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National Broadband strategies – The case of Brazil

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Introduction

Universal coverage of broadband services is a common goal that almost any country aims to achieve. However, the ways to reach this goal vary among regions and among countries both with respect to policies applied and technologies to be implemented (Lemstra and Melody, 2014; Henten and Falch, 2017).

Broadband for all is a widely accepted policy objective in both developed and developing countries. However, the policy strategies for achieving this goal are very different in different countries. These differences are originated in different levels of economic and technological development, as well as differences in institutional factors. For instance has the government played a leading role in Japan and South Korea, while US and UK have a strong emphasis on market forces and competition.

Brazil has chosen their own strategy for broadband development. This strategy is defined within a specific national context taking international experiences into account. This paper analyses broadband policy in Brazil in order to identify national characteristics and to discuss to which extend it follows international trends in broadband policy. Finally the policy is evaluation with the purpose of identifying possible lessons to be learned by other countries.

The paper as a point of departure consider following three dimensions:

1) Regulatory vs developmental policies
2) Infrastructure vs service competition
3) Networks vs content prioritization

This framework is developed in (Henten and Falch, 2018) with the purpose of comparing broadband strategies in different countries.

The paper first describes these dimensions, and how the framework relates to other kinds of categorisations. Second it provides a brief overview of how the Brazilian telecom market developed. The subsequent section presents various policy initiatives taken within the area of broadband. Finaly the paper concludes with an analysis of these initiatives using the three dimensions framework presented in section two.

Trends in analysing broadband policies

Numerous studies on broadband policies have been published. A large number of both theoretical and econometric studies focus on regulation as the key policy tool for the promotion of broadband investments - see Cambini & Jiang (2009). Other studies

focuses on broadband policy in one or in a sample of countries. Each of these studies use their own categorisation ICT policies.

The book "The dynamic of broadband markets in Europe" (Lemstra & Melody, 2014) provides a broad overview of broadband policies in a large number European countries, and can be seen as a follow-up of "Global Broadband Battles" published in 2006 (Fransmann, 2006). Both studies seek to use national experiences to identify succesfull policies and which factors that determine the diffusion of broadband. Using a historic approach (Lemstra & Melody, 2014) uses 15 extensive European country cases to identify 20 different factors, which have an impact on the penetration of broadband. In its categorization of policy policies it refers to the distinction between development and regulatory policies. Fransmann suggests that the combination of strong regulation and direct intervention (i.e. developmental policy in our terminology) applied in East Asian countries has contributed to their successful broadband strategy.

An on-going discussion in broadband policy is whether investments in the infrastructure should be promoted through the creation of a competitive market (regulation) or by providing public subsidies. This leads to a distinction between regulation and direct intervention. (Falch, 2007) distinguishes between direct intervention, regulation and facilitation, Frieden (2005) distinguishes between regulation, supply stimulation and demand stimulation.

In other studies the distinction is between promotion of competition by the use of various regulatory measures and infrastructure support, for instance by engagement in PPP arrangements (Picot & Wernick, 2007; Falch & Henten, 2007). Montolio & Trillas (2013) make a similar distinction as they talk about policies 'related to market power (regulation and competition policy) and those related to positive externalities (network externalities and impact on overall economic growth)'. It should be noted that while the first type is carried out at the national or international levels, the second type is often carried out at more decentralized levels (regional or municipal).

It follows that policy discussions have followed different dimension. The framework applied in this paper represents an attempt to embrace these dimensions into a single model, which can be applied to describe and compare ICT policies across countries.

Regulatory vs developmental policies

This dimension distinguishes between a regulatory and a developmental approach. In this context, we will only deal with regulatory and developmental policies, which are aimed at the telecom sector specifically. Regulation embraces primarily activities carried out by national telecom authorities. This includes sector specific regulation only not regulation in general.

The objective of a regulatory approach is to create a stable policy framework for a liberalized telecom market with real competition. The instruments in this approach are rulemaking and correction of market failures. However, direct market interventions are to be avoided. This approach is theoretically supported by institutional economics (Spiller & Tommasi, 2008).

The developmental approach is to stimulate investments and the use of ICT through various public sector initiated activities. The instruments include policies, which are more intrusive than those applied in the regulatory approach. These could be public investments and direct market intervention, e.g. in the form of public private partnerships providing public support to infrastructure development or subsidies to use or supply ICT services. However, it includes also less intrusive measures such as demand stimulation via public consumption or upgrade of ICT skills of the citizens. This approach is supported by (Fransmann, 2006), and is in line with an active industrial policy as supported by Stiglitz (1998).

