



**Brazilian Agency for Industrial Development**

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**Project: Bulletin of Industrial Conjuncture, Sectoral  
Monitoring, Industry Overview and Industrial Policy  
Analysis**

**BULLETIN OF INDUSTRIAL CONJUNCTURE**

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The effects of the international economic crisis configure the central issue of the debate on the Brazilian industry's recent performance and future prospects. An analysis of Brazil's industrial conjuncture in the last quarter of 2008 reveals its very negative effects on production and employment, as well as on foreign trade. Additionally, an analysis of data on January 2009 shows, albeit preliminarily, the persistence of the negative effects observed at the end of last year.

### **Effects of the international crisis on the Brazilian industry's performance in the fourth quarter of 2008**

The international crisis escalated and entered its most acute phase as of September 2008, with a strong impact on the Brazilian economy and industry. First, the main transmission mechanism of the international crisis to the domestic economy was the interruption of credit flows, which made difficult usual operations to roll over debt and procure working capital. At the same time, the feeling that the international crisis would be deeper and last longer caused an extremely rapid reversion of expectations, which translated into strategies to reduce production drastically to avoid accumulating unwanted stocks. As it will be discussed later, the adjustment implemented by the production sector has also included a reduction in labor costs and an increase in dismissals, reinforcing the negative scenario. Finally, the last transmission vector was a sharp decrease in prices and in the quantum demanded in the foreign market.

The growth pace of the Brazilian economy decelerated clearly in the last quarter of 2008. Considering growth over the same period of the previous year, the rate fell from 6.8% in the third quarter to 1.3% in the last quarter. As to the variation regarding the immediately previous quarter, it ranged from a rise of 1.8% in the third one to a decline of 3.6% in the last, the higher quarterly reduction observed in the data series initiated in 1996 (Table 1).

From the point of view of economic activities, the industry's negative performance is important, especially in the manufacturing industry. In fact, considering the variation over the same period of the previous year, it was the negative performance in the manufacturing industry (-4.9%) that led to a decrease in the industry growth rate as a whole (-2.1%). In relation to the previous quarter, the industry decreased 7.4%, a much poorer performance when compared with that of other economic activities.

Considering demand components, the loss of dynamism in domestic demand must be emphasized, since it had been supporting the cycle of expansion drastically interrupted as of the last quarter of 2008. This can be observed in growth deceleration in household consumption expenditures, in gross fixed capital formation, and in imports of goods and services in the last quarter of 2008 when compared to the same period of 2007 (Table 1). Domestic demand deterioration becomes more evident when we examine the decrease in demand components in the fourth quarter of last year in relation to the immediately previous quarter: household consumption expenditures (-2.0%), gross fixed capital formation (-9.8%), and imports of goods and services (-8.2%). Government consumption, which had played a less significant role in the previous cycle of expansion, showed a more vigorous rate in the fourth quarter of last year in relation to the same quarter of the previous year (5.5%). Even so, government consumption grew timidly when we compare the last quarter with the immediately previous one (0.5%).

As to foreign demand, represented by the performance of exports, we observe that it started to influence economic growth negatively at the end of last year (-7.0%). Also comparing with the third quarter, there was a reduction in exports in the last quarter of 2008 (-2.9%).

**Table 1 – GDP Variation Rate per Activity and Demand Component  
(3Q/2008 and 4Q/2008) (In %)**

	Quarterly rate against same quarter of previous year		Quarterly rate against immediately previous quarter <sup>(*)</sup>	
	3Q/2008	4Q/2008	3Q/2008	4Q/2008
Agriculture and Livestock	6.4	2.2	1.3	(0.5)
Industry	7.1	(2.1)	3.6	(7.4)
Mining	7.8	0.2	-	-
Manufacturing	5.9	(4.9)	-	-
Civil construction	11.7	2.1	-	-
Electricity, gas and water	5.7	3.2	-	-
Services	5.9	2.5	0.8	(0.4)
GDP at basic price	6.3	1.0	1.5	(2.7)
GDP at market price	6.8	1.3	1.8	(3.6)
Household consumption expenditures	7.3	2.2	2.7	(2.0)
Government consumption expenditures	6.4	5.5	0.6	0.5
Gross fixed capital formation	19.7	3.8	3.8	(9.8)
Exports of goods and services	2.0	(7.0)	6.1	(2.9)
Imports of goods and services (-)	22.8	7.6	5.5	(8.2)

(\*) Seasonally adjusted.

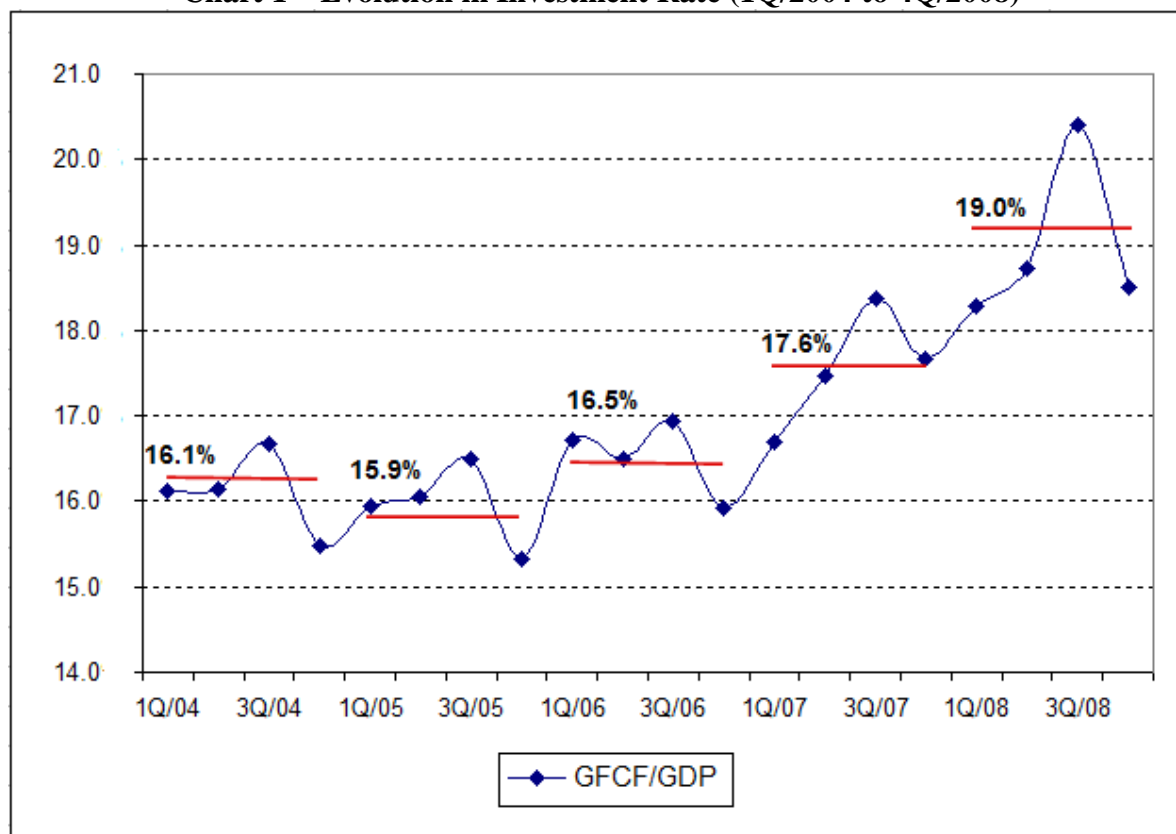
Observation: These data include the revision of numbers previously released by IBGE, which were recalculated based on changes in weight coefficients implemented by that institution. For this reason, there are differences in relation to data found in previous bulletins of industrial conjuncture.

