# The panorama of the pharmaceutical sector and its interaction with the university in Rio de Janeiro


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# Objective

> To analyze the behavior of the pharmaceutical system of innovation of the state of Rio de Janeiro, by evaluating its strengths, weaknesses and the challenges that exist for its development.

> To emphasize the advantages that exist in the state of Rio de Janeiro, capable of keeping the local actors in the State,

> what are the disadvantages faced by these actors

> and what are the challenges that the state government must face to reduce the disadvantages, to increase the advantages and to promote the return of the sector's growth and development in the State.

# Methodology: case study

- **Literature**
  - regional development and the systems of innovation (Cooke *et al.*,1997; Lundvall *et al*.,2002, Fauré and Hasenclever, 2005 and 2007)
  - the national pharmaceutical sector (Bermudez *et al*., 2000; Hasenclever, 2002; Buss *et al*., 2008; Paranhos, 2012)
  - the development of the state of Rio de Janeiro (Lessa, 2000; Hasenclever *et al*., 2012; Urani and Giambiagi, 2011).
- **Secondary data**
  - Annual Register of Social Information of the Ministry of Labor and Employment – RAIS/MTE;
  - Monthly Industrial Physical Production Research of the Brazilian Institute of Geography and Statistics – PIM-PF/IBGE.
  - Ministry of Education – ME
  - Ministry of Science, Technology and Innovation - MCTI

# Methodology: case study

- **Primary data**
  - interviews were conducted with 23 important actors of the pharmaceutical sector in the State between 2008 and 2012, within a broader research at a national level.

Table 1: Codes of interviewees in field research

| Interviewees | Code |
|---|---|
| National pharmaceutical industries | NPI |
| Multinational pharmaceutical industries | MPI |
| Official public laboratories | OPL |
| Industries of pharmaceutical products | IPP |
| National CROs | CRO |
| Pharmaceutical research industries | PRI |
| Researchers | RES |
| Innovation agencies | IAG |
| Industry incubator | INC |
| Government institutions | GOV |
| Other actors linked to the sector | OAS |