Infrastructure vs service competition

Infrastructure competition means the competition between alternative broadband infrastructures whether the same technologies are used or competition relies on the use of different technologies. Service competition means that network operators use the same infrastructures but compete on network services. Services based competition was been seen as fast way to introduce competition in the cupper based legacy networks owned by the former state owned monopolies. Martin Cave has introduced the theory of the ladder of investment (LoI), stylized by (Cave, 2006). The idea in the LoI theory is that new operators will enter the markets using the infrastructures of existing operators, and then they will climb up the rungs of the ladder as they get a better grip on the markets, eventually deploying their own infrastructures. LoI is developed for providing xDSL services, but the same model can also be applied on other infrastructures such as coax and optical fibres.

The general conclusion seems to be that service-based competition promotes immediate competition, leading to lower prices and higher subscription rates, but that it may limit investments in new infrastructures and coverage by high-speed technologies. Service-based competition supports static competition, while infrastructure-based competition supports dynamic competition.

Networks vs content prioritization

A key issue in the technology policy debate is whether a technology-push or a demand-pull strategy is the best way to promote innovation. In the 1960s and 1970s, the extent to which the rate and direction of innovation was dependent on supply and demand was debated (Nemet, 2009), and this distinction is applied in later studies on technical change and economic theory for instance in the concept of the techno-economic paradigms (Freeman & Perez, 1988).

In the debate on broadband policy this conjecture translates into the debate on whether broadband policies should be concerned mainly with the deployment of networks or mainly with the creation and diffusion of content? Within the European ICT policy the main focus was in its initial phase on the supply side. However in more recent policy initiatives such as the Digital Agenda content creation has a more prominent position (European Commission, 2014) (Falch & Henten, 2015).

The Brazilian Telecom Market – an Overview

Brazil has a long tradition in government participating in the economy. Since the 1930's, when the crisis initiated in the United States affected Brazilian coffee exportation, the dynamic centre of Brazilian economy moved from external to domestic demand. The industrialization process in this period became known as Import Substitution Industrialization (ISI), mainly with protectionist and foreign exchange policies. These policies were implemented for three decades, changing the Brazilian economy from rural to urban, in a project of a "national building" (Gremaud et al., 2012).

In the 1950's more developmental policies were implemented inspired by the ideas of Raúl Prebish and Celso Furtado, starting on investments on infrastructure industry, specially energy and transporting (Gremaud et al., 2012; Villela, 2011). Although Brazilian politics and economy has suffered discontinuities, especially with the military dictatorship initiated in 1964, the development project continued, and many state-owned companies were created (Boschi, 2010; Gremaud et al., 2012).

Although the long tradition in public investment in Brazilian industry, the telephone system took almost one century to receive attention from policy makers. Since the first telephone lines installed in 1879 by American investors with the support of the emperor Pedro II until 1972, when the state has taken the responsibility for telephone infrastructure, the sector was almost completely private and unregulated (Kingstone, 2003).

In 1972, following the development wave, the telephone system was nationalized and the national state-owned company Telebras was created, and from this time until the privatization process, became the responsible for the deployment of the Brazilian telecommunications network. Although the initial performance of Telebras was quite strong, the economic crisis and the hyperinflation in Brazil on the 1980's eroded company's profits. By the early 1990's Telebras was an increasingly unpopular and inefficient state-owned enterprise and became a target for privatization (Guimarães, 2007; Kingstone, 2003).

At the same time, beginning with British Telecom in 1981, many Telecommunication companies were privatized during the decades on 1980 and 1990 (Molano, 2000). Following the Washington Consensus, president Fernando Collor (1990-1992) privatized many state-owned companies, but Telebras privatization came only after changes in the constitution and many negotiations between government and Congress led by the president Fernando Henrique Cardoso (1995-2002). The auction in 1998 netted roughly US$ 22 billion, the largest privatization in the world to that date (Kingstone, 2003).

In 1997 Telebras was demerged in 12 smaller companies, called "babybras", four for fixed telephony[1], and eight for mobile (Faiola, 1998). Each "babybras" was responsible for one region or long-distance calls. The concession for each of these regional companies was bought by foreign investors (incumbent companies in industrialised countries) and funded by pension funds (Shima, 2013). For each region, the government authorized, by concession, the entry of one company to compete with the privatized incumbents. These new companies were called "mirror companies". To be sure that the private companies were meeting the requirements, a regulatory agency, called Anatel, was created (Costa, 2008; Gião and Vargens, 2004; Shima,

[1] Among these four companies, three operated only in local calls and long-distance calls between states among the region of operation. Only one company, Embratel, could operate for long- distance in the whole Brazilian territory and international calls.