Source: System of National Accounts (SCN)/IBGE.

Another important aspect of the reduction observed in the Brazilian economy's performance in the last quarter of last year was a deceleration in the vigorous growth of investment rate, because gross fixed capital formation – which had been growing since the first quarter of 2004 and exceeding GDP growth since the second quarter of 2005 – decelerated sharply in the last quarter of 2008.

As to the investment rate, it reached 20.4% in the third quarter of 2008, the highest level since 2000, but fell to 18.5% in the last quarter of the year (Chart 1). Therefore, the worrying growth deceleration in the investment rate at the end of last year stands out, affecting the performance of the Brazilian economy. Even so, we observe a continuous growth in the annual average investment rate over the last years, which will probably act as a foundation and incentive for reinforcing investments greatly over the next years.

**Chart 1 – Evolution in Investment Rate (1Q/2004 to 4Q/2008)**



Source: SCN/IBGE.

Data on physical production in the Monthly Industrial Survey-Physical Production (PIM-PF/IBGE) confirm a drastic change in performance indicators. Comparing the results of the fourth quarter of 2008 with those of the same period of 2007, we can see generalized falls in physical production in the general and manufacturing industry (-6.3%) and in the mining industry (-6.5%), reverting the highly positive performance observed in previous quarters. Still, growth rates accumulated in 2008 reached 3.1% for the general and manufacturing industry and 3.8% for the mining industry, levels that are equivalent to almost half of what had been observed in the total accumulated in the 12 months that ended in the first quarters of the year (Table 2).

**Table 2 – Growth Rate in Industrial Production (4Q/2007 to 4Q/2008) (In %)**

Activities	4Q 2007	1Q 2008	2Q 2008	3Q 2008	4Q 2008
<b>Quarterly growth rate in relation to the same quarter of the previous year</b>					
<b>General Industry</b>	7.9	6.4	6.2	6.7	-6.3
Mining Industry	6.1	6.8	6.3	8.9	-6.5
Manufacturing Industry	8.0	6.4	6.2	6.6	-6.3
<b>Growth rate accumulated over the past four quarters</b>					
<b>General Industry</b>	6.0	6.6	6.7	6.8	3.1
Mining Industry	5.9	6.2	6.3	7.0	3.8
Manufacturing Industry	6.0	6.7	6.7	6.8	3.1

Source: Monthly Industrial Survey –Physical Production (PIM-PF)/IBGE.

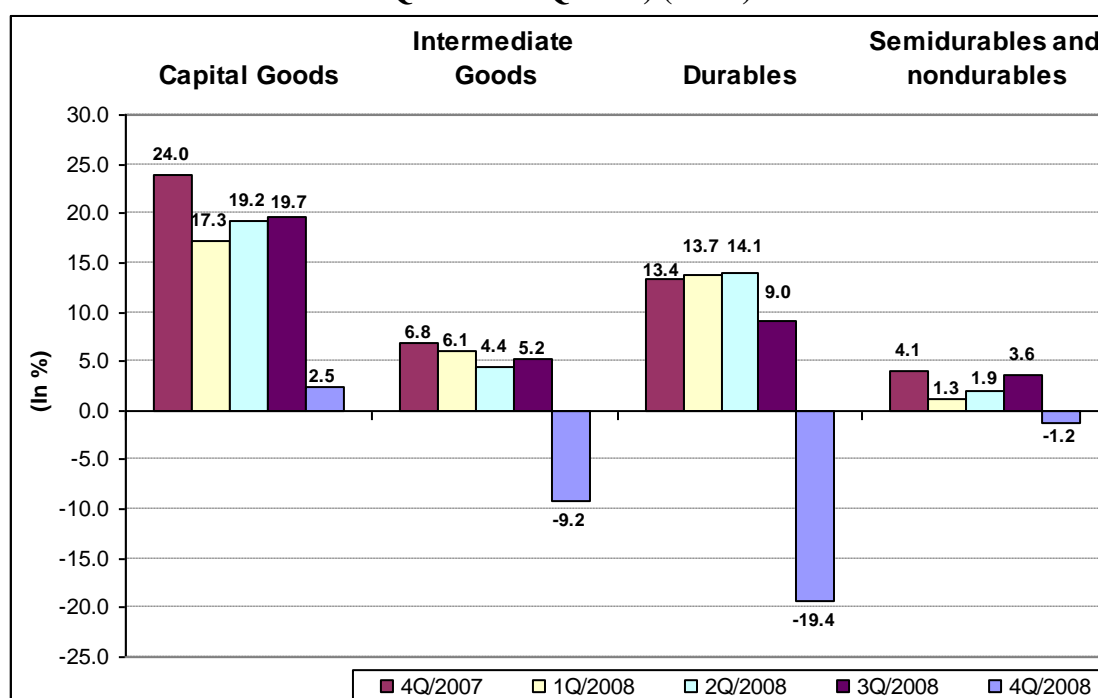
Data on industrial production organized by category of use show that consumer durables suffered a substantial decrease in the last quarter of the year (-19.4%), certainly the highest

among those observed for other categories of use. It is worth underscoring that this category had been performing positively in 2008, fuelled by a significant expansion in credit and automotive production, as highlighted in the previous bulletin of industrial conjuncture. A comparison with data about physical production in the immediately previous quarter (considering the seasonal adjustment) reveals an even more marked reduction (-25.1%).

The category of capital goods, which had been leading the industrial growth in the first quarters, grew only 2.5% in the fourth quarter of 2008 in relation to the same period of the previous year, contrasting with considerable increase observed in previous quarters (Chart 2). Even so, capital goods were the only category of use to perform positively in terms of physical production in the last quarter of last year. Considering the production growth accumulated in 2008, the level is still high for capital goods (14.3%), but lower than growth rates accumulated in the 12 months that ended in the first quarters of 2008 (which remained at about 20.0%).

Intermediate goods also followed this downward trend in production in the last quarter of last year (-9.2%), reverting its positive performance in previous quarters. In this case, decrease in foreign demand has definitely played an important role in some highly export-oriented segments. As to consumer semidurables and nondurables, which were growing steadily over the year, we also observed a decrease (-1.2%), although a more timid one.

**Chart 2 – Evolution in Industrial Production per Categories of Use  
(growth rate in relation to the same period of the previous year –  
4Q/2007 to 4Q/2008) (In %)**



Source: NEIT/IE/UNICAMP, based on data from PIM-PF/IBGE.

