

Privatization, Modernization and Internationalization – How a steel Brazilian company turns a global raw materials player

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Abstract: The paper presents an interpretation about organizational and strategic changes of the National Steel Company (CSN), a company created in 1945 by the Brazilian state and symbol of the country's industrialization. The discussion is part of a research project whose purpose is to comprehend the recent trajectory of the company, its relations with the state and their efforts to compete in a globalized scenario. The fundamental question that guided this research was whether the steel business remains the core business of the company and its positioning in the global market for the production and marketing of steel. This exploratory research uses the approach of production networks to interpret the geo-economic relations resulting from globalization. The study supports the notion that between the date of foundation and the eighties, the company focused all its efforts to improve and modernize its steel production unit, installed in the city of Volta Redonda - RJ, city located in the main development shaft of the country. The data show that there was a first transition of business, local and national to a transnational business corporation. A second transition from steel to mining is underway, but the result is not yet clear, because of the high interdependence between sectors.

Keywords: National Steel Company, Privatization, Modernization, Productivity

1. Introduction

The paper analyzes the organizational and strategic evolution of National Steel Company (CSN), a company created by the Brazilian state during the Second World War, and a symbol of the country's industrialization process in the twentieth century. The analysis of the CSN's recent history helps to understand the dynamics of Brazilian capitalism, through its relationships with stakeholders' spheres of university, business and government, and their effort to compete on equal terms in the international arena.

The question that guides the research is whether the steel business is still the core business and what her position in the global production and marketing of steel. This is an exploratory research approach that uses theory of networks of production and the Triple Helix approach to interpret geo-economic relations resulting from the globalization process.

This study is part of a broader research developed in the Institute of Humanities and Social Sciences, an academic unit of Fluminense Federal University in the city of Volta Redonda, state of Rio de Janeiro, Brazil. Besides this introduction the paper was structured containing six parts.

2. Theoretical Review

This item presents the central concepts to the analysis of the trajectory of CSN throughout its history, and particularly in the last twenty years.

2.1. Production networks, industrial districts and areas of investment attraction

In the last 25 years of the twentieth century industrialized countries have enhanced the knowledge base of their own economies, in accordance with the new techno-economic paradigm based on the diffusion of communication and information technologies (ICTs) (Harvey 1992).

The production relations undergo constant change, whether caused by cultural, environmental, political or social influences. What's observed today is that such changes cause a climate of uncertainty for producers, governments and consumers. Peter Dicken (2011), among others, deal with these uncertainties as a reflection of globalization, which has been recurring issue due to the large development of ICTs and the speed in which we have access to the news. This information explosion feeds the insecurity climate and reinforces the feeling that something is happening in the world. These uncertainties reflected in the business world, which has sought strategies to sustain business in a market that has become increasingly competitive, comprehensive and demanding.

International integration during the nineteenth century can be considered superficial, marked by transactions made by independent companies that offer products and services. Currently, transactions have a deep integration, organized in transactional production networks, distributed in wide geographic and complex areas (Dickens, 2011).

Production networks are extremely complex structures with varied links that form multidimensional multilayered lattices. Networks benefit from advances in logistics systems and ICTs to strengthen relations time/space and set on a global, national, regional and local scales or levels. It can act dependently or independently one from another.

One of the current organizations challenges is how to remain attractive and competitive in a business environment increasingly influenced by the internationalization of information, products and services. Also, maintaining and improving its workforce and increasingly focusing on profitable investments.

Ann Markusen (1995) argues that developed countries are the regions where the phenomenon of competitiveness intensification are better observed, because labor is relatively scarce due to low birth rates and their high-qualified skills, generating high productivity, but too high costs. In relation to developing countries, recently recognized as world powers, formerly called "developing" countries, which have a vast amount of labor relatively qualified and idle, and therefore cheaper, what can be said is that there are spaces more and other less competitive. These differences in productivity and costs between economies and between regions is a factor that contributes to the attraction and maintenance of companies in emerging countries. It's easy to find spaces in which plants can be installed in exchange of government subsidies and lower operating costs. This scenario means that there is greater mobility of businesses and investments from developed economies to the emerging ones.