2013). Baby Bras, Mirror Companies and shareholders after privatization are summarized in the boxes 1 and 2 below.

Box 1: Privatized Companies, Competitors and Shareholders – Fixed lines

Region	States	"BabyBras"	Incumbent		Entrant (mirror)	
			Brand	Shareholders	Brand	Shareholders
I	Rio de Janeiro, Minas Gerais, Espírito Santo, Bahia, Sergipe, Alagoas, Pernambuco, Paraíba, Rio Grande do Norte, Ceará, Piauí, Maranhão, Pará, Amapá, Amazonas and Roraima.	Tele Norte Leste	Telemar	Previ + BNDES + Petros + Andrade Gutierrez + La Fonte Group	Vesper	Qualcomm + Velecom
II	Federal District territory, Rio Grande do Sul, Santa Catarina, Paraná, Mato Grosso do Sul, Mato Grosso, Goiás, Tocantins, Rondonia and Acre	Tele Centro-Sul	Brasil Telecom	Opportunity Bank + Telecom Italia	GVT	Bell Canada + WLL + Qualcomm + SLI Wireless
III	São Paulo	Telesp	Telefônica	Telefónica España	Vesper	Qualcomm + Velecom
IV	Brazil (whole territory)	Embratel	Embratel	MCI + Worldcom	Intelig	National Grid + France Telecom + Sprint

SOURCE: Gião and Varges (2004); Shima (2013); Own elaboration (Gião and Vargens, 2004; Shima, 2013 Own elaboration)

Box 2: Privatized Companies, Competitors and Shareholders – Mobile lines

Region	States	"BabyBras"	Incumbent ("A" Band)		Entrant (mirror - "B" Band)	
			Brand	Shareholders	Brand	Shareholders
1	São Paulo	Telesp Celular	Telefônica Celular	Telefónica España; Potugal Telecom	Tess (country side)	Telia + Eriline + Primave
					BCB (capital region)	Bell South + Splice
2	Espírito Santo and Rio de Janeiro	TeleSudeste Celular	Telefônica Celular	Telefónica España + Iberdrola + NTT + Itochu	Algar	Lightel Technology + Queiroz Galvão + Korea Mobile Telecom +
3	Minas Gerais	Telemig Celular	Telemig Celular	Telesistem International Wireless (TIW) + Opportunity Bank	Maxitel	Vicunha Group + Bradesco Bank + Globopar + Telecom Italia Mobile (TIM)
4	Paraná, Rio Grande do Sul and Santa Catarina	Telesul Celular	Telecom Italia Mobile (TIM) (Paraná and Sata Catarina)	Telecom Italia Mobile + Globopar + Bradesco Bank	Global Telecom	DDI + Motorola + Inepar
			Telefônica Celular (Rio Grande do Sul)	Telefónica España + Portugal Telecom	Telet	Bell Canada + TIW
5	Acre, Federal District, Goiás, Mato Grosso, Mato Grosso do Sul, Rondônia and Tocantins	Tele Centro-Oeste Celular	Tele Centro-Oeste Celular	Splice do Brasil	Americel	Bell Canada + TIW
6	Amapá, Amazonas, Maranhão, Pará and Roraima	TeleNorte Celular	TeleNorte Celular	TIW + Oportunity Bank + Brazilian Pension Funds	NBT	Inepar + Splice
7	Bahia and Sergipe	Tele Leste Celular	Telefônica Celular	Telefónica España + Iberdrola	Maxitel	Telecom Italia + Vicunha Group
8	Alagoas, Ceará, Paraíba, Pernambuco, Piauí and Rio Grande do Norte	Tele Nordeste Celular	TIM Nordeste	Telecom Italia Mobile + Globopar + Bradesco Bank	BCP	Bell South + Splice + Safra Bank + O Estado de São Paulo

SOURCE: Gião and Varges (2004); Shima (2013); Own elaboration (Gião and Vargens, 2004; Shima, 2013 Own elaboration)

In 2000 legislation permitted free entry of Personal Communication System companies and, by 2002, free entry of any services (Considera et al., 2002; Mocelin and Barcelos, 2012). Box 3 below summarizes the evolution in telecommunications regulation in Brazil. In 2008, after several years of scandals involving Brasil Telecom's shareholders, Telecom Italia sold its share to Pension Funds and City Goup. In 2009, after changing the legislation, government, under influence of president Luís Inácio Lula da Silva (a.k.a. Lula), authorized the merge of Brasil Telecom and Telemar into a nationwide private incumbent company, branded Oi. This merger was led by the Brazilian National Bank of Social and Economic Development (Banco Nacional

de Desenvolvimento Econômico e Social – BNDES). “This was a measure of industrial policy justified by a policy of fostering national champions” (Shima, 2013, p. 31).

