&T) Cooperation with Brazil is based on the framework agreement on scientific research and technological development between Germany and Brazil, which was updated in 1996 and places particular emphasis on the integration of industry partners in both countries. In addition to governmental funding institutions (CNPq, CAPES, FINEP, etc.), the Brazilian research funding scene also features institutions at state level, such as FAPESP in São Paulo and FPERGS in Rio Grande do Sul. The key areas of cooperation in individual specialist fields were determined in collaboration with the Brazilian partner ministries MCT (science and technology), MEC (education), MMA (the environment), and the overarching MRE (foreign ministry). Environmental research, sustainability research, and marine research are at the forefront of the collaboration. Application-oriented research focuses on the following areas, among others: information technology, genome research, nanotechnology, biotechnology, health, and space flight. The BMBF supports a wide range of measures for technology transfer.

The German Federal Ministry for Education and Research with its International Bureau started in 2007 a dialogue project in cooperation with the German Development Institute with the title "Dialogue 4S: Sustainable Solutions - Science for Sustainability" aiming at the BRICS countries (Brazil, Russia, India, China, South Africa). This aims to break open the thematic restriction and widen the focus of Germany's technology and research competence in sustainability.

France

In first place is France in subjects of innovation and basic science. The most favoured sectors are nanotechnology, bio combustibles and ICT. The most intense cooperation is done between the CNPq and the CNRS. With France, cooperation is very strong in Agriculture and Environment, which is mainly carried out by IRD and CIRAD.

Also there is a modality of projects type 2 + 2 with two companies, one from Brazil and the other from France, and two research centres, one in each country. As far as innovating initiatives there is the programme of initiatives through which 5 managers visited research centres, institutes... in France (in 2007) and in 2008 it will be the other around. Brazil is number 14 in the French co-publication ranking with 600 co-publications a year. France is number 2 in the Brazilian co-publication ranking. More than 900 French scientists are visiting their colleagues in Brazil each year (average of 18 days: i.e. 80 French researchers are present each day in Brazilian laboratories).

Spain

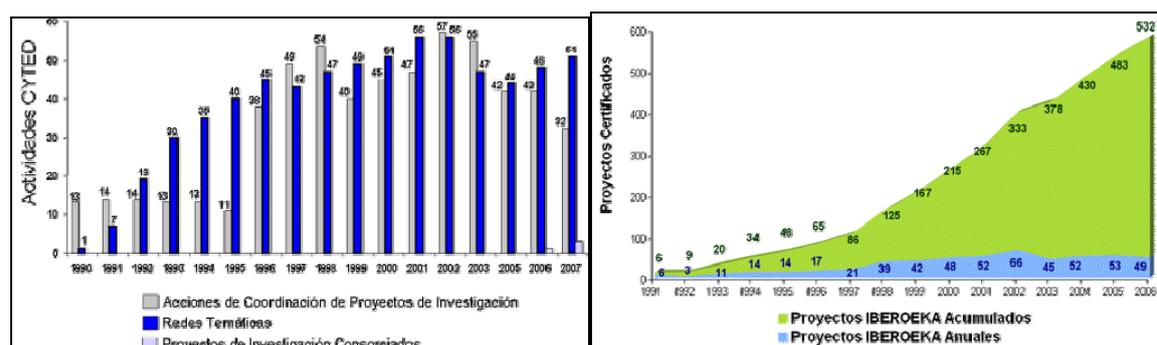
IV Meeting of the S&T Commission (2008) for the Cooperation between Spain and Brazil

In this meeting it was established a bilateral program of cooperation between the two countries for the next 4 years, which is articulated in 3 main points:

- Priority and sectorial concentration in the strengthening of the institutional capacities, democratic government etc.
- Geographical concentration in the Brazil Northeast, for being the region which has the lowest levels of social and economic development.
- Development of the triangular cooperation, with projects in third countries less developed.

CYTED – IBEROEKA ³⁹

The CYTED program has as main objective to contribute to the harmonious development of the Iberoamerican region through the establishment of cooperation mechanisms between groups of research (Universities, RO and innovative enterprises) with the objective to translate the RTD results to the productive sector and the civil society in general. Number of activities carries out by CYTED (1990 – 2007) and IBEROEKA program (1991 – 2006) between Portugal and Spain with all the Latin American countries:



There is considerable interest and scope in EU-Brazil co-operation in **higher education**, to broaden academic knowledge and bring future intellectual elites closer together. Brazil has been an active participant in the EU's higher education programme Alβan, Erasmus Mundus and in EU Member States' bilateral exchange programmes. Brazil also registered a strong participation in the EU's ALFA programme for EU-LA interuniversity co-operation. Significantly, consideration is being given to the launch of a policy dialogue on education to exchange best practices.

The EU proposes to stimulate further the exchanges and dialogue between our cultures, by intensifying university exchanges in the near future, with funds from the EU's Country Strategy Paper 2007-2013: €30,5 million are foreseen for additional Erasmus Mundus scholarships for Brazilian students.