What becomes a challenge for the companies located in emerging regions is to remain attractive and competitive. With increased productivity and income, there is a consequent increase in costs, this creates the risk of capital and investments transfer to new emerging regions. As an alternative to not equate with competition, regions investing in the concept of improving the "local climate for investment", causing economists, businessmen, geographers and planners seek alternatives to increase the attractiveness of industrial districts established.

In general, one Industrial District "is an area spatially delimited, with a new direction of economic activity and export specialization defined, it can be related to the natural resource base, or certain types of industry or services". The literature on the subject identifies four types of industrial districts (Markusen, 1995):

1. Marshallian – especially its Italian variety

2. Central-Radial (Hub and Spoke) – in which the regional structure is built around one or more large plants belonging to one or a few companies.
3. Industrial Platform Satellite - consisting of branches or subdivisions of transnational corporations, which may be attracted to regional facilities and low cost of labor or may have advanced technological features.
4. Supported by the state (state-centered) - a government owned company serves as an anchor for the development of the regional economy.

There is an extensive literature on the Marshallian Districts, both on its Italian variant (Piore, Sabel, etc) as a variant on USA (analyzed by authors like AnnaLee Saxenian). Originally, the Marshall's idea was related to a region with a set of companies with small production scales, with local capital and local scope of operations, forming a broad network of relationships between them constituting an agglomeration specialized and large-scale production. Associated with this cluster there's also a range of specialized services, including financial, that make this agglomeration competitive nationally and internationally. The Italian variant, as well as the USA, included some issues as trust, cooperation between the actors and the formation of a local culture as elements of firm's aggregation (Markusen, 1995; Saxenian, 2006).

The Center-Radial District is comprised by companies whose sphere of action is regional (sometimes national) and has a behavior as key firms or economic axes, bringing a lot of suppliers and related activities. The economy basis of these regions varies according to the position in which these firms are placed in their domestic and international markets. The center-radial districts may exhibit a strong network of connections - where small firms are highly dependent - or as a more nuclear - when regions benefit from agglomeration economies due to firm-axis, without necessarily having them as suppliers and / or buyers.

Depending on the district profile, may be more than one main firm, which are integrated or not in one or more sectors. They may also coexist only without being connected to each other. In this type of district, economies of scope and scale are common and firms and personnel turnovers are low. In general, their decisions are made locally, but its repercussions and impact are global. About intra-district cooperation, there is a total lack of cooperation between the actors, either in the division of risks, in stabilizing markets or in the apportionment of innovation costs.

One factor that drives this phenomenon is the need and propensity of companies to train, empower and invest in occupations / activities of interest. Regarding resources for investments, they are given by firms-keys, which provide capital for your particular activity in order to fund a comprehensive strategy for your company. This is also reflected in relations with local and regional governments, whose discussions are limited to the maintenance of the company's interests (to maintain the standards of attractiveness) and ensure that politicians defend the same in the national and international level.

In the long-term center-radial districts have high dependence of their key companies to maintain their investment capacity. It takes a great effort to have recycling and innovation that keep companies with mature activities competitive and also maintain its profitability. The regions in which such ventures flourish are mostly characterized by high wages and good income distribution. However, it is noteworthy that at this production stage activities of unions becomes so crucial and active, which is its largest reflective discussion about capital and labor with rising real earnings of workers.

The Satellite Platforms result in the interest of large international firms to seek locations outside of urban centers to produce. It happens because production costs are reduced compared to the localities of high urban concentration. They can be found in every country independently of the economic development level. In this type of district economic structuring occurs through decisions taken out of the platform (local plant production). There is the option to use the economies of scale that vary with each plant from moderate to high. A supply chain is not created in this case, because due to the heterogeneity of their products, firms on satellite platforms not congregate together. This is a big difference of this kind of districts to the others mentioned, as in this case firms have not shaft base and decision center locally. Its main feature is the total absence of connections and transactions with location that is inserted. This is reflected in work relations, where priority positions are occupied by the available manpower in the company in a vertical way. In a second moment the positions are open to local professionals, who are called in for most tasks less elaborate and more routine.

Some characteristics of satellite platforms make regional growth limited, such as: 1) The funds invested in companies are from outside, specifically applied to the development of the firm, 2) There is no place for new capital investments and implementation of new business, and 3) The diversity of economic focus makes business interest in local low, especially to creating partnerships for infrastructure, marketing and

solving managerial problem, among others. The compensation of the plants tends to come through government activism or by business associations pressure.