Box 3: Dynamics of changes in Brazilian Telecommunications’ Regulation

<table>
<tr><th rowspan="3">Sector</th><th colspan="7">Phases</th></tr>
<tr><th colspan="3">Privatization (Assisted Competition)</th><th colspan="4">Liberalization (Spread Competition)</th></tr>
<tr><th>1999</th><th>2000</th><th>2001</th><th>2002</th><th>2003[a]</th><th>2004[b]</th><th>2005-2008</th></tr>
<tr><td>Fixed landline</td><td colspan="3">Regional duopoly (incumbents and local "mirror" companies).</td><td colspan="3" rowspan="5">Free entry for new companies. For incumbents and "mirror companies" who want to explore other regions, some targets need to be reached</td><td rowspan="5">New Technologies: multi-play broadband (explored by fixed, mobile and cable TV companies)

Local Number portability

New mobile bands</td></tr>
<tr><td>Intra-regional long distance</td><td colspan="3">Competition between the regional incumbent and the two long-distance national distance companies.</td></tr>
<tr><td>Inter-regional long distance</td><td colspan="3">National duopoly</td></tr>
<tr><td>International long distance</td><td colspan="3">National duopoly</td></tr>
<tr><td>Mobile</td><td>Regional duopoly</td><td colspan="2">Authorized free entry for Personal Communication System[d]</td></tr>
<tr><td>Other Services[c]</td><td colspan="8">Competitive market</td></tr>
</table>

Source: Adapted from Mocelin and Barcelos (2012).

Notes: [a] In 2003 it was allowed to enter authorized companies in any market segment or services, provided they fulfilled obligations of service and expansion of contracts. [b] In 2004, concessionaires were permitted to enter any market segment or services, except Cable TV, through the mandatory constitution of subsidiaries, provided that all the obligations of service and expansion provided for in contracts were met. [c] Value added services. [d] Although the regulatory framework promoted the entry of the Personal Mobile Service in 2000, the delay in the bidding of the C, D and E bands led to its postponement for 2002.

The Brazilian National Broadband Program

Brazilian government sees Broadband as an essential instrument for the country's economic and social development, both for the population and for private companies, as shown in items I to VIII of article 1 of Decree No. 7.175, of May 12, 2010, which establishes the National Broadband Program (Programa Nacional de Banda Larga - PNBL) (Brasil, 2010):

> Art 1st. The National Broadband Program (PNBL) was established with the objective of promoting and disseminating the use and supply of information and communication technology goods and services in order to:
> I - broaden access to broadband Internet connection services;
> II - accelerate economic and social development;
> III - promote digital inclusion;
> IV - reduce social and regional inequalities;
> V - promote the generation of employment and income;
> VI - expand Electronic Government services and to facilitate citizens' use of State services;
> VII - promote the training of the population for the use of information technologies; and
> VIII - increase Brazilian technological autonomy and competitiveness.

These objectives have intention to use broadband as an instrument for the promotion of social inclusion. The Brazilian government seems to see the universalization of broadband as a solution to the problem of income distribution.

> Building the way to overcome the social divide that divides Brazilian society is the main goal of the National Broadband Program. Social inclusion today has a new and important dimension: digital inclusion. Social stratification and accumulation of wealth are increasingly due to the ability to access, produce and circulate knowledge. Digital inclusion is a matter of citizenship: a new right in itself and a means to secure other rights to the population (Comitê Gestor do Programa de Inclusão Digital, 2010, p. 6).

Digital inclusion is seen as a mean to guarantee other fundamental rights that can be distributed over the internet. In the Geneva Declaration of Principles, signed in 2003, participating countries, including Brazil, agreed on the potential of information and communication technologies to promote the Millennium Development Goals. The Geneva Declaration also ratifies the Universal Declaration of Human Rights and proposes the use of information and communication technologies, the so-called ICTs, as a means of guaranteeing such rights, but recognizes should be considered not as an end in themselves, but as a means (International Telecommunication Union, 2005).