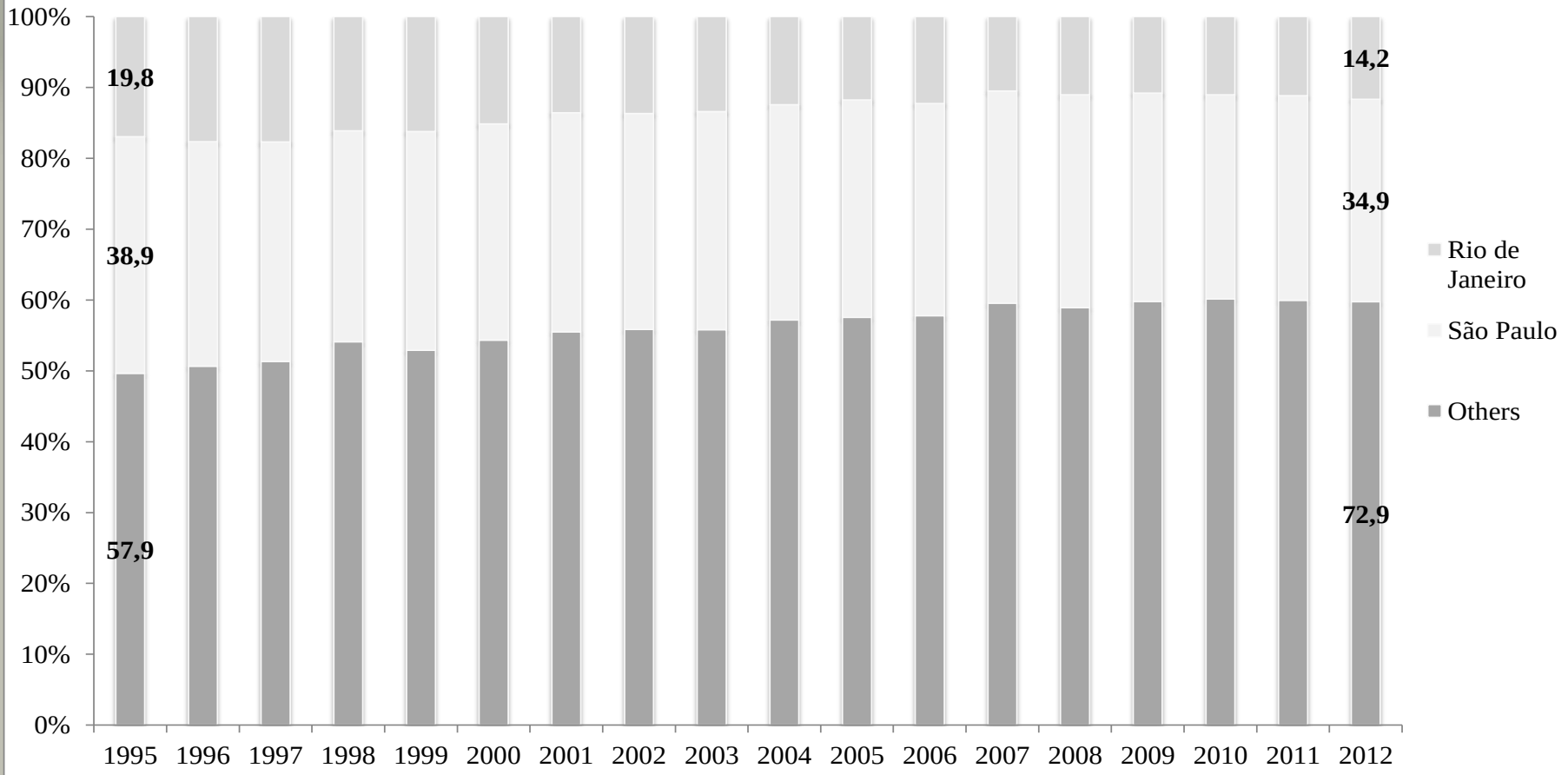
Source: Field Research, Prepared by GEI/IE/UFRJ.

# Results

# Number of industries:

## the second largest concentration of pharmochemical industries and pharmaceutical laboratories in the country

**Chart 1: Number of industries in the pharmaceutical system of innovation in the SRJ (percentage in the country; 1995-2012)**




Source: Prepared by the Economics of Innovation Research Group based on RAIS/MTE.

# Number of Workers

> The number of formal workers employed in these industries presents a more expressive fall than that occurring in the number of industries.

> In 1995, 21.9% of the workers were employed in the pharmaceutical sector of the SRJ, but in 2012 this percentage decreased to 9.5%, causing an important fall in the formal employment number in the sector of 12 p.p..