Upon examining production data per industrial activity, we can stress a growth deceleration in the total accumulated over last year in several sectors related to either capital goods or consumer durables, caused mainly by a production decrease concentrated in the last quarter of 2008. Some of the sectors that supported the significant growth rates accumulated in industrial production in the first quarters of 2008 decreased in the last quarter of the year when compared with the immediately previous quarter (taking into account the seasonal adjustment) as, for example: motor vehicles (-26.2%); electronic supplies, communications

devices and equipment (-21.1%); machinery and equipment (-13.3%); and office machinery and data processing equipment (-13.1%). We must stress that the sectors mentioned depend crucially on continuous credit expansion. Therefore, the global crisis eventually affected them more forcibly. Moreover, it is important to remember that these sectors also use a considerable amount of imported inputs, which makes difficult to come to decisions about production and stock replenish in a situation of uncertainty about future demand and exchange rate.

The only former leading sectors whose growth rates increased in the total accumulated in 2008 were: other transportation equipment (42.2%), headed by the extraordinary performance of aircraft (58.2%) and railroad rolling stock (54,7%); and pharmaceuticals (12.7%). The sector of medical and therapeutic equipment, optical and other instruments virtually kept to its growth path (16%).

Therefore, the analysis of the recent performance of industrial production reveals a rapid and strong negative adjustment in the business system's expectations, initially motivated by credit shortage, which resulted in a drastic and generalized decrease in physical production in industry. This effect was enhanced by a disproportional adjustment in employment levels.

The movement of job vacancy creation in the Brazilian industry in the first quarters of 2008, emphasized in previous bulletins of industrial conjuncture, was drastically interrupted in the last quarter of the year, when there was a severe loss in formal employment: loss of 344,700 jobs in the manufacturing industry and 3,600 in mining, totaling 348,300 jobs lost in the Brazilian industry. This decrease in formal employment in the Brazilian industry in the last quarter of 2008 was approximately four times higher than that observed in the same period of 2007.

As a result, data from the General Register of Employed and Unemployed Persons (CAGED/MTE)<sup>1</sup> show that the creation of formal employment by the Brazilian industry all over 2008 was significantly lower than that observed in the previous year, as a consequence of a greater and generalized movement of dismissals in relation to hirings in the last quarter of last year. About 166,200 job vacancies were created in the Brazilian industry in 2008, corresponding to a decrease of 57% in relation to 2007 (Table 3).

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<sup>1</sup> CAGED/MTE shows results for all companies that hired/dismissed formally employed individuals in the period surveyed, thus providing census coverage. Data about 2007 and 2008 were organized based on the new CNAE 2.0. PIMES/IBGE provides sample coverage, including companies with five or more employees. Therefore, divergent trends can be found in these two sources of data, mainly in sectors where small and medium companies prevail.

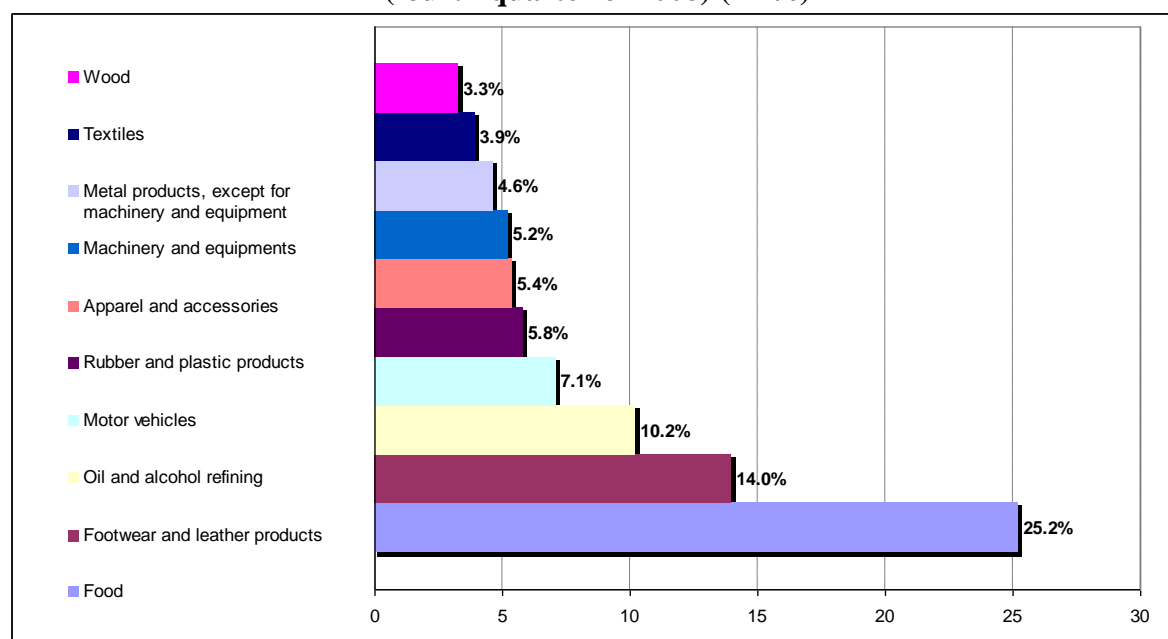
**Table 3 - Evolution in Hirings, Dismissals, and Formal Employment Creation in Industry (2007-2008) (In thousands)**

	4Q 2007	Year 2007	1Q 2008	2Q 2008	3Q 2008	4Q 2008	Year 2008	Variation (%) 2008/2007
<b>Hirings</b>	641,8	<b>3,027,8</b>	894,4	924,8	964,7	598,1	<b>3,382,0</b>	11.7
<b>Dismissals</b>	728,3	<b>2,641,2</b>	741,4	757,1	770,9	946,4	<b>3,215,7</b>	21.8
<b>Net Vacancy Creation</b>	<b>(86,5)</b>	<b>386,6</b>	153,1	167,7	193,9	(348,3)	<b>166,3</b>	(57.0)

Source: NEIT/IE/UNICAMP, based on data from CAGED/MTE.

Widespread job losses in industry in the last quarter of 2008 are confirmed when we observe the behavior of the balance between formal hirings and dismissals for different sectors. All of them lost vacancies in the last quarter of the year, except for the beverage sector. The industrial sectors with the most severe losses in formal employment in the fourth quarter of 2008 were: food (25.2%); footwear and leather products (14%); oil and alcohol refining (10.2%); motor vehicles (7.1%); rubber and plastic products (5.8%); apparel and accessories (5.4%); machinery and equipment (5.2%); metal products, except for machinery and equipment (4.6%); textiles (3.9%); and wood (3.3%) (Chart 3). Sectors that traditionally carry a heavy weight in formal employment and depend on income evolution, such as food and apparel, responded jointly for almost 30% of job losses in the fourth quarter of 2008. We must remember that some of the sectors mentioned headed the growth of industrial production and formal employment in previous quarters, such as machinery and equipment and motor vehicles, which reveals a clear reversion of the virtuous performance seen in these sectors until then.

**Chart 3 – Composition of Formal Employment Loss per Industrial Sector (fourth quarter of 2008) (In %)**



Source: NEIT/IE/UNICAMP, based on data from CAGED/MTE.