Since the Brazilian government has signed and ratified the document at the two meetings of the World Summit on the Information Society, it is assumed that it agreed with all items and believes in the use of ICTs to promote human rights. That is why the commitment to mass broadband, which "... must be seen as an instrument for the realization of the rights of citizens of the digital age" (Comitê Gestor do Programa de Inclusão Digital, 2010, p. 7). The government therefore recognizes the limits of ICTs, seeing them as an instrument, not an end itself (Alimonti, 2016). It recognizes, therefore, that the PNBL itself will not promote economic and social development, but it can contribute to this larger goal.

Despite these goals, Peixoto (2011), in a study on the formation of the Agenda for the PNBL, affirms that until the implementation of PNBL broadband was the government's priority. Instead, it emerged as a spill-over of the educational agenda, which aimed to bring education to remote regions.

The first attempt to roll-out broadband in Brazil took in place in 2010 under the National Broadband Program (PNBL). The three pillars of the PNBL were price reduction, coverage improvement and speed improvement. The program has also four dimensions or sets of actions: (i) regulation; (ii) financial and tax incentives; (iii) technological and productive policy; and (iv) building of a national network (Comitê Gestor do Programa de Inclusão Digital, 2010).

The guidelines for the regulation was: (i) to promote competition and free enterprise; (ii) to promote innovative businesses that develop the use of convergent services; (iii) to adopt swift procedures for conflict resolution; (iv) to stablish mandatory sharing of infrastructure; (v) to manage public infrastructure and public assets, including radiofrequency, to reduce the costs of broadband internet connection service; and (vi) to expand the offer of services in the installation of telecommunications infrastructure.

For the financial and tax incentives pillar, the guidelines were: (i) to increase the access to credit by small and micro-providers; (ii) to offer credit for digital cities projects; and (iii) reduction of the taxes for broadband services to end users and equipment of the end of the value chain.

For the technological and productive policy pillar, the proposed instruments were: (i) to increase tax incentives for equipment produced in Brazil; (ii) special conditions loans, through the National Development Bank (BNDES), for the national telecommunications equipment producers; (iii) Utilization of a special fund, which is subject to contingency. The requirement was to prevent the contingency (Comitê Gestor do Programa de Inclusão Digital, 2010).

The decree No 7175 enacted in May 12, 2010 stablishes 8 objectives for the National Broadband Program: (i) to broaden access to broadband Internet connection services; (ii) to accelerate economic and social development; (iii) to promote digital inclusion; (iv) to reduce social and regional inequalities; (v) to generate employment and income; (vi) to expand e-Government services and to facilitate citizens' use of State services; (vii) to promote the training of the population for the use of information technologies; and (viii) to increase Brazilian technological autonomy and competitiveness (Brasil, 2010). Box 4 below summarizes the policies and the instruments of PNBL.

Box 4: Policies and instruments of PNBL

Instrument	Action	Target	Beneficiary	Executor
Infrastructure Regulation	Implantation of pipelines and fibres jointly to the execution of infrastructure works	To bring broadband to remote areas	Operators	Federal Government
	Induce and strengthen unbundling networks	Improve competition	Entrant companies	Anatel
	Take advantage of the installed capacity in the domain area of federal highways.	Increase public network capacity	End users	Federal Government
Service Regulation	Expand backhaul capacity and coverage	All cities with backhaul coverage	End users	Anatel
	Detail rules and conditions for network and data interconnection	Universalization of class V interconnection	End users	Anatel
	Radio spectrum management	Expansion of mobile broadband offer	Entrant companies	Anatel
	Expand and optimize mobile broadband access network	Coverage of the 3G network throughout the national territory	End users	Anatel
	Increase competition and service alternatives with innovative business	Enable new business models	Companies	Anatel
Funding and taxes incentives	Increasing access to credit by small and micro-providers	Increase competition	Entrant companies	BNDES
	Digital Cities Projects	Increase internet access	City Halls and public schools	Federal Government
	Tax exemption for the end user (modems)	Price reduce for end users	Modems manufacturers	Federal Government
Productive and technology policy	National Content Policy	Protection to the national manufacturer	Modems Manufacturers and Application Developers	Federal Government and BNDES
Building of a national network	Infrastructure building	Network in 4.278 municipalities	Building Contractors	Federal Government

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Source: Comitê Gestor do Programa de Inclusão Digital (2010), own elaboration

According to Brazilian law, since June 2013 the Federal Senate is responsible for evaluate public policies. A commission formed by senators Zezé Perrella, Alfredo Nascimento and Anibal Diniz published a report on the results of PNBL in 2nd December 2014 (Senado Federal, 2014).