In the medium term, the platforms are affected by the possibility of migration of industrial plants to new platforms (more competitive). Those investing in differentiation and sophisticated product are more likely to survive than those that invest in low cost manufacturing location.

The Districts Supported by the State are organized around some public entity, either a military base or a concentration of public agencies. It can be also a university and/or research technology institutes, or a state owned enterprise. It tends to have a setting next to a center-radial district in which the lead organization is a major employer and defines including the territory geo-spatial organization. Several reports are found in the literature on cities that hosts military bases in the United States and, more recently, on technology parks and technopoles.

2.2. Triple Helix

The Triple Helix approach (TH), proposed by Etzkowitz and Leydesdorff (1995), argues that the proximity and intensity of linkages between universities, industry and government are critical to improving the environmental conditions that favor innovation. In the TH approach, university is raised to a position equivalent to industry and government, representing a triad of institutional spheres with equal and overlapping activities. The origin of this change is the growing importance of research and new knowledge creation process and to the current economy, which brought a third mission to the university, called by these authors as the second academic revolution (Etzkowitz and Leydesdorff, 2000). This new university's role came to join the missions of education and research and assumes that the university shall have an entrepreneurial attitude, incorporating economic development to their academic goals (Etzkowitz, 2010).

The entrepreneurial universities have a key role in the Triple Helix through technology transfer, incubation of new firms and taking the lead in regional economic development efforts. Moreover, one of the most important characteristics of an entrepreneurial university matured is the definition of their research problems that balances outside sources as well the research with a more academic scope (Etzkowitz, 2008).

According to Etzkowitz *et al* (2005), in recent years, Brazilian universities not only play their traditional role, but are also assuming some of the roles of other institutional spheres – industry and government - helping to put the knowledge in use by establishing organizational mechanisms to transfer knowledge and technology and performing a strategic role in the regional economic development.

The university-industry-government relations can take various configurations, also called stages. In the first, titled Triple Helix I, both universities and companies are inserted within the governmental sphere - to the authors this stage is practically overcome in the contemporary world being typical on socialist states and/or totalitarian or military governments. In stage Triple Helix II, each actor plays their role alone, with well-defined borders and little interaction. This configuration is called *laissez-faire*. In the Triple Helix III, an overlap occurs between the performance limits of each actor, the interrelationships deepen in quantity and complexity, with the emergence of hybrid organizations from these interfaces (Etzkowitz and Leydesdorff, 2000). In this configuration arise so-called hybrid and consensus spaces. Regional development entities or science, technology and innovation parks are typical results of linkages at this stage.

Note that this last stage, the actors are independent, but with strong ties, engendering social networks multifaceted, that ultimately determine new ways of working. For example, universities are now taking a more business behavior (entrepreneurial), licensing patents or creating mechanisms and structures to support the creation of technology-based companies from their research labs and graduate programs. The firms internalize some activities similar to the academic context, such as knowledge sharing and employee training.

There are several channels of university-industry interactions that contribute to increasing innovation processes in organizations. Among the different types of university-industry interaction, LESTER (2005) identified and classified four categories that he calls "Channels of Interaction":

1. Education and training - Education is the basic role of the university, contributing to the development of local human capital through training people for society;
2. Codified knowledge - Research and Development (R&D) in the university contributes to the increase codified knowledge stock, including publications, patent applications, software and hardware;