Based on data from the Annual List of Social Information (RAIS/MTE)<sup>2</sup>, we can state that, on average, in the fourth quarter of 2008 alone, industrial sectors lost about 5% of the

<sup>2</sup> In the RAIS/MTE (December 2007), data are organized according to the new CNAE 2.0. They can be used to analyze the formal employment share of several industrial sectors in the Brazilian industry and also serve as

formal employees existing in December 2007. For some sectors, formal employment loss in the last quarter of 2008 was even more important when compared with employment in December 2007: oil and alcohol refining (-26.8%); footwear and leather products (-12.2%); food (-6.8%), and motor vehicles (-6.0%). Although other sectors might not have stood out in the composition of job loss in the last quarter of last year, they lost an important number of formal employees: office machinery and data processing equipment (-11.5%) and electronic supplies and communications devices and equipment (-8.6%).

Another worrying aspect in this recent movement in the industry's formal employment market is its potential contribution to prolong crisis effects due to a reduction in the wage bill. The net loss in wage bill in the Brazilian industry reached R\$ 337,2 millions in the last quarter of 2008. This result was a consequence both of a decrease in the number of hired persons and of an increase in the wage bill of dismissed employees. Comparing with the same period in 2007, the wage bill of the hired decreased 2.2%, whereas the wage bill of the dismissed increased 38.8% (Table 4). The result in the last quarter of the year eventually produced a negative accumulated result for 2008 (decrease of R\$ 155 millions).

**Table 4 – Evolution in the Industry Wage Bill – hirings and dismissals (4Q/2007 and 4Q/2008) (In R\$ millions)**

	Wage Bill of Hirings			Wage Bill of Dismissals			Variation in Wage Bill (%)	
	4Q 2007	4Q 2008	Variation (%)	4Q 2007	4Q 2008	Variation (%)	2007	2008
<b>General Industry</b>	480,3	469,9	(2.2)	581,5	807,2	38.8	25.1	(155.7)
Mining Industry	13,8	15,5	12.3	11,5	21,7	88.7	13.7	9.5
Manufacturing Industry	466,5	454,4	(2.6)	570,0	785,5	37.8	11.4	(165.2)

Observation: Values deflated by IPCA – at December 2008 prices.

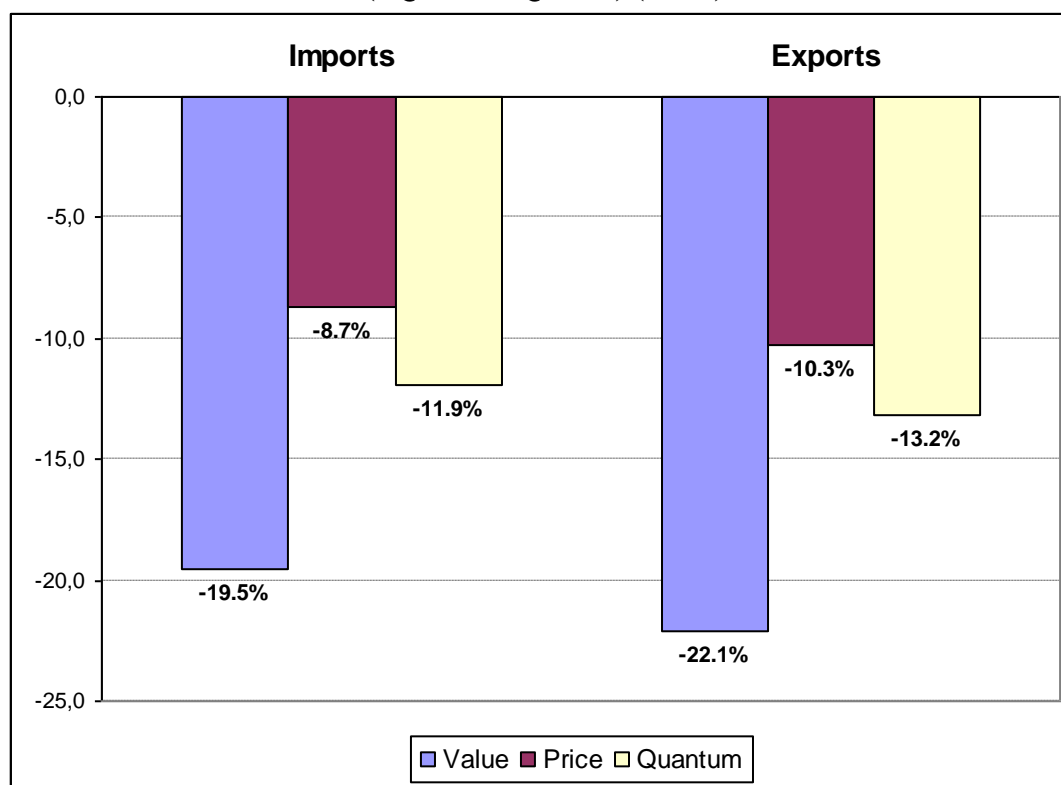
Source: NEIT/IE/UNICAMP, based on data from CAGED/MTE.

Considering data on Brazilian foreign trade for the fourth quarter of 2008, we observe a positive balance of approximately US\$ 5 billion (FUNCEX), although markedly lower (-38.6%) when compared with the positive balance of the immediately previous quarter. We observed a fall in exports (-22.1%) to US\$ 47 billion and a fall in imports (-19.5%) to US\$ 42 billion in the fourth quarter when compared with the third quarter of 2008 (Chart 4). It is possible to see that this decrease in imported and exported values was a result of a combined decrease in price and quantum, although quantum decrease has been more substantial for both exports and imports.

A comparison of the last quarter of last year with the same period of the previous year also shows a sharp decline in trade surplus (-43.7%). In this case, the decline resulted from an increase of 20.1% in Brazilian imports when these two periods are compared. Brazilian exports, on their turn, showed a slight increase of 6.9% in the last quarter of 2008 in relation to the same period of 2007. Price increase for exported products (17.2%) was the only reason for this rise in exports, taking into account that the exported quantum (-8.7%) fell sharply over the period under analysis.



**Chart 4 – Variation Rate for Exports and Imports: value, price and quantum (4Q-2008/3Q-2008) (In %)**



Source: NEIT/IE/UNICAMP, based on data from FUNCEX.

Therefore, the global crisis outbreak has translated into decreases in industrial production and in the total of wage and salaried employees, in a net loss of industrial wage bill, as well as in a decrease in the Brazilian trade surplus in the last quarter of 2008. Now, we are to investigate, even though in a preliminary way, the persistence of the effects of the global crisis on the Brazilian industry based on the most recent available data (Jan. 2009) about production, employment, and foreign trade.

### **The performance of the Brazilian industry in January 2009**

Data on January 2009 show an ongoing downward movement in the physical production of the general industry and of both the manufacturing and mining segments when compared with January 2008: -15.2%, -15.0%, and -18.2%, respectively (data from PIM-PF/IBGE, seasonally adjusted). We must stress that falls observed in January this year were slightly lower than those observed in December 2008 in relation to the same period of the previous year, which reveals a downward movement concentrated mainly in the last month of last year. Comparing the results of physical production for January 2009 with those for December 2008, we can even see a timid recovery in the general industry (2.3%), in the manufacturing industry (2.2%), and in the mining industry (1.4%), however, we must remember that the basis for comparison can be considered very low.

