

Telecommunications System of Innovation in Brazil: Development and Recent Challenges

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Objective and Structure of the paper

■ Objective

- Examine the development of Brazilian Telecom Innovation System and the main impacts of structural reforms of the 1990s
- Discuss the main challenges it is facing now.

■ Structure

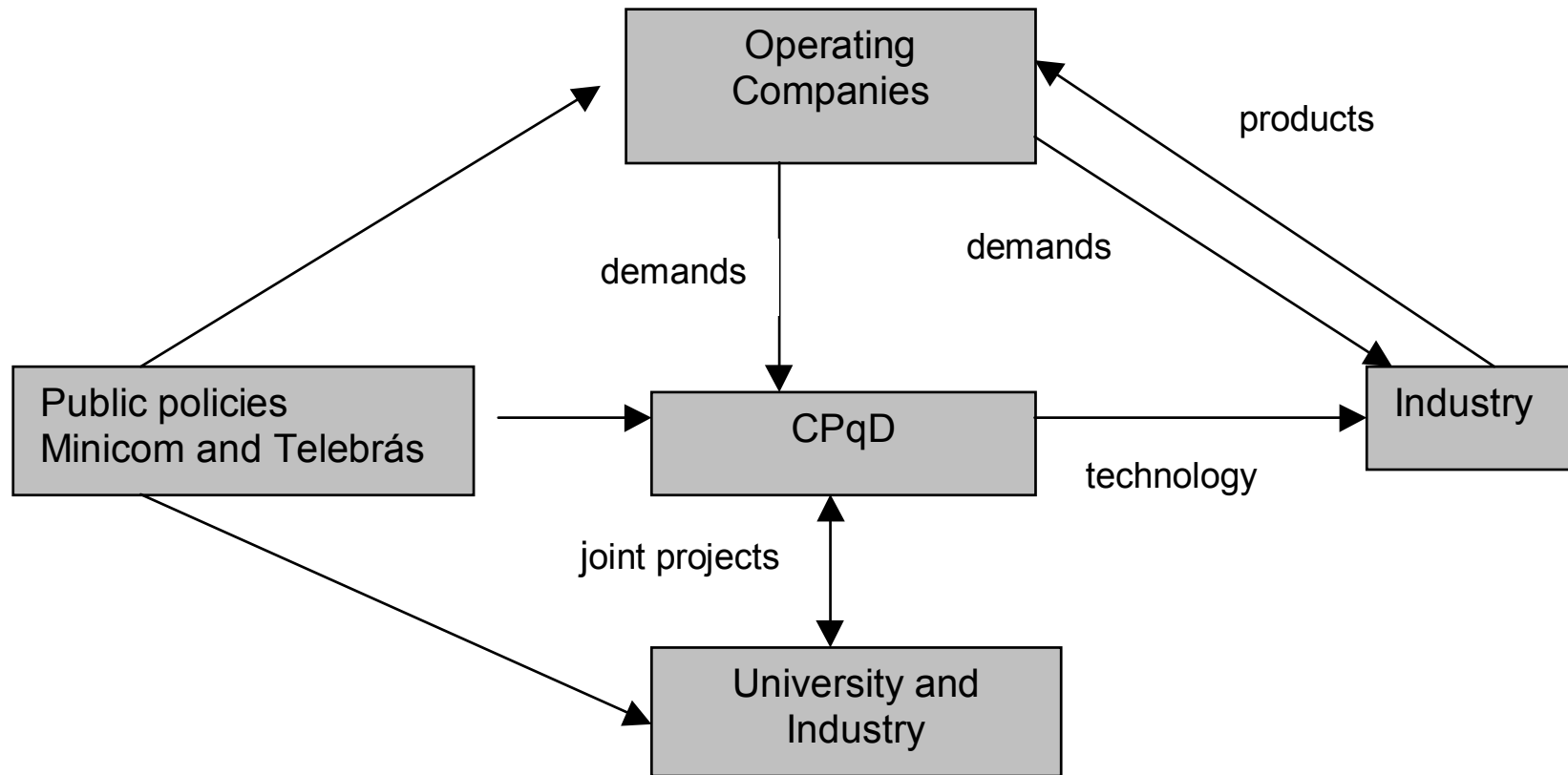
- Development and main achievements of the Brazilian telecom innovation system
- The policy regime changes of the 1990s: Trade liberalisation, Deregulation and Privatisation
- Impacts of the structural changes on the innovation system
- Conclusion: Main challenges