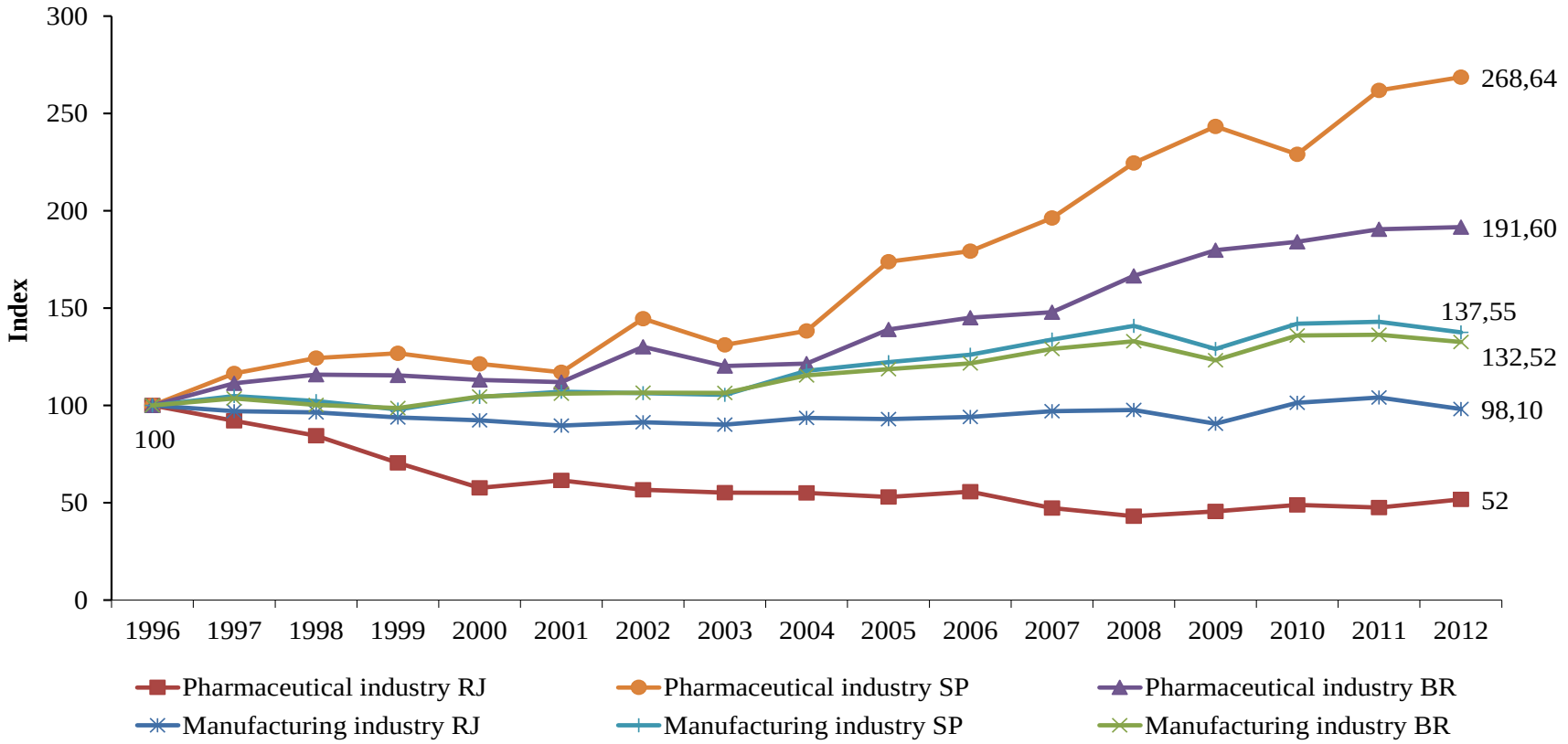
> The SSP has presented a reduction, but much smaller (4 p.p.) and the rest of the group, with the other states, presented an increase of almost 17 p.p.

>This demonstrates a decentralization of employment in the pharmaceutical sector, with a more significant loss in the SRJ than in the SSP.

> However, when analyzing the absolute numbers of employment in the pharmaceutical sector, it can be observed that there is a reduction of 34.5% in the SRJ, but an increase of 40.6% in the SSP between 1995 and 2012.

# Production data

**Chart 2: Index of physical production in manufacturing and pharmaceutical industry in Brazil and the states of Rio de Janeiro and São Paulo (1996-2012)**




Source: Prepared by the Economics of Innovation Research Group based on PIM-PF/IBGE.

# Science and Technology Data

> The SRJ holds a significant specialization in the knowledge areas related to the pharmaceutical sector, showing a strong scientific and human resources formation capacity.

> There is a total of 158 undergraduate courses in the great knowledge areas related to the pharmaceutical sector, the most frequent ones are Biologic Sciences (50%), Pharmacy (22%) and Chemistry (19%). The others are Biologic Sciences I (7%) and Industrial Chemistry (2%), in 39 public and private STIs.