All categories of use decreased in physical production when comparing data for January 2009 with those for the same month last year. Consumer durables and intermediate goods headed this fall in physical production in the period, with -27.9% and -18.7%, respectively. Capital goods did not fall behind, since they decreased 10.4%, followed by semidurables and nondurables, which decreased 6.2%. However, taking December 2008 as a basis for comparison and using the seasonally adjusted series, we again see an increase in physical

production in most categories of use, clearly headed by consumer durables (38.6%). Consumer durables managed to recover partially the production losses observed in previous months (-21% in November and -33% in December in relation to immediately previous months), which responded for a dramatic decrease in stocks at the end of last year. Capital goods also showed a relative recovery in production in the first month of this year, with an increase of 8.4% when compared with December of last year, but were not able to recover from the sharp fall observed in previous months. The only exceptions were semidurables and nondurables, whose production decreased slightly in January in relation to December (-0.6%).

Production decrease spread to the different industrial sectors under study. Virtually all sectors monitored by PIM-PF showed a decrease in production in January of this year in relation to the same month of last year – the only exception was the sector of miscellaneous products. Losses in the production of motor vehicles (-34.7%) and machinery and equipment (-30.3%) stand out. These sectors were leading the cycle of expansion until then. Comparing January 2009 with December 2008, almost half of the sectors monitored in the monthly survey continued to show a decreased production, with emphasis on other transportation equipment (-9.9%) and medical and therapeutic equipment (-9.5%). However, some sectors managed to grow in January 2009 when compared with December 2008, and again we stress the low level of the basis for comparison. This was the case for furniture (40.8%); motor vehicles (28.4%); basic metallurgy (13.6%); and apparel and accessories (10.3%).

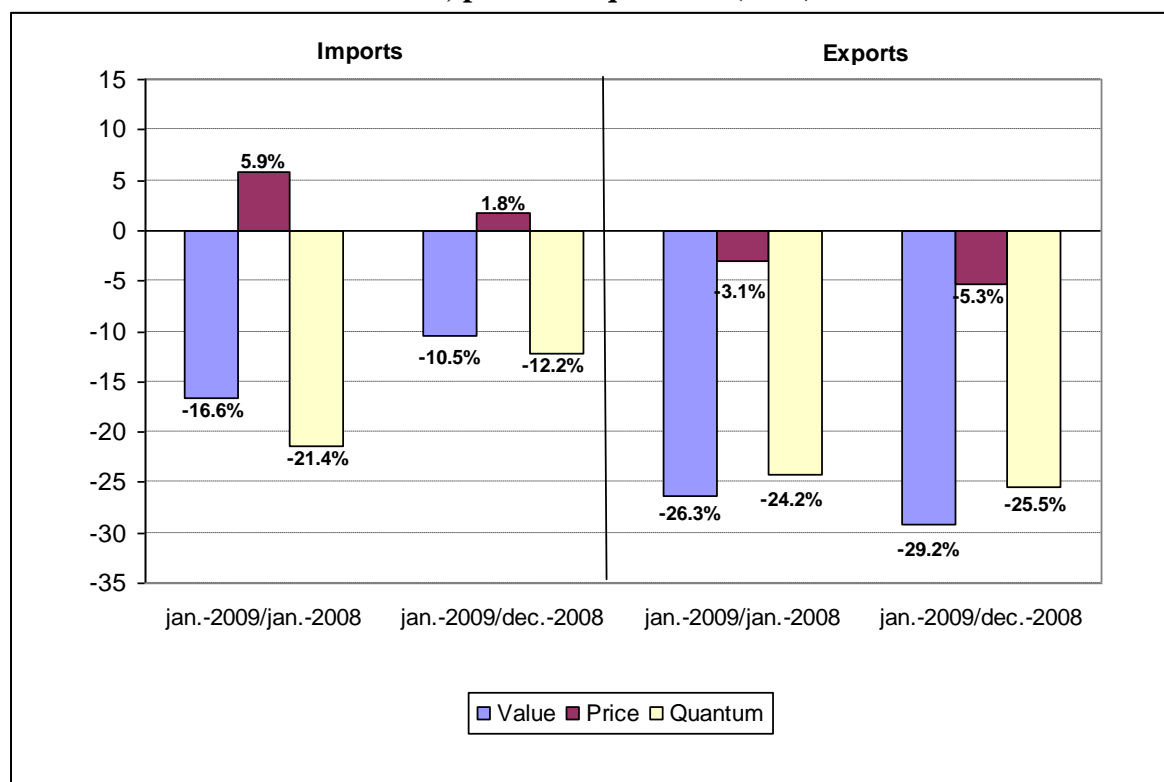
The physical production decrease in the general industry and in the manufacturing and mining segments, when comparing January 2009 with January 2008, was followed by a sharp fall in formal employment in the general industry in the first month of this year: 54,000 job cuts. In view of the creation of about 59,000 job vacancies in January 2008, the persistent negative effect of the global crisis on formal employment in January 2009 becomes evident. A comparison with December 2008, when massive dismissal was the main reason for nearly 270,000 job cuts in industry, points to a deceleration in the industrial employment decline. However, this constant downward movement in employment maintains concern over the effects of the global financial crisis on the Brazilian industry and economy.

As to data on foreign trade, comparing January 2009 with December 2008, we see that exported values continued to decrease, mainly due to a fall in exported quantum, mirroring the deterioration of the international scenario. As regards imports, we also see a continuous fall in quantum, whereas prices rose slightly. Yet, values imported in January 2009 decreased 10.5% in relation to December 2008 (Chart 5).

Therefore, there are clear signs that the negative situation that began in the last quarter of 2008 will persist, due to the weakened Brazilian demand for imported goods and to the international decreased demand and prices for Brazilian exports. Again, the growing strangling of Brazilian foreign trade becomes evident, resulting especially from the deceleration of global demand, with bearish effects on international prices and quantum demanded by different countries, and also from domestic difficulties concerning reduced credit for exports.

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**Chart 5 – Variation Rate in Exports and Imports:  
value, price and quantum (In%)**



Source: NEIT/IE/UNICAMP, based on data from FUNCEX.

The analysis of data on January 2009 reveals, albeit preliminarily, the maintenance of the negative effects of the global crisis on the Brazilian economy, conveyed by severe reduction in credit and liquidity and by a sudden reversion in the economic agents' expectations, which produced a strong and persistent contraction in industrial production and employment. Thus persists the reversion – initiated in the last quarter of 2008 – in the growth pace that had prevailed until the third quarter of 2008.

The maintenance of an international scenario with no recovery in view allows us to foresee that international trade will keep shrinking in the next periods, which means that the industrial sectors that depend heavily on the foreign market will continue to face difficulties to regain their pre-crisis levels of activity. It also means that possibilities for recovery and reversion from the most acute phase of the crisis will depend largely on the recovery ability of the domestic market.