The **Programme Alβan** ^{40 41} (European Union Programme of High Level Scholarships for Latin America) aims at the reinforcement of the European Union-Latin America co-operation in the area of Higher Education and covers studies for postgraduates as well as higher training for Latin America professionals/future decision-makers, in institutions or centres in the European Union. Further to opening-up of the European Higher Education Area to Latin Americans Alβan scholarships will contribute to better employability skills and career opportunities for Latin American postgraduates and professionals in their own countries.

³⁹ Ministerio de Ciencia e Innovación, Programas CYTED e Iberoeka.

⁴⁰ <http://www.programAlβan.org>.

⁴¹ <http://europa.eu.int/comm/europeaid/projects/Alβan>.

Brazil's Participation in the Programme ALBan – Call 2007 Per Host Country (Brazil)

Host Country	Master	Doctorate	Specialisation	Total
CZ- Czech Republic	2	0	0	2
DE- Germany	11	4	0	15
ES- Spain	31	31	1	63
FR- France	37	24	1	62
IT- Italy	3	5	0	8
LT- Lithuania	1	0	0	1
NL- The Netherlands	8	6	0	14
PL- Poland	1	0	0	1
PT- Portugal	43	40	2	85
UK- United Kingdom	30	23	0	53
Total	167	133	4	304

The general objective of the **programme ALFA**⁴² (Regional Cooperation with Latin America - ALFA III) is to contribute to the development of the higher education in Latin America (LA) through cooperation between the EU and the countries of Latin America, as a means of contributing to the economic and social development of the region in general and the more balanced and equitable development of Latin-American society in particular.

The Programme is implemented through:

- Joint Projects (Lot 1) designed to encourage exchanges of experiences between Higher Education Institutions (HEI) in Latin America and the EU.
- Structural Projects (Lot 2) to promote the reform of higher education systems at regional level in Latin America.
- In addition, Accompanying Measures (Lot 3) will be financed to increase visibility and promote results of Lots I and II projects.

5.3. S&T cooperation with Brazil of major competitors of the EU

The main competitors of the EU in terms of cooperation between Brazil and foreign countries in Science, Technology and Development are. Japan, USA and Canada. In the 3 cases Agreements on Science and Technology has been signed between Brazil and those countries. The cooperation with Japan is through official channels but with US the direct cooperation between partners (like universities) is very strong. However, some significant differences exist in the model of bilateral cooperation.

- The Japanese cooperation is concentrated in the poorest regions of Brazil: The North and North-East and the Japan collaboration does not contemplate donation or loan financial resources.
- With Canada the traditional cooperation is decreasing because Canada considered now Brazil an Emergent Economy. The geographical priority is focused in the Northeast States, followed by the peripheries of urban cities and federal-level initiatives. Applied sciences and technology are the main sectors of future collaboration.
- With US, great importance is give to Innovation and Commercialization of Technology, Nano-sciences and some sectors of basic science. Education is other of the areas with priority.

⁴² <http://ec.europa.eu/europeaid/where/latinamerica/regional-cooperation>.

Japan⁴³

Framework of the Cooperation Program: The Technical and Financial Cooperation Program between Brazil and Japan is regulated by the “Basic Agreement of Technical and Financial Cooperation”, signed by the governments on September, 22 of 1970. The negotiation about the formalization and transaction programs, projects and areas of interest is made between the Ministry of Foreign Affairs of Brazil and the Ministry of the Foreign affairs of Japan. The projects are co-coordinated by the Brazilian Agency of Cooperation (ABC) and by the Japan International Cooperation Agency (JICA).

More than 96 billion Yens (about 750 million EUR) have been received by Brazil through the technical and financial cooperation that places Brazil in 6^a position among all the countries beneficiated by the Japanese Aid, and the first position in the world out-of the Asian continent. The Brazilian institutions can access to the program by means of the presentation of proposals that will be evaluated and approved for the ABC and the JICA.

It is important to detach that the bilateral technical cooperation with Japan does not contemplate the donation or loan of financial resources, also it does not contemplate, university infrastructure, academic researches, and scholarships. The main items contemplated by the cooperation include high level consultancy (sending Japanese consultants), the qualification and training of Brazilian technicians in Japan and, in some cases, the equipment donation. The national counterpart, is translated in staff, local installations and expenses fits to the Brazilian institution, amount that must be, at least, equal to the value of the requested cooperation.

The objectives of Japanese cooperation with Brazil are:

To provide knowledge and technological transfer in areas of interest of Brazilian institutions

To fortify the administrative capacities of the country

To concentrate efforts towards the reduction of internal and inter regional disparities. to contribute for the sustainable development involving local communities and public agents

Focus on Regions Priorities: The regions North and Northeast are considered with priority in reason of its lesser relative, economic and social development.