> There are 39 master's degree courses, 3 professional master's degree courses and 35 doctorate's degree courses in the knowledge areas related to the pharmaceutical sector, in 10 STIs, being two state universities, three federal research institutes and one private university.

> And also, 307 research groups in Biology (45%), Chemistry (43%) and Medicine (1%) (DP-CNPq, 2010)

# Graduate courses

Table 3: Graduate courses in the pharmaceutical sector

| Characteristics | | Number of Graduate Courses | | |
|---|---|---|---|---|
| | | Master's | Professional Master's | Doctorate's |
| Knowledge Área | Biotechnology | 2 | 0 | 2 |
| | Biological Sciences I (*) | 13 | 0 | 11 |
| | Biological Sciences II (**) | 10 | 2 | 10 |
| | Biological Sciences III (***) | 4 | 0 | 3 |
| | Pharmacy | 2 | 1 | 1 |
| | Chemistry | 8 | 0 | 8 |
| Institution | Public | 38 | 3 | 34 |
| | Private | 1 | 0 | 1 |
| **Total Courses** | | **39** | **3** | **35** |

(*) Biological Sciences I: General Biology, Botanic, Genetics, Biological Oceanography, Zoology.

(**) Biological Sciences II: Biophysics, Molecular Biology, Biochemistry, Pharmacology, Physiology, Morphology.

(***) Biological Sciences III: Microbiology, Applied Microbiology, Parasitology.

Source: Capes, 2011.

# Primary data outcomes

1) the need to strengthen the internal structure of R&D in the pharmaceutical industries for the generation of innovation and to improve the interaction with the academic sector;

2) the need to restructure and modernize the internal structure of the universities;

3) the need to have a previous planning about the government's actions and the creation of an adequate environment for innovation;

4) the fundamental role played by government financing and support to innovation activities of both industries and universities' liaison agencies (NITs), even if still in the initial phase

5) the need to make proper and efficient rules devised to the pharmaceutical sector.

# Government actions

- The Program '*Rio Fármacos*' (Decree nr. 24.857/1998):
  - to foster the pharmaceutical chain, granting special tax conditions to the industry, wholesalers and distributors that are part of the pharmaceutical chain;
- Decree nr. 36.450/2004:
  - to reduce taxes on the circulation of goods and services (ICMS): reduction of 8% to pharmaceutical companies.
- Considering the actions to promote innovation:
  - State Innovation Law nr. 5.361/08 and its Decree nr. 42.302/10.
  - The financing to projects through the state support agencies: Foundation for the Support of Research of the State of Rio de Janeiro (Faperj) and the Foundation of Support to the Technical School (Faetec).

# Most recent government action

> After a number of seminars and meetings between the state government and important actors from the state pharmaceutical sector (including private and public companies, the State Funding Agency, researchers from universities and research institutes, company incubators and the state office of the regulatory agency), the Executive Group of the Industrial Complex in Life Sciences of Rio de Janeiro (GECIV-RJ) was created

> to establish and develop the guidelines of state policies for the strengthening of the productive and innovation complex in life sciences (State Decree nr. 43.315/2011).

> In 2013, Faperj published the first announcement devised, discussed and prepared in the context of GECIV-RJ to support projects of research, development and biotechnological innovation in human health.

> In 2014, Another call with the same objective should be launched and a new scheme to support start-up biotechnology industries called Start up Bio.

# Conclusions

> There is the need to identify elements, obstacles and characteristics of the system to create a regional environment to the development of regional innovation, as Cooke (1998) has pointed out.

> Therefore, a more entrepreneurial organization and structure of these actors are still needed.

> Actions should focus on the promotion of industries already located in the State, the attraction of others and the creation of new innovative industries.

> However, there should also be a concern on how these industries are internally organized and structured, so they can virtuously interact with the university and absorb its knowledge.

> It is important to highlight that the local government should understand its role as regional innovation organizer and the relevance of public policy in generating regional synergies that would be the basis to the dynamics of innovative regions.

# Grupo Economia da **Inovação**

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