More immediately, the great challenge is to resume credit operations, so that production and demand financing flows are able to recover. Moreover, a more active monetary policy is fundamental to revert as soon as possible the vicious circle of production decrease, unemployment increase, wage bill loss, and demand decrease. On the other hand, it is of great importance to take steps to support production and stimulate demand, such as reducing taxes on manufactured goods, in order that the Brazilian economy can rapidly emerge from the most acute phase of the crisis and resume its growth path.

## **Broadband Expansion in Brazil**

In the last decades, there has been a notable dynamism in the sector of information and communication technologies (ICTs), as a result of structural changes, mainly technological ones, which not only altered economic dynamics in industries and nations, but also produced social transformations related to the forms of communication and access to information. More recently, the vector of this dynamism has been the expansion of broadband (BB) internet.

Downloads and uploads of the most diverse content types and sizes based on Internet Protocol (IP) platform come to require broader and broader bands to be accessed. Thus, BB became an essential resource to access information. Besides ADSL, which is offered by telephone service providers, new BB technologies are increasingly widespread – coaxial cable (used by monthly-subscription TV providers); MMDS (or wireless cable); VSAT (via satellite); BPL (broadband over power line); FTTH (fiber to the home, via optic fiber) – leaving dial-up connections behind.

Moreover, technologies that allow for broadband access away from desktop workstations are expanding progressively faster in notebooks and cell phones for example, such as 3G, WiMax, and WiFi. Besides making it possible to download larger contents more rapidly, such wireless technologies can operate in less densely populated areas, and are particularly interesting to universalize internet access.

Several economic benefits can be achieved in addition to the social ones resulting from BB internet access, such as new types of services and technologies to be explored, which would consequently increase productivity, competitiveness, and growth, not only in the sector of telecommunications itself, but also in a wide range of industries related to it.

BB expansion is intrinsically linked to demand for faster access to sizable contents available on the internet. According to data from the International Telecommunication Union (ITU), in the last years, the rise in the number of BB subscribers was much higher than the total number of subscribers of conventional internet access (Table 1). Globally speaking, from 2000 to 2007, the number of BB subscribers rose by 56.1%, whereas the total number of internet subscribers increased 18.7%.

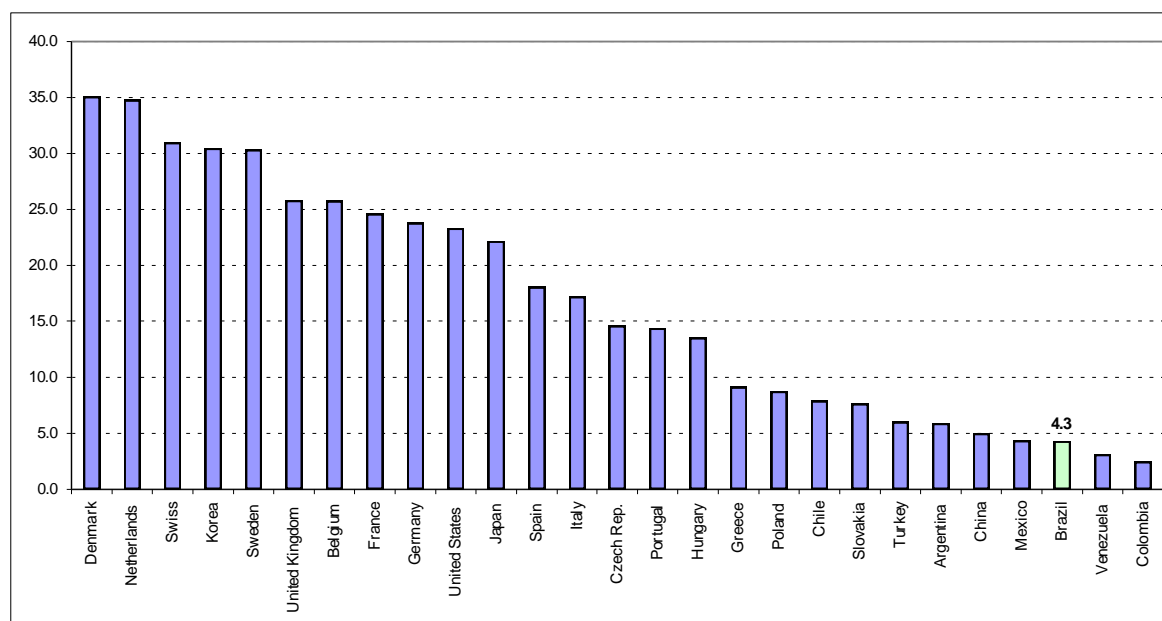
**Table 1 – World: Numbers of internet and broadband internet subscribers (2000-2007) (In thousands of people)**

Year	Internet	Broadband
2000	166,868	15,889
2001	240,968	37,050
2002	285,566	66,020
2003	329,172	103,686
2004	353,739	157,864
2005	383,025	218,496
2006	409,088	283,679
2007	553,916	358,340
<b>Variation (2000-2007) (%)</b>	231.9	2,155.30
<b>Annual Average Variation (%)</b>	18.7	56.1

Source: ITU.

Today, the OECD countries are the world leaders in BB expansion (an average of 15 subscribers per 100 inhabitants). In 2007, five countries of this organization had at least 30 subscribers per 100 inhabitants (Denmark, the Netherlands, Swiss, Korea, and Sweden) (Chart 2). Comparatively, the Brazilian expansion rate is still much lower than that seen in developed countries (4.3%)<sup>3</sup>, and also lower than that of several developing countries, such as Turkey (6.2%), Argentina (6%), and China (5%).

**Chart 1 – World: Broadband Expansion (2007) (In %)**



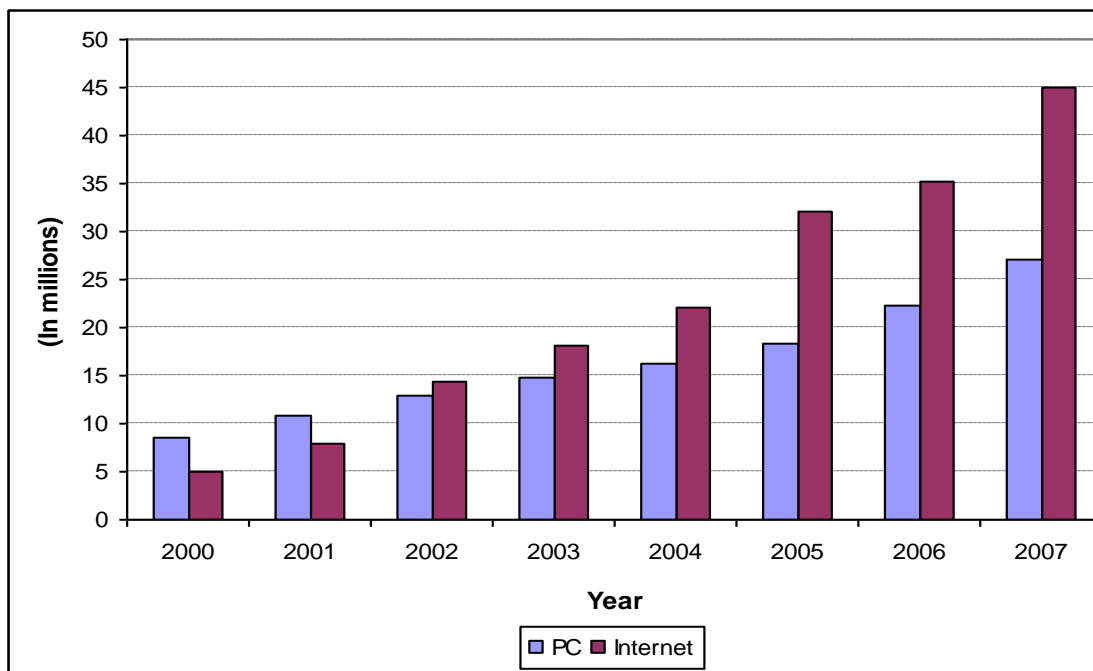
Source: OECD (2008) and Teleco.