Development of the Brazilian telecom innovation system

- Origin: mid 1970s
 - Creation of Embratel, Telebrás and CPqD
 - Government policies focusing on
 - stimulating setting up of nationally owned telecom equipment firms
 - increase of local added value by the multinational subsidiaries
 - local technological and innovation development in telecom in hardware and software

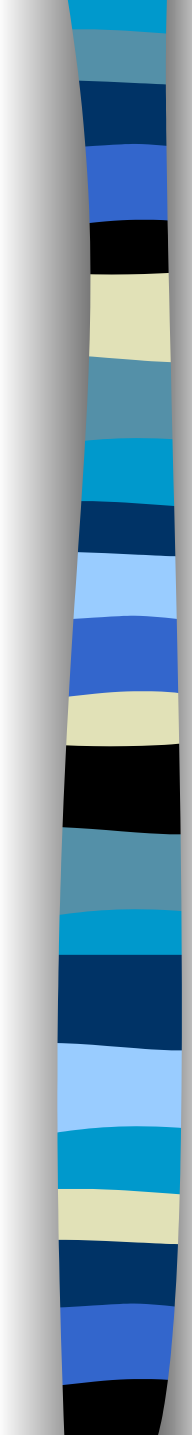
Brazilian telecom innovation system (From the 1980s to mid 1990s)



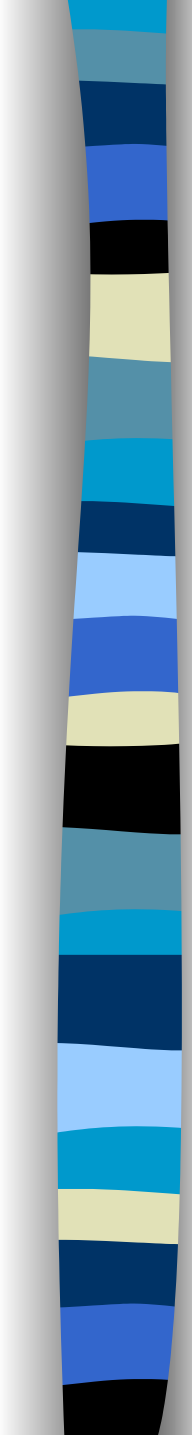


Main achievements of the Brazilian telecom innovation system

- Gradual involvement of multinational subsidiaries in the process of innovation and technological capability development
- Establishment of a network of local suppliers (120 local firms responsible for 17% of the market in 1982)
- Development of key technologies for the telecom system expansion (Trópico)
- Reduction in the investment costs of building the Brazilian telecom network



As pointed out by Hobday (1990) 'CPqD has developed virtually from scratch a range of digital exchange systems designed not only to suit Brazil's tropical climate, but also the particular types of telephone traffic conditions found in the various regions. CPqD's close relationship with industry has enabled technology transfer and joint development with local firms in exchange, transmission and peripheral telecom technology' (p. 19) and 'there can be little doubt that in the areas of industrial and technological progress in digital telecom Brazil was, in the 1980s, leading the Third World, mostly as a result of the policies adopted after 1974' (p. 19-20).



As Mytelka (1999) pointed out, ‘given the debt crisis and the decline in import capacity that this engendered from the mid-1980s on, there was little likelihood that Brazil could have significantly increased the speed with which its network was expanded and digitalized in the absence of TDX programme that provided cheaper, more appropriate and technology intensive, digital products.’

Main achievements of the Brazilian telecom innovation system



In summary, telecommunications in Brazil is one of the few areas where a sectoral national innovation system was developed



Changes in the Brazilian institutional and regulatory model - International Context

- Context of the 1990s: liberalisation of telecom industry and privatisation of the state monopoly became a consensus
- New set of influences based on internet technologies: fundamental changes transforming the telecom industry
- New technological regime: R&D intensive activities concentrated in the equipment suppliers



Changes in the Brazilian institutional and regulatory model (I)

- Early 1990s: Trade liberalisation did not significantly affect the organisation of the innovation system
 - Major consequence: increase in the share of foreign capital in the telecom industry
 - Nationally owned firms: Productive restructuring and downgrading processes
 - reduction in R&D efforts
 - CPqD: changes of orientation
 - focus on operating system and software development