Form of cooperation are:

1. PCT - Technical Cooperation Projects

- To transfer technologies to Brazilian technicians and institutions
- To reach success in a short period of time
- To elaborate studies of the projects of public development, such as Brazilian partner-economic infrastructure: feasibility studies, survey of natural resources; managing plan study for elaboration of geographic maps; detailed drawing underground sheet
- To collect data and basic information for city director plans to capture financial resources in order to implant economic and social development programs.

2. PICT – Individual Projects of Technical Cooperation

- To allow the Japanese government to evaluate the necessity and viability of the requests of cooperation under the form of ED and PCT.
- To perfect techniques in areas of interest of the Brazilian social and economic development, in the governmental institutions of research and professional formation, dedicated to the activities of advising in the planning of projects and orientation of research, beyond qualification and training.

3. DS - Development Studies

- To elaborate studies of the projects of public development, such as Brazilian partner-economic infrastructure: feasibility studies, survey of natural resources; managing plan study for elaboration of geographic maps; detailed drawing underground sheet.

⁴³ 2008 The Ministry of Foreign Affairs of Japan.

- To collect data and basic information for city director plans to capture financial resources in order to implant economic and social development programs.

To sum up, cooperation with Japan is intense, but has specific characteristics: it is concentrated in the poorest regions of Brazil (the North and North-East). It is also not concentrated in the form of simple donations and does not contemplate university infrastructure, academic research or scholarships. The main items contemplated by the cooperation include high-level consultancy (sending Japanese consultants), the qualification and training of Brazilian technicians in Japan and, in some cases, equipment donation. Aid is submitted via JICA and ABC. The goals of this cooperation are knowledge and technology transfer to areas of interest in Brazil, the strengthening of the country's administrative capacities and reducing the differences between regions, contributing to sustainable development.

United States⁴⁴

Science and Technology: Science and technology cooperation remains an important aspect of the Brazil-U.S. relationship. In 1994 the Brazil - USA Science and Technology Agreement was extended and amended, thus reaffirming both nations' intent to cooperate on S&T. Energy, earth and space science, biotechnology, engineering, and agriculture are just some of the areas of joint interest that will carry Brazil and the U.S. into the future. On July 21, 2006, the first meeting of the U.S.-Brazil Ministerial Level Joint Commission on Scientific and Technological Cooperation was held in Washington, DC. Potential fields include information technology and communications, biotechnology, agriculture, energy, public health and Earth observation.

Sectors of mutual interest⁴⁵

- **Renewable Fuels:** Objective: Increase access to modern energy services benefits everyone by facilitating cheap electricity and catalyzing economic growth, especially in rural settlements.
- **Agriculture:** Institutions such as Brazil's Agricultural Research Corporation, Embrapa, and The Agricultural Research Service of the U.S. Department of Agriculture are working together to implement programs of mutual benefit.
- **Earth Observation and Forestry:** Through the Executive Committee of the Group on Earth Observations, the U.S. and Brazil are working to develop capacity worldwide for producing and using earth observations and for establishing a Global Earth Observing System of Systems (GEOSS).
- **Global Positioning Systems:** The two countries have also collaborated on Global Positioning Systems, which has had a significant impact in accuracy. GPS increases public safety by preventing transportation accidents and by reducing the response times of ambulances, fire-fighters, and other emergency services.
- **Information, Communications and Technology:** Brazil and the United States are moving quickly toward enhancing broad internet access by leveraging broadband and wireless communication technologies.
- **Health:** Brazil-U.S. research efforts have placed both nations at the forefront of biomedical research. Brazilian and U.S. medical researchers now collaborate regularly, cooperatively conducting important research about tropical disease, HIV/AIDS, cancer, and cardiology.

⁴⁴ <http://www.ed.gov/news/pressreleases/2008/07/07252008.html> / <http://www.ed.gov/programs/fipsebrazil/index>.

⁴⁵ Paula Dobriansky, Under Secretary, Remarks to the U.S. - Brazil Joint Commission Meeting on Science and Technology Cooperation National Academy of Sciences July 21, 2006.

- **Higher Education:** The U.S.-Brazil Program provides grants for up to four years to consortia of at least two academic institutions each from Brazil and the U.S. Funds cover stipends for student and faculty travel abroad as well as for curriculum development in areas such as watershed management, and weather and climate impact on agricultural and water resources. The US - Brazil Program is administrated jointly by the Fund for the Improvement of Postsecondary Education (FIPSE, U.S. Department of Education), and the *Fundacao Coordenacao de Aperfeicoamento de Pessoal de Nivel Superior (CAPES)*, Brazilian Ministry of Education. The program provides grants for up to four years to consortia of at least two academic institutions each from Brazil and the United States.

Canada⁴⁶

Canada and Brazil Science and Technology Cooperation Agreement: In 2005, Foreign Affairs and International Trade Canada (DFAIT) was provided with a mandate to negotiate a Science and Technology Cooperation Agreement with the government of Brazil. This agreement will be the final component of the International Science and Technology Partnerships Program (ISTPP) to be delivered, following the successful signings of agreements between Canada and Israel, India and China.