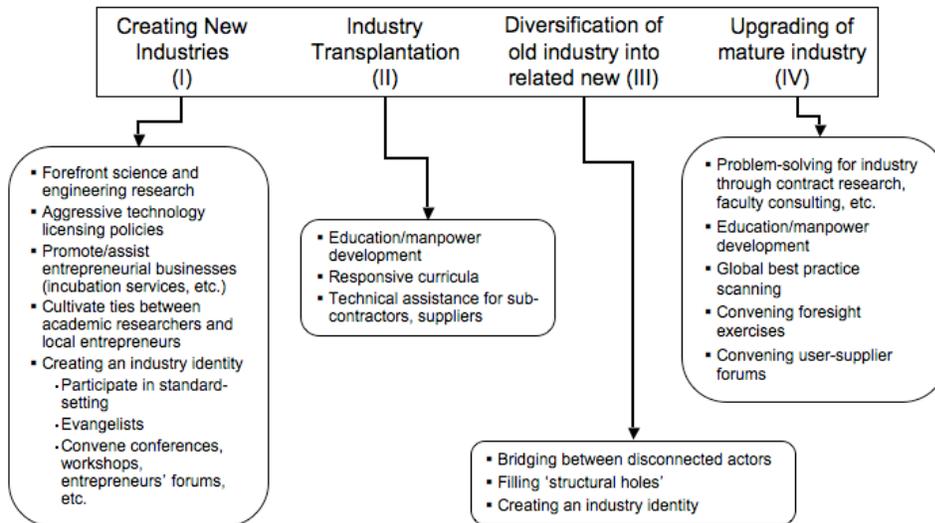
3. Local capacity to solve scientific and technological problems – It includes various forms of support for the creation and development of new technology-based companies, such as incubation programs, technology parks. This category also includes joint research projects between universities and companies, consulting firms, university laboratories use by companies, among others;
4. Space Debate - Use the university as a public space for an ongoing debate on the development of the industry, new technologies and market opportunities.

To improving the understanding of the role that universities can play in technological development in every economic environment, Lester developed a typology called "Industrial Processes Transformations", which seeks to capture the economic transformations that are occurring in a particular region, reaching four distinct types:

1. Endogenous Creation - The creation of an industry that has no precedent in regional economy, leading to a completely new industry.
2. Installation of a new industry - It also entails the development of an industry that is new to the region, but in this case, the primary mechanism is the import of industry from elsewhere;
3. Industrial diversification from existing technologies - It refers to transitions in which an existing industry in a region declines, but its technology is redesigned and provides the foundation for the emergence of a new industry;
4. Upgrade of existing industries - It occurs through the infusion of new production technologies, or improvements of products or services.

Lester did an association between the "Channel of Interaction" with every kind of "Industrial Transformation Process", and has developed a structure with the activities that the university can take to support innovation due to the economic times of determined region. This structure is shown in Figure below. For him, the interactions of lower technological content are equally or more important than those involving university-industry interactions in high technology areas. Moreover, they open space for universities, especially those who are not on the frontier of knowledge, to present a contribution to the innovative activities of their region (Lester, 2005).

University roles in alternative regional innovation-led growth pathways



Source: Lester (2005)

2.3 “Company town”

According Lima (2008), the “company town” can be regarded as a “mini-city” in which a set of community facilities including houses, commercial buildings, schools, hospitals and recreational areas belonging to a company and where control is exercised over the people’s inflows and outflows, setting a closed urban nucleus. The emergence of these “company towns” would have happened in Europe and the United States, following the expansion of the Capitalism’s scales of production (with a greater concentration of capital and labor) and also as a myth of Capitalism’s perfect society in the service of production.

In research on the Urban Nucleus of Carajás - A “company town” located by Companhia Vale do Rio Doce (CVRD) in southeast Pará, Brazil to support the Carajás Iron Project (1986) – draws attention to the creation of “company towns”, such models applied means the reconstruction of urban phenomena through negation of existing structures (cities “spontaneous”) and the founding of new structures, turning their goals and contents for the economic viability of the projects which they are linked (Roberts, 2002 *apud* Lima, 2008). Maybe this helps to understand why most “company towns” is associated with the

image of progress and modernity in the region where they are being installed. It follows the idea of industrialization to economic growth and local development.

In Brazil, the subject is not well studied as in the USA, but it's possible to find several experiences that are more known for eccentricity, ambition and failure (Fordlandia and Jari Project) than the success (Carajás and Volta Redonda).

3. Research Design

This research is exploratory and descriptive. Exploratory research aims to provide greater awareness of the problem, in order to make it more explicit or build conjectures (MARCONI & LAKATOS, 2003). In social sciences, exploratory research attempt to discover relationships between phenomena, not only to know the type of relationship, but also to determine the existence of the relationship (RICHARDSON, 1999). This is also a descriptive research, where the goal is the characteristic' description of a given population or phenomenon.

Regarding the technical procedure, this is a case study about a company that personifies, in many aspects, the region and country economic development. In this study, the company's historical evolution the current situation and prospects of its development model are analyzed. The case study is most indicated when the investigated object can be considered as a contemporary phenomenon, in which the researcher has little control over events and there is the need to use multiple information sources, seeking converging research lines (Yin, 2005). The case study also allows penetration into the social reality through a thorough and deep dive in a bounded object. In this particular case, it is important the study the evolution of the CSN, which will be done in section 4, as about the region, which will be done in section 5. The research presented below was started in October 2011 and is based on the analysis of several, with reference to the period 2000 to 2010.