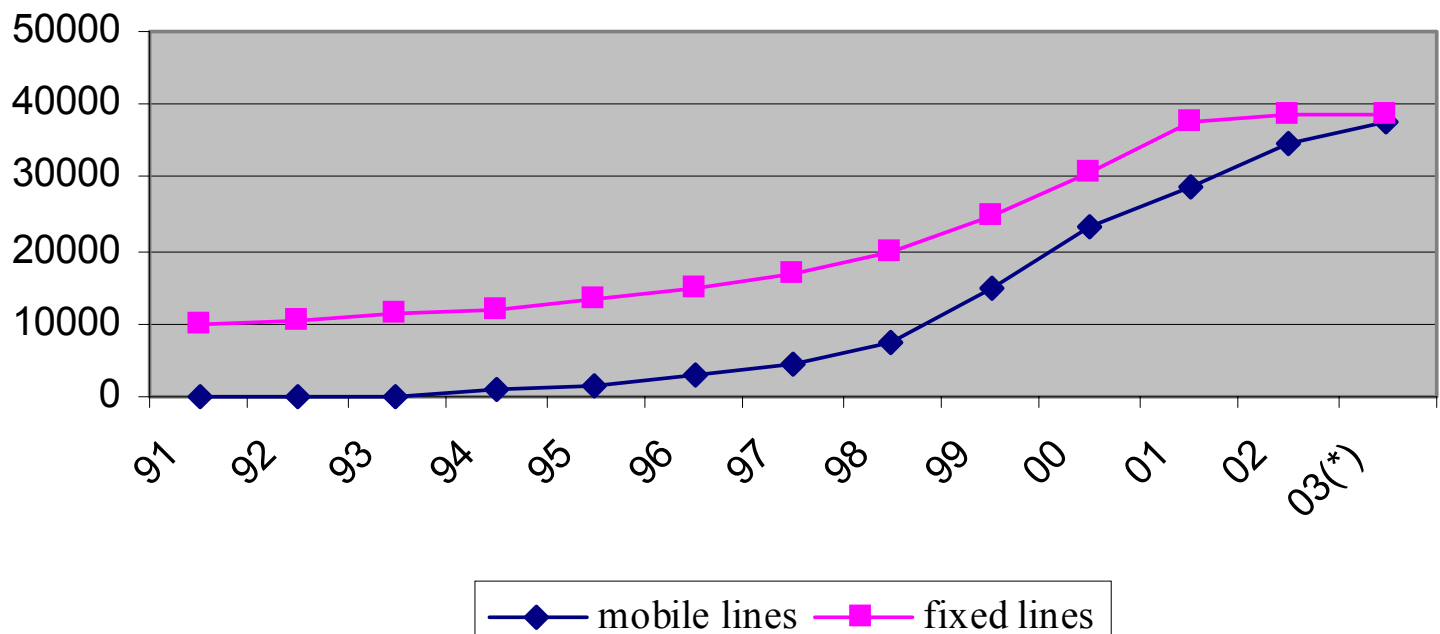


Changes in the Brazilian institutional and regulatory model (II)

- 1995: beginning of the liberalisation process (Telebrás' Privatisation in 1998)
 - Increase in the number of fixed installed lines with low competition in local telephony
 - Significant increase in the number of mobile lines with high competition
 - High investment by all operators in the period 1995-2001 (approximately US\$ 24 billion)

Changes in the Brazilian institutional and regulatory model (III)

Figure 2: Evolution of fixed and mobile lines in Brazil
(in thousands)





Impacts on the telecom innovation system (I)

■ National telecom industry

- Increase in telecommunications imports of components, parts, pieces and final products with negative effects on the trade balance
- Entrance of new equipment suppliers
- Acquisition of dynamic nationally owned firms by MNCs subsidiaries

Impacts on the telecom innovation system (II)

Table 1: Trade balance of the telecommunications equipment industry and total electronic complex deficit (1996-2002)

(US\$ million)

Description/Year	1996	1997	1998	1999	2000	2001	2002
Imports	1 925.2	2 664.2	2 578.7	2 540.3	3 160.0	3458.3	1432.9
Exports	154.1	288.1	329.1	484.2	1 310.3	1547,8	1546
Telecom Trade Balance	-1 771.1	-2 376.1	-2 249.6	-2 056.1	-1 849.7	-1910.5	113.1
Electronic Complex Trade Balance	-5 474.3	-6 378.8	-5 680.0	-5 157.9	-6 299.1	-5805.1	-3 115.1

Source: BNDES (Social and Economic Development National Bank - www.bndes.gov.br)



Impacts on the telecom innovation system (III)

Table 2: Market Share of the main suppliers of telecom equipment in the Brazilian market, by origin of capital (*)

Year	1988	1997	2000
Market share of the nationally owned firms	77%	41,5%	8,7%
Market share of the foreign firms	23%	58,5%	91,3%

Source: Oliva, 2002 .