This gap between broadband expansion in Brazil and in other countries has some important conditionings. First, we must consider that people have to purchase terminals for access, be they either fixed (such as PCs) or mobile (such as third generation cell phones – 3G). Concerning fixed terminals, in spite of the fact that, from 2000 to 2007, the number of PCs soared nearly 218% (an annual average increase of 18%), from 8.5 to 27 million, the

<sup>3</sup> Data available on the Teleco website show that, until the third quarter of 2008, broadband penetration in Brazil had already reached 5%. Cf. <http://www.teleco.com.br/blarga.asp>.

number of internet users grew much more (798%, or 37% annually on average over the same period), from 5 to 45 million (Chart 2).

**Chart 2 – Brazil: Number of PCs and Internet Users  
(2000-2007) (In millions)**



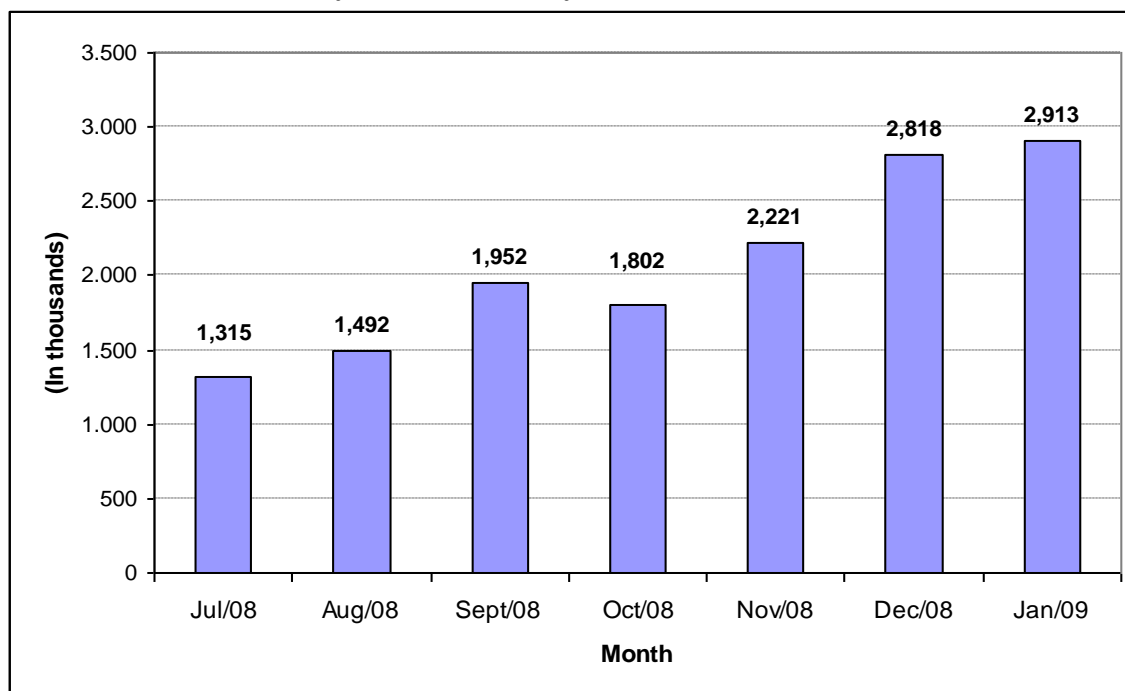
Source: Telebrasil (2008).

The market for BB access from mobile terminals is also in full expansion. The main competitors in this segment are services based on 3G and WiMax (still being tested in most companies). With them, it is possible to access wireless BB services in any type of computer – by means of data boards, USB modems, or laptops with built-in 3G modules – or cell phone. Especially in cell phones, the 3G technology made internet access (file, music, or document downloads) much faster than in previous BB technologies – GPRS and EDGE<sup>4</sup>. Widespread in European countries, in the United States, Australia, Korea, and Japan, 3G is already being used in 15 Latin American countries, and is growing in Brazil. All over the world, the number of 3G cell phones rose by 5.000% between 2003 and 2008 (up to the third quarter), from 7.2 to 367 millions, which corresponds to an annual growth rate of 119% (Teleco).

Brazil reached the end of January 2009 with approximately 2.9 million 3G cell phones – 1.8% of the total of cell phones in the country –, which represented an increase of 121.5% in relation to July 2008 (Chart 3). Today, 56.4% of the Brazilian population (107 million inhabitants) are covered by 3G technology in nearly 390 municipalities.

<sup>4</sup> Cf. <http://www.tecnologia3g.com.br/compareodesempenho.php>.

**Chart 3 – Brazil: Evolution in the number of 3G cell phones  
(July 2008 to January 2009) (In thousands)**



Note: In Oct./08, TIM did not release its number of cell phones, producing a difference in relation to the previous month.  
Source: Teleco.

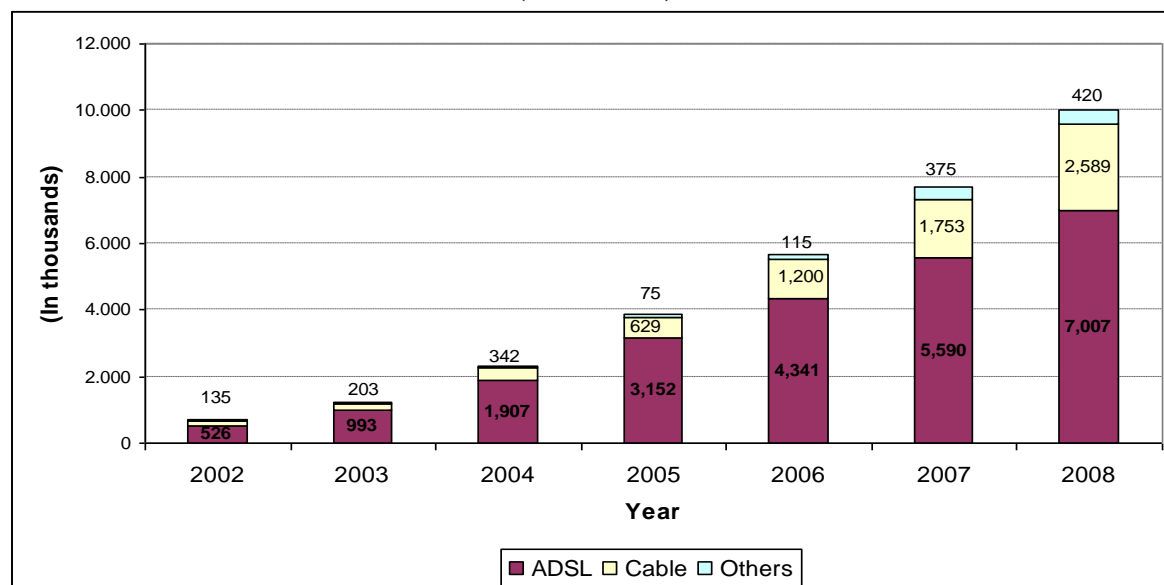
In spite of its improvement, Brazil, as well as other developing countries, is at a much lower level than developed countries regarding mobile BB expansion. According to ITU, in 2007, there were 167 million mobile BB subscribers all over the world, but the expansion of access was of 13% in developed countries and of only 3% in developing countries.