4. Trajectory of National Steel Company - CSN

This item will discuss the CSN, whose evolution was organized into four parts.

4.1. Symbol of Brazilian development - 1945-1980

Founded on April 9, 1941, by edict of the Brazilian's President Getúlio Vargas, and started its operations on October 1st, 1946, the President Vargas Steel Mill (UPV) is located next to the river Paraíba do Sul, current city of Volta Redonda, then a district of Barra Mansa. The decision to locate the plant is related to its equidistance from the main consumer centers in Brazil (Rio de Janeiro, Sao Paulo and Belo Horizonte), concentrating half of the country's GDP. Volta Redonda was the laboratory where the "Estado Novo", name of Vargas' period (1930-1945), experienced all theories about driving country into a full development (Fontes, 2011). Initially, the company only produced coke, pig iron castings and long products.

In the 1970s, even as a state company, CSN promoted two expansion programs in order to increase its production capacity. The first was completed in 1974, when the production capacity reached 1.6 million tons of crude steel and its product line was expanded. The second circle was completed in 1977, when the production capacity reached 2.4 million tons of crude steel. In this same period, the process of globalization and industrial restructuring were intensified, called by some authors as the crisis of Fordist's production standard (Amaral Filho, 2001 apud Ferreira, Leopoldi, Amaral, 2012).

According FONTES (2011), who recently studied the topic:

"Over the years, CSN has developed its role as an instrument of economic regulation of the Dictatorship governments of Brazil. Often the economic teams of Brazilian governments used the prices of steel produced by the company as a mechanism to control inflation. This was one of the factors that led to constant crises in the sector." (Monteiro, 1995 apud Fontes, 2011).

According Castro e Figueiredo (2005) apud Fagundes (2013), some innovative technological capabilities were developed in CSN during this period, such as the generation of organizational techniques based on advanced R&D, development of R&D and engineering for process improvement and development of supervision and control of the production process systems activities.

4.2. Crisis and privatization - 1980-1994

The third update program production was completed in 1989 when the CSN reorganized the plant in order to conform to the new production scales. The UPV peaked 4.5 million tons of crude steel produced

per year. This was a particularly difficult period marked by labor movements, accelerating inflation, political instability and economic packages.

In the political field, becomes majority the understanding that the state should withdraw from the economy, leaving only its basic functions, called by certain Minimum State. This change process continued and was expanded in the 1980s, creating an unprecedented movement of trade and financial openness and accelerating economic restructuring and the internationalization of production (Diniz, Crocco, 2006 apud Ferreira, Leopoldi, Amaral, 2012).

During the 80s the company was losing money and it was considered a major problem. The Brazilian government even wondered closing it because the expenses were excessive and returns low. The privatization of CSN occurred in 1993. The auction lasted about three days and the major stakeholders, articulated by the Grupo Vicunha, a Brazilian textile holding, got only 25% of stocks offered, below the 50% required. So, partners were attracted for a shared management as Banco Bamerindus (now HSBC), Banco Bradesco and Companhia Vale do Rio Doce.

According FONTES (2011),

“The privatization program of the 1990s was mainly driven by the need for the government to maximize its revenue from the sale of state owned enterprises. Proof of this, most buyers was foreign or domestic private enterprises”.

Soon after the privatization, the company was managed in several ways before having a given control. In 1995, the Executive Benjamin Steinbruch, from Grupo Vicunha, assumes the presidency of the company where it remains till now.

The trajectory of the company and the city, between 1945 and 1994, is typically a “company town”, in which the company, as central leverage of city development, provides benefits to employees beyond the working relationship and have a decisive influence on the city’s formation, including its geospatial organization, with neighborhoods to the workers, engineers and upper level managers.

4.3. The end of a “company town” - 1994-2002

A comprehensive restructuring process is performed for privatization and post-privatization leading to revision of the role of "company town" and a break with the city. CSN while state-owned company had

vices and its organizational structure was overloaded. At the end of 1993, it has nearly 40,000 direct and indirect employees (outsourced), which is reduced to just over 20,000. The effect was a crisis in the city of Volta Redonda, with increasing default in trade and other direct and indirect effects (Monteiro, 1995 apud Fontes, 2011).