The 2005–2010 Country Strategy concentrates CIDA’s (2005–2010 Country Strategy for Brazil) efforts in Brazil both geographically and sectorally. Geographically, CIDA’s priority is Brazil’s northeast, followed by the peripheries of urban metropolises and federal-level initiatives.

Sectorally, CIDA will concentrate programming in the areas of governance, health and the world of work, with gender and ethnic equality and environmental management constituting crosscutting themes. The strategy also opens the door for developing a more mature relationship with Brazil through trilateral cooperation and other regional initiatives.

Canadian interests in Brazil: The Canada-Brazil bilateral relationship has not yet fully achieved its potential. Until recently, the focus has been placed on conflicts that overshadowed an otherwise positive relationship. In 2003, the two ministers of Foreign Affairs endorsed a joint plan of action to reinvigorate Brazil-Canada bilateral relations. The plan highlighted extensive areas of collaboration including hemispheric and global issues, federalism and parliamentary relations, commercial initiatives, science and technology, education/cultural exchanges, security/military cooperation, and technical and development cooperation.

Program Implementation with Brazil (Bilateral Program): Emphasis is placed on the systematic involvement of the Brazilian Cooperation Agency (ABC) in policy dialogue, program planning, management, implementation and monitoring. Starting in 1996, the program worked on the basis of a technology transfer approach, with technology referring to Canadian approaches or models which incorporated unique know-how or expertise, and technology transfer referring to the sharing of these Canadian approaches with strong partners in Brazil that were able to successfully adapt them to meet pressing development challenges. Three lines of concentration have been identified jointly with the Brazilian Cooperation Agency sectoral, institutional and regional. Finally, the strategy includes new dimensions based on policy dialogue and trilateral cooperation.

Sectoral concentration: The Brazil program concentrates its efforts primarily in social sectors (governance, health and the world of work) while maintaining gender and ethnic equality and environmental management as crosscutting themes. Governance is the primary sector for programming and cuts across the other two sectors, health and the world of work, contributing to synergies at the program level:

In support of the activities described above, Canada’s program in Brazil devotes resources to building knowledge, gathering intelligence and sharing information, and emphasizes the collection and dissemination of lessons learned. The program has developed an information

⁴⁶ ISMILLIONCD4-24/2005E-HTML 0-662-40631-1. Canadian International Development Agency.

sharing and promotion strategy including contextual analysis, knowledge sharing, dissemination of results, and support for the policy dialogue strategy.

Canadian Partnership Branch (CPB): CIDA's bilateral program in Brazil represents approximately half of Canada's Official Development Assistance to Brazil in any given year (not including support through multilateral channels). Through CPB mechanisms, Canadian partner organizations design and carry out projects and programs that aim at improving the quality of life and building the capacities of their local private sector and civil society counterparts.

The main sectors of CPB programming in Brazil are Government and civil society (25%), Education (24%), Industry (9%), Agriculture (9%) and Health (7%).

Over the coming years, CIDA's bilateral program in Brazil will continue to work closely with CPB and will actively seek new and innovative ways to cooperate and create synergies between CIDA-funded projects and programs.

5.4 Conclusions: Cooperation with Brazil

In this chapter, we analysed and drew conclusions on Brazil's potential, the manner in which it organises its RTD system, its science, technology and innovation policies and its recent internationalisation process.

The chapter will provide a brief analysis of cooperation between Brazil and the EU, individual MS/AC and the EU's main competitors. These relationships can only be understood on the basis that Brazil is today a powerful economy that is becoming a world player, which boasts a structured and powerful science, technology and innovation system that is currently expanding through its universities and research centres, as well as its industries, and which benefits from a large mass of well-educated university students, particularly within a select group of universities. Additionally, we have seen how individual Brazilian states have efficient tools for promoting their own RTD systems.

At Community level, Brazil is one of the four Latin American states that have signed an RTD cooperation agreement (together with Argentina, Chile and Mexico). This has allowed it to participate in all those projects aimed at countries with cooperation agreements, such as INCO-Nets, BILATs, etc. Additionally, Brazil forms part of networks such as EURALINET, EULANEST, etc., or thematic ones such as EULASUR, to give just a few examples.

In FP6, the country's participation was the most important of all Latin American countries, with a total funding of more than 14 million euros. Specifically, Brazil participated significantly in the following programmes: IST, Sustainable Development, Global Change and Ecosystems, Food Quality and Safety, Specific Measures in Support of International Co-operation, and more. Its participation remains significant in the current FP7, for example in ICT –with more than 10% of all projects approved for the Latin American region, although in this first call it is behind Argentina, Chile and Mexico.

With regard to training, Brazil has been a leader in the ALFA II and ALBAN programmes. In the case of ALFA II, Argentina and Brazil have been leaders in terms of projects funded, followed at some distance by Mexico and Colombia. As far as ALBAN is concerned, the main host countries for Brazilian students were Portugal, Spain, France and the UK.