Of the target of 40 million households with broadband by December 2014, at the time of the evaluation, held in August of that year, only 27.2 million households owned the service. Although it is an important step towards universalization, the goal is far from being achieved. According to the evaluators, through a survey and data from Datasenado, the main obstacle to the acquisition of broadband is still the price. 28% of respondents stated that they did not have a computer in their homes. A second measurable goal of the program was to have the national network in 4,278 municipalities. At the time of the evaluation, only 612 municipalities were contemplated with such a network (Senado Federal, 2014).

The investments made became also below expectations. Of the investment of BRL 2.9 billion foreseen for the PNBL in the Pluriannual Plan (PPA) from 2012 to 2015, the budget execution was only BRL 214.1 million, that is, less than 7.4%. Of the total amount planned, the budget execution laws of the respective years provided for the investment of only BRL 314.7 million. In addition, it also contributed to the low execution, the contingency of resources. The goals of price reduction and coverage expansion are threatened by a common factor: market concentration. The diagnosis of the Federal Senate, in addition to confirming the reduction in the number of fixed-line companies from five to four, still estimates the reduction to only two for the next few years (Senado Federal, 2014)

Despite the pessimistic diagnosis, the report points to important advances. In addition to the reactivation of the Telebras System, in 2012 the Special Taxation Scheme of the National Broadband Program (REPNBL) was approved, with the purpose of stimulating the deployment, expansion and modernization of telecommunications networks that support broadband internet connections, through tax relief. The tax benefits consist of tax exemptions from a series of federal taxes and contributions. As a solution for next broadband policies, the commission suggested the nationalization of wholesale market, similar to Australian model (Senado Federal, 2014).

Apart of the National Broadband Policy, the Brazilian Civil Landmark of the Internet, among many other rules, stablishes the Network Neutrality principle and prevent the operator to discriminate the content (Brasil, 2014).

Conclusion

The dimensions of the broadband policy initiative taken PNBL are depicted in boxes 5 and 6.

The way the telecom market has developed resembles both the US and the European markets. Like in the US, the telecom market has been dominated by a private owned operator for most of the 20th century, but the operator was nationalized in the 1970's, and therefore the point of departure for the telecom reforms made in the 1990 were similar to that in most European countries. However the divestiture of Telebras was clearly inspired by the divestiture of AT&T in US.

Compared to US and Western Europe, Brazil has still a major challenge with regard to coverage of a huge area. This means that the policy objective of universal service becomes more important. Therefore there is more focus on infrastructure expansion than on infrastructure competition.

Like other countries in Latin America, Brazil has had a tradition for using a developmental approach, and this is also reflected in the broadband plan, which includes quite a number of developmental initiatives involving public funding. A special aspect of this strategy is that strengthening of the domestic telecom industry. This was also a part of the early telecom plans made within the EU, but this kind of industrial policy was abandoned, at least officially, in when a more regulatory approach was taken in late 1980's.

This developmental policy supporting investments in a broadband network infrastructure is combined with a strengthening of unbundling of network facilities potentially leading to more service based competition.

PNBL is a plan for promoting broadband infrastructure, and looking at the policy initiatives included, you could easily get the impression that Brazil follows a network oriented strategy. It should however be noted that content development is addressed in other kinds of policies and it therefore fair to say that Brazil follows a developmental approach with emphasis on service-based competition and content creation.

Box 5: PNBL Policies Dimension Categorization

Developmental	**Regulation**	**Infrastructure vs service-based competition**	**Content regulation**
Implantation of pipelines and fibres jointly to the execution of infrastructure works	Detail rules and conditions for network and data interconnection	Induce and strengthen unbundling networks	Civil landmark of the internet
Increasing access to credit by small and micro-providers	Radio spectrum management	Take advantage of the installed capacity in the domain area of federal highways	
Digital Cities Projects		Expand backhaul capacity and coverage	
Tax exemption for the end user (modems)		Expand and optimize mobile broadband access network	
National Content Policy		Increase competition and service alternatives with innovative business	
Infrastructure bundling			

Box 6: Summary of PNBL Policy Dimensions

Dimension		Number of iniciatives
Infrastructure vs. service competition	Infrastructure	1
	Service	2
Regulatory vs. Developmental	Regulatory	2
	Developmental	8
Networks vs. content prioritization	Network	0
	Content	1

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