Another conditioning related to BB expansion in Brazil is the development of access infrastructure. The remotest regions of the country, of lower income and lower population density, are often not reached by BB access infrastructure (backhaul) and/or do not have access to this kind of service (since providers tend to offer it mostly in more profitable regions).

Among the BB access technologies available in the country, the most widespread are wired technologies, such as ADSL (provided by landline telephone companies) and cable modems (provided by monthly-subscription TV providers). ADSL is the most widespread technology, totaling 7 million connections in 2008 (70% of the total), with an annual average growth of 54% from 2002 to 2008. Cable modems rank second, totaling 2.5 million connections in 2008 (26% of the total), with an annual average growth higher than that of ADSL (64%) in the period (Chart 4).

Wireless technologies (such as WiFi and radio), in spite of being narrowly spread in the country (420,000 BB connections in 2008), grew at a significantly high rate (54% on average annually) from 2002 to 2008. These technologies are important to provide BB internet access in areas where ADSL and cable networks do not reach and also in less densely populated areas, facilitating the universalization of BB access in Brazil.

**Chart 4 – Brazil: Total broadband connections per technology of access (2002-2008)**



Note: Other technologies include radio connections and 3G cell phones and exclude satellite connections.  
Source: Teleco.

In 2007, despite the high proportion of Brazilian households with internet dial-up access (42% of the total), half of them were already accessing the internet through BB technologies (Table 2). In the same year, those Brazilian regions in which more than half of households had internet BB access were Center-West and South, with 68% and 58% of the total of households, respectively.

ADSL is more widespread in the South and Center-West regions, where it is used by 43% and 42% of the households, respectively. Access via cable modems is more widespread in the Southeast and Center-West regions (20% and 15% of households, respectively). Wireless connection via radio is, as mentioned before, more widespread in less populated regions, such as the North and Northeast (24% and 15% of households, respectively), as well as satellite connection, which is found in 2% of households in the Southeast and in 1% of households in the North and Northeast (and not found in the South and Center-West regions).

**Table 2 – Brazil: Type of internet broadband access per household, per region (2007) (In %)**

Region	Dial-up	Broadband					Others <sup>(*)</sup>
		Total BB	ADSL	Cable	Radio	Satellite	
North	43	47	14	8	24	1	10
Northeast	47	46	17	13	15	1	6
Center-West	24	68	42	15	11	0	8
Southeast	45	46	19	20	6	2	9
South	34	58	43	6	8	0	8
Total	42	50	25	16	8	1	8

(\*) Other types of technologies/ Do not know/ Did not answer.

Source: CGIBr (2008).

Besides the different expansion patterns in each region of the country, the penetration of PCs, internet access, and BB access is also different in relation to social classes, and it is clear that, according to data for 2007, users are concentrated on the highest income brackets (Table 3).



**Table 3 – Brazil: Level of penetration of PCs, internet, and broadband internet in households, per social class (2007) (In %)**

Class	PCs	Internet	BB Internet <sup>(*)</sup>
A	88	82	78
B	63	50	52
C	25	16	43
D and E	4	2	39

(\*) In % of households with internet access.

Source: CGIBr (2008).

This takes us to a third aspect related to the low level of BB penetration in our country: the price charged for the service. The concentration of this technology expansion on higher income classes reveals the fact that the high cost of access is one of the main barriers for classes C, D and E (for 35% of the sample), whereas it is a barrier for only 18% of the sample referring to class A. Another important factor that impedes access to the internet is unavailability in the region where some people live (for 15% of the sample total) (Table 4).

**Table 4 – Brazil: Barriers for internet broadband access (2007) (In %)\***

Class	Not interested	High cost	Unavailable in the area	Other reasons	Broadband access in a different location	Do not know /Did not answer
A	56	18	17	6	3	1
B	44	31	12	9	3	1
C, D and E	41	35	18	4	1	1
<b>Total</b>	<b>43</b>	<b>32</b>	<b>15</b>	<b>7</b>	<b>2</b>	<b>1</b>

(\*) Percentage over the total of households with internet access whose respondents know the type of connection they own.  
Source: CGIBr (2008).

Indeed, according to Turolla *et al.* (2008), the cost to access BB internet in Brazil is one of the highest in the world. The cost of the cheapest access plan in Brazil (NET-São Paulo) is R\$39.95/Mbps, 22 times higher than an access plan in Japan, R\$ 1.8/Mbps, and twice what an American user pays. Moreover, this cost is even higher in less densely populated regions, such as the North, which is more distant from the major centers. There, an internet access plan can cost 56 times more than an American plan and almost 400 times than a Japanese one. Even within the national territory itself differences are marked, since in regions difficult to reach where there is no competition, such as the State of Amazonas, the price of a broadband plan can be three times higher than the same plan in a more densely populated area of the country.

In view of this, it is possible to consider that the inconsistencies in broadband internet penetration between Brazil and several countries of the world, as well as within the national territory itself, are largely related to income and availability, since, besides high price in relation to other countries and also significant differences among the more and the less populated regions, the infrastructure of access is not homogeneously available. It means that, in Brazil, a large part of the population is excluded from the various opportunities a connection to high speed internet can offer for personal use, business and financial transactions, or for accessing public services such as e-government.

Wireless and mobile technologies – such as radio, satellite, 3G, and WiMax – would allow for the expansion of broadband supply in less densely populated areas, and represent a step forward to change the scene of digital exclusion. Besides, these technologies mean excellent opportunities for industrial and technological development in the production chain of telecommunication equipment in Brazil, which can lead to relevant economies of scale, and

result in cost reductions that would benefit the final user.

In addition to private investments, public policies simultaneously directed to both expansion and maintenance of investments in technology and universalization programs are essential to guarantee and expand the access to BB services all over the country. Among the most recent government measures, we can mention, for instance, the use of funds from FUST and FUNTTEL, the various programs of electronic government, and regulatory measures such as the revision of the General Plan for Competition Targets (Plano Geral de Metas de Competição-PGMC), the mandatory installation of backhaul in all Brazilian towns that do not have it until 2010 by means of the General Plan for Universalization Targets (Plano Geral de Metas de Universalização-PGMU), and the expansion of spectrum licenses.

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