Some member states have strong interests in RTD with Brazil: these include Germany, France, Italy, the UK and Spain, as regards official cooperation, and the Netherlands, whose cooperation does not generally go through official channels. Nevertheless, some of the smaller member states, such as Slovenia and Sweden, also have cooperation agreements with Brazil. Despite these cases, in general, 50% of member and associate member states do not show any special interest in cooperation with Brazil. We will doubtless have to wait for Brazil to show on the world stage its increasing importance as a large emerging economy for the other member states to focus their attention on the country.

Bilateral cooperation between the MS/AC and Brazil is concentrated in classic cooperation formulas, such as joint projects, researcher and student exchange and mobility programmes, seminars, workshops, etc. However, some countries (e.g. France and Spain) have come up with new cooperation formulas, such as the “2+2” projects (associations between 2 enterprises from France and Brazil and 2 universities/research centres from the countries) or triangular-type projects such as those mentioned previously (North-South-South cooperation).

The subject areas regarded as most important by member states are biotechnology, energy efficiency (clean/renewable), environment and climate change (environment, biodiversity, climate and energy co-operation to reach cost effective solutions with higher technical performance and supporting sustainable development) and technologies in general (see second and third levels) and, for multilateral cooperation, space technology and advanced manufacturing systems.

Globally speaking, the countries most active in bilateral cooperation with Brazil are Spain, Portugal, Italy, France, Germany and the UK.

6. Lessons Learnt

6.1. Lessons learnt for international mobility of Brazilians and European students and researchers

The internationalization of higher education in Brazil has expanded since the 1990s. The process is far from completed, however. In an effort to promote national development, the government has supported international academic cooperation in order to raise its graduate programs and research centres to international levels. Its policies have increased mobility for researchers, professors, and students, both between Brazilian institutions and with foreign ones. Brazil's relations with other countries traditionally focused on Europe and the United States. However, in response to the new direction of foreign policy since 2003, priority has been also placed on developing cooperation with developing countries, including China, India, South Africa, and countries in Latin America.

Joint action with international institutions has grown in a disorganized fashion, with low standards of quality, often as a result of market trends rather than deliberate institutional strategic planning. But the truth is that it is increasingly difficult for academic systems to orientate themselves independently in a world that is increasingly competitive, constantly changing, and dominated by universities in industrial countries. The strongest universities are those in English-speaking countries (the United States, the United Kingdom, Canada, and Australia) as well as the largest countries in the European Union (notably France and Germany, followed by Italy and Spain). The Spanish institutions are one of the leaders in providing inter-institutional programs and collaborating in networks and mobility programs with Brazilian universities (including national programs and the Spanish participation in the EC educational/training programs: ALFA, ALBAN etc.). The principal drive for this relationship may be found in the linguistic proximity of the two countries' languages and the proactive policies of Spanish institutions, spurred by decisions at recent summit meetings of Ibero-American Heads of State.

Weaknesses/challenges

At most higher Brazilian's education institutions, the culture of internationalization is only just beginning. It remains highly dependent on the type of institution, the institutional authorities in charge, and the faculty involved.

Public educational policies are needed that promote and regulate internationalization in teaching, support the official recognition of degrees and diplomas earned at approved institutions outside Brazil, and provide more flexibility and academic freedom to researchers.

Research and mobility must be sustained by networks of researchers and promoted by the development of distance technology.

Opportunities

There is considerable interest and scope in EU-Brazil co-operation in higher education, to broaden academic knowledge and bring future intellectual elites closer together. Brazil has been an active participant in the EU's higher education programme ALβAN, Erasmus Mundus and in EU Member States' bilateral exchange programmes. Brazil also registered a strong participation in the EU's ALFA programme for EU-LA interuniversity co-operation. Significantly, consideration is being given to the launch of a policy dialogue on education to exchange best practices.

Enhancing internationalization is key to strengthening education at the national, institutional, individual, and professional level. Public and institutional policies promote internationalization by diversifying and strengthening the scientific and technological basis of sustainable development while preserving national interests and incentives to implement international networks for excellence in scientific and technological research.

Through the CNPq and CAPES, the government has adopted policies to encourage the repatriation of students completing their studies abroad. Orienting science and technology toward economic goals reflects Brazilian foreign policy in two lines of action:

1. The first is state of the art technological transformation, including distance education through computer technology and automation, biotechnology, new materials, space technology, and precision engineering.
2. The second is improvement of technology that has a direct impact on education, public health, basic sanitation, urban and regional development, security, hunger, nutrition, the environment, energy, and transportation

6.2. Lessons learnt for enhanced S&T cooperation between European and Brazilian S&T institutions

Over the last years, Brazil has become an increasingly significant global player and emerged as a key interlocutor for the EU. However, until recently EU-Brazil dialogue has not been sufficiently exploited and carried out mainly through EU-MERCOSUR dialogue. Brazil will be the last "BRICS" to meet the EU in a Summit. The time has come to look at Brazil as a strategic partner as well as a major Latin American economic actor and regional leader. The first EU-Brazil Summit, took place in Lisbon in July 2007, and will mark a turning point in EU-Brazil relations.