(*)The concept of nationally owned and foreign firms are based on the control of voting capital criterion.

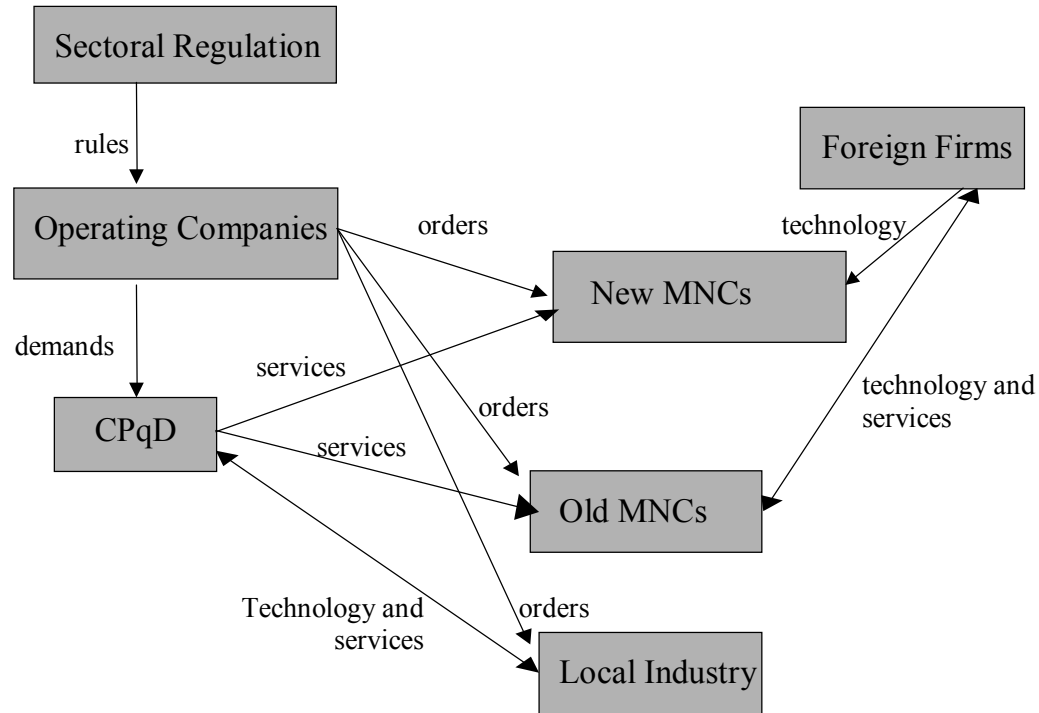


Impacts on the telecom innovation system (IV)

- Transformation of CPqD into a private Foundation (resources from concession contracts and Funttel)
 - Change in the mix of activities
 - reduction of research activities of higher risk
 - increase in short term consultancy and technical assistance
 - Change in technological strategies of firms
 - Reduction of R&D by both national and MNCs subsidiaries

Impacts on the telecom innovation system (V)

Figure 3: Innovation system of telecom
(late 1990s)





New telecommunications industry: major international trends


- Change of the mix of R&D between incumbents and equipment suppliers
- Concentration of R&D efforts in the equipment supplier layer
- Low R&D investment by the incumbents
- Pressures to reduce long run R&D
- Developed countries maintain innovation and R&D efforts in telecommunications
 - incumbents still by locally
- Globalisation: “more rhetoric than reality” (Fransman, 2002)



Main Challenges for Brazil (I)

- New operators with global procurement policies and traditional suppliers
- Denationalisation of the telecom industry (equipment suppliers and incumbents)
- Brazilian multinational subsidiaries concentrated in product adaptations to local markets
- FUNTTEL, FUST, supporting instruments from BNDES and New Informatics Law - Is it enough???

Main Challenges for Brazil (II)



Need of a systemic approach of the policy instruments to foster the telecom innovation system