Science, Technology and Innovation is a declared priority area for the Brazilian government. The recent entry into force of the EU/Brazil S&T Co-operation Agreement and the new possibilities for international participation in the EU's FP7 provide a sound basis for increasing existing co-operation with the following orientations:

1. The S&T sector dialogue should be strengthened and joint planning improved to focus and set priorities through appropriate thematic dialogues in areas of common interest.
2. The Brazilian side is encouraged if and when appropriate to fund its own participants in FP7 activities. Both sides should facilitate researchers' mobility which the EU promotes through the specific People programme. The EU and Brazil should consolidate and improve the visibility of co-operation in this area.
3. Cooperation in Education and Training associated with RTD will be encouraged
4. The establishment of an agreement between EURATOM and Brazil should be considered, following the model of existing agreements with other countries. This could be either in the specific field of fusion, for example to promote Brazil's accession to the International Thermonuclear Experimental Reactor (ITER) project, or in broader areas of nuclear research.

6.3. Lessons learnt to gain benefit from Foreign Direct Investments (FDI)

Developing trade and investment: Brazil is the most important market for the EU in Latin America, accounting for one third of total EU trade with this region and with a two digit

annual growth rate in recent years in bilateral trade flows. The EU is also Brazil's most important trading partner, accounting for 22% of Brazil's total trade. However, Brazil only accounts for 1.8% of total EU trade, ranking only number eleven of major EU trade partners (Eurostat, 2005). This demonstrates the significant potential this market represents for the EU. Of all the BRICS, Brazil has attracted the most EU foreign direct investment, with an investment stock reaching €80.1 billion. Brazil is also a significant investor in the EU, in particular in sectors such as trade, mining and construction.

On market access, our objective (EU) is to increase our trade opportunities even further through the EU-MEROSUR negotiations, given the relatively high current level of protection in Brazil's goods and services markets. The EU therefore encourages Brazil to reduce tariff and non-tariff barriers, promote economic reform and good governance in the tax area and establish a stable regulatory environment for economic operators, including foreign investors. A more open trade and investment climate in Brazil would boost competitiveness in all sectors and create means for increasing prosperity.

The future EU-Brazil Partnership is an opportunity to address issues of specific bilateral relevance that complement the EU-MERCOSUR discussions, for example through dialogue on intellectual property issues, the new Brazil's industrial policy and regulatory cooperation as well as consultations in the sanitary and phyto-sanitary (SPS) area, so increasing mutual understanding of the respective SPS conditions that may affect trade.

The European Investment Bank's (EIB) loans have played an important role in reinforcing economic ties between Brazil and the EU and supported the development of the private sector. Brazil has been the largest recipient of EIB loans in Latin America and will remain an important recipient of EIB loans. EIB financing in Brazil will be in support of the EU objectives of focusing on environmental sustainability (including climate change mitigation), energy security, support of the FDI, and the transfer of technology and know-how. In view of Brazil's significant weight in the world economy and key international fora, such as the G20, the WTO and the G8 outreach group, the EU should also enhance dialogue with Brazil on financial and macroeconomic issues. This could include macroeconomic and fiscal challenges, strategies for structural reforms to increase sustainable growth, and social cohesion issues.

7. Recommendations for enhancing S&T cooperation with Brazil

Building on the present analytical report, as well as on the analysis of the questionnaires of the status of the bilateral cooperation between Member States/Associated Countries and Brazil⁴⁷ and on the conclusions of the OMC-Working Groups' discussion, this section proposes a number of recommendations addressed to EU Member States/Associated Countries and the European Commission in order to have them strengthen S&T cooperation with Brazil and increase the respective impact.

The first part of the recommendations is generic in character and closely corresponds to the recommendations on S&T cooperation with other priority partner countries.

The second part summarises specific recommendations targeting the S&T cooperation with Brazil.

7.1. Recommendations targeting at S&T cooperation with Brazil and other priority partner countries

Fostering knowledge based strategic agenda setting

It is recommended to:

- deepen the knowledge based dialogue between the EU Member States and Associated Countries on the prospects of the S&T cooperation with Brazil as a strategic partner of the EU. The knowledge base should be provided among others by
 - the outcome of further mutual learning exercises,
 - the experiences of established cooperation programmes of MS/AC as well as multilateral cooperation programmes like CYTED
 - systematic information gathering on Brazilian S&T including policies through ERAWATCH and pooling MS'/AC' efforts,
 - (joint) efforts of the MS'/AC' and Community Science Councillors,
 - deliverables of relevant EU funded Coordination and Support Activities,
 - impact assessment of bilateral S&T agreements at MS'/AC' and Community level.
- complement the ongoing S&T dialogue between the European Commission and Brazil with an S&T dialogue between the EU MS (and possibly AC) and Brazil. In view of the Communication of the European Commission on international S&T cooperation⁴⁸ and following the respective Council Conclusions of 2 December 2008⁴⁹ such a dialogue should aim at identifying joint interest beyond the themes of the EU RTD Framework Programme and at fostering coordination of concrete implementation measures building on MS'/(AC') instruments.
- make regular use and ensure a proper dissemination of results of completed or ongoing EC-funded coordination and support projects targeting Brazil⁵⁰ in order to improve S&T cooperation with Brazil by building on information which
 - address the Brazilian S&T landscape, key institutions, existing co-operation patterns as well as barriers for the cooperation,
 - draw conclusions on cooperation potentials and ways to further enrich the cooperation.

These data could provide a valuable input to political dialogue at MS'/AC' and Community level, could add new momentum to the implementation of S&T co-operation and should prepare the ground for strategic scheduling future Coordination & Support Activities of the

⁴⁷ See "Comparative Summary Report and Summary of Recommendations on the cooperation with Brazil, India and Russia", CREST OMC-Working Group on Internationalisation of S&T, Brussels, December 15, 2008

⁴⁸ Communication from the Commission to the Council and the European Parliament "A Strategic European Framework for International Science and Technology Cooperation, COM(2008) 588, Brussels, 24.09.2008

⁴⁹ Conclusions of the European Competitiveness Council concerning a European Partnership for International Scientific and Technological Cooperation, Brussels, 02.12.2008

⁵⁰ ERANET EULANEST, INCONET EULARINET, BILAT Brazil, NCP BBICE.

EC.

Offering an optimum framework for S&T cooperation - removing barriers

It is recommended to

- examine how well known existing good practices in funding schemes can be implemented at the individual EU country as well as the Community EU level for joint S&T of MS'/AC' with Brazil and introduce advanced schemes where gaps are found on MS'/AC' and Community level, aiming wherever possible at reciprocity. This could be done through
 - pooling experiences of MS/AC and from Community activities taken into consideration the deliverables of relevant completed and ongoing coordination and support projects
 - analysing funding schemes as regards driving motivations, strategic orientations,
 - immanent research priorities, rules and regulations, evaluation practices, budgets and legal implications, as well as corresponding restrictions and developing scenarios to overcome these barriers,
 - promote the integration of Brazilian programme owners in thematic ERA-NETs.
- move towards a more flexible, simplified and harmonized cooperation framework through Community S&T agreements through
 - making sure intellectual property rights as stipulated in Brazil's laws are implemented and that fair access to Brazilian intellectual property is ensured respecting the interest of the Brazilian partners,
 - allowing easy transfer of S&T equipment (donations) to Brazil without custom fees, easy trans-border shipping of scientific material , and open access to S&T infrastructure in Brazil,
 - permitting tax free allocation of S&T funding from EU program owners to Brazilian institutions,
 - offering simple administrative procedures for EU S&T organisations to establish representations in Brazil, including the provision of working visas for EU personnel.
- stimulate an open but coordinated dialogue between European and Brazilian public and private S&T and innovation stakeholders on themes relevant for the framework of S&T cooperation, ranging from a full mutual understanding of each others IPR rules and regulations to joint participation in tri- or multipartite R&D undertakings. For implementing such dialogue schemes ongoing and upcoming coordination and support activities funded under the Specific "Capacities" Programme within the RTD Framework Programme should be applied.

Putting emphasis on the "human dimension" through brain-circulation

It is recommended to:

- increase the brain-circulation between the EU, the AC and Brazil through promoting the opportunities, advancing funding schemes and removing still existing barriers. New concepts should be developed at national, bilateral and Community level for enhancing outward mobility of researchers from EU-MS/AC towards Brazil including to
 - promote Brazilian research potential in order to better attract EU researchers,
 - foster the creation of national scientific personnel mobility centres in Brazil and their involvement in the ERA-MORE network of European mobility centres,
 - make use of the EURAXESS Portal (building on the examples for Australia, Canada, Chile and Japan).

Following examples of good practice, MS'/AC' should consider offering return-fellowships for high-qualified Brazilian scientists in order to pave the way for sustainable cooperation. Along that line the temporary funding of joint research groups consisting of young Brazilian and EU talents could be considered by MS/AC. At Community level the introduction of

return fellowships for Brazilian scientists as a new component of the Marie-Curie programme could be taken into consideration.

- attract the interest of Brazilian students and researchers who are supported through European fellowship programmes at national or Community level to work in Brazilian branches of European industries. Dedicated promotion campaigns could be foreseen by MS'/AC's programme owners and by the European Commission. It should be envisaged by the respective programme owners to establish a European alumni-database to map the flow of Brazilian students and researchers to stay in touch.
- analyse the impact of the European Visa Directive in order to prepare the ground for a better access of Brazilian scientists to the European Research Area.

7.2. Specific recommendations targeted at S&T cooperation with Brazil

Widening the strategic partnership with Brazil

It is recommended to:

- widen S&T policy dialogues at MS'/AC' and Community level by introducing advanced trans-sectoral dialogue schemes covering S&T, educational, industrial and (regional) development policies. The dialogues should address problem solving through knowledge based, sustainable solutions. In order to raise their efficiency a coordination between the various EU-Brazilian dialogues at individual MS and Community level should be aimed at (see 7.1)
- Enhance coherence of Community policies relevant to/for Brazil through dedicated workshops, possible topics to be covered: sustainable agriculture – research – urban migration.
- analyse at MS'/AC' and Community level options for dedicated programmes supporting triangular cooperation involving S&T stakeholders from EU, Brazil and the rest of Latin America and/or Africa. Brazil can act as a bridge between the EU and Third Countries of 'the South'.
- increase the presence of Science Counsellors in the embassies of MS/AC in Brazil in order to provide additional political momentum to the S&T cooperation with Brazil and to increase the visibility of MS/AC in comparison with European competitors in particular the US and Japan.

Enhancing strategic S&T cooperation and advancing the instruments and institutions

It is recommended to:

- set-up at Community level a joint group of high level European and Brazilian scientists with expertise in priority areas to analyse the outcome and the scientific, economic and societal impact of previous EU-Brazilian S&T cooperation in order to provide strategic experts' guidance for future directions on topics and most appropriate formats of S&T cooperation. In particular in the rather extended area of environmental sciences could be addressed. Here, it seems crucial to put the S&T cooperation into a wider policy framework and foresee a trans-sector policy coordination within EU-Brazil's overall partnership. Wherever appropriate and respecting the principle of variable geometries, MS and AC should be invited to coordinate their national or bilateral activities towards/with Brazil to contribute to the implementation of the strategic EU-Brazilian partnership.
- systematically include social and global social issues in the periodic S&T dialogue schemes both at MS/AC and Community level addressing among others the enormous socioeconomic differences between north and south of Brazil.

- build future bilateral S&T cooperation between MS/AC and Brazil on relevant S&T programmes and strong S&T systems at the level of the Brazilian States, such as Sao-Paulo and Minas-Gerais. Once appropriate, introduce joint funding schemes with programme owners established by the Brazilian States.
- launch at Community level ‘coordinated calls’ with Brazilian programme owners either on Brazilian Federal level as well as on the level of Brazilian States following the examples of other partner countries of the EU.
- analyse options at MS’/AC’ level for joint EU-Brazilian efforts to transferring science to innovation and to strengthen joint industry oriented research among others through:
 - specific programmes for bridging science and industry, incorporating SMEs in the EU and Brazil,
 - linking research driven clusters in specific sectors of mutual interest with a great impact on the economy (nanotechnologies, biotechnology, ICT, energy etc.),
 - exploiting S&T cooperation potential with particular economic impact through pilot and market studies in some specific target domains.
- analyse present practice at MS’/AC’ level (such as France) of establishing joint research groups/laboratories in target sectors of common interest and of high added value (e.g. material sciences, biodiversity, biotechnology). Building on the outcome, other MS/AC could introduce advance funding schemes for joint research groups – once appropriate jointly with programme owners at the Brazilian federal level as well as at the level of some Brazilian States (e.g. Sao Paulo, Rio Grande do Sul, Minas Gerais, Santa Catarina).
- establish at Community level specific programmes of inter-regional S&T cooperation, both of Brazilian States and European regions. Here, good practice from the EU INTERREG programmes should be analyzed.

Offering an optimum framework for S&T cooperation and removing barriers

It is recommended to:

- enhance the visibility of the EU-Brazilian cooperation and allow mutual learning, through disseminating good cooperation practice and concrete results of completed/ongoing activities at all levels via a dedicated webportal to be established at Community level. Apart from S&T programmes supporting international cooperation mobility programmes such as ALFA, ALBAN, ERASMUS MUNDUS or URB-AL should be analysed. Here, in particular the deliverables of Coordination and Support Activities within the EU RTD Framework Programme (like BILAT Brazil) could provide the knowledge base and a web-based technical solution.
- provide optimum access at Community level to each others (EU and Brazilian) S&T infrastructures and to initiate a joint agenda setting for establishing joined S&T infrastructures in defined sectors of mutual high-priority and of high added value (nanotechnologies, energy, health, biotechnology, advanced materials, ICT...).

Strengthening brainpower attraction and circulation

It is recommended to:

- increase the number of individual fellowships on MS’/AC’ level for Brazilian investigators and students. At a request of Brazil, special emphasis should be put on engineering sciences and emerging technologies.
- introduce by MS’/AC’ advanced programmes, which support joint training courses at masters and PhD level between high level universities and research institutions in Europe and Brazil. Here, good practice from some MS (such as France and Germany) should be considered.