According FONTES (2011),

“After privatization, the city would have passed through a phase of crisis and after recovery, with attempts to diversify the economy undertaken by municipal governments and the movement of the population itself toward alternatives outside the CSN as a major employer of labor”

During eight years, until 2002, there is a broad process of rethinking the company and modernize it in technical and managerial terms. After deploying numerous upgrade programs, CSN currently produces about 5.8 million tons of crude steel per year. As can be seen in the graph below, the number of direct employees is reduced from about 15,000 in 1995 to just over 8,500 in 2005, as a result of the processes automation and implementation of integrated management systems. Between 1994 and 2009, productivity per employee increased 600%.

To achieve these figures the company has gone through four stages between 1994 and 2002 that are reflected in its management model. Initially, the private partners that participated in the auction assumed the management and made a financial restructuring of the company. As the members were not in the specialist in steel production, the results were not the best and operational management was given to the employees, especially to a group that has occupied high level management positions. This group tried to keep the same practices of the period in which the company was state and was eventually replaced by a group of professionals led by economist Maria Silvia Bastos Marques, who chaired the company between 1996 and 2002. At last, as a result of the unwinding of capital between CSN and Companhia Vale do Rio Doce, the company's control became to be exercised by the President of the Board of Directors and major shareholder Benjamin Steinbruch.

Over the years, actions for the technological modernization of the facilities were practiced in CSN. Some factors allowed the implementation of new management and organizational structure, facilitating the integration of knowledge between units, such as: the provision of courses and internal and external

training; the import of professionals; partnerships with customers for design of new steels and suppliers to process improvement; the participation of the factory floor in the solutions to problems; groups to address anomalies and standardization, as well as projects with external research centers, used to acquire new knowledge and increase the number of specifications, such as steel for electrical purposes, two-piece cans and automobile industry (Castro and Figueiredo, 2005 *apud* Fagundes, 2013).

This variety of learning mechanisms provided to CSN more technical knowledge; making new practices were aggregated to the unit and the flow of knowledge to spread the organization. Further, because the increase specifications required by customers, the knowledge flow now occurs more dynamically and mechanisms have been implemented, allowing the integration of knowledge between people from different areas. All these efforts influenced on reducing costs and increasing flexibility of new products by new processes (Castro and Figueiredo, 2005 *apud* Fagundes, 2013).

It's observed that in the post-privatization period, CSN has focused on improving its technical performance in processes, influenced by the accumulation of technological capacity. This emphasis seems to have been determined by the need to increase the company's competitiveness, driven by the privatization process itself, beyond the business context of the time; they started to demand better economic performance. Moreover, this process improvement wasn't reflected in the output indicators technological development process, such as patents. Bazzo (2010) *apud* Fagundes (2013) reviewed 335 applications for patents for invention or utility model, made by CSN between 1982 and 2009, and found that the CSN has undergone many organizational changes that have undermined the quality management intellectual property in the company. Only 93 of these applications (28%) were turned patents.

4.4. Global Player - 2002-2013

Since 2000, with the aim of adapting the model of sell goods and services, that ceases to be strictly domestic and turns global, CSN start to make investments: 1) in acquisitions nationally and internationally, 2) in the modernization production process, 3) in technological upgrading of existing plants, and 4) especially in new market niches to increase the added value of steel production. This led to

purchases the product at very competitive prices. All these investments and strategies resulted in the horizontal growth of the company, which focuses on the international market while supplying the domestic market.

As a publicly held corporation, its shares are traded on the stock exchanges of São Paulo (BM&F and Bovespa) and New York (NYSE). Currently, it is a highly integrated company, with businesses throughout the steel production chain, from the iron ore mining to the commercialization of the various manufactured products. This system combined with efficient management process turns CSN in one of the lowest cost steel producer in the world.

5. The region and local actors

Located between the two largest economic centers of Brazil, the Region of the Middle Paraíba Valley (PVR-RJ) is rich in events involving the rise, decline, resilience and reinvention of their local economy. In the last century the region faced a decline in coffee culture, managing to rebuild by the deployment of the CSN in the 1940s. From then walked the path of growth until the mid-1990s, when privatization of the CSN sparked a period of economic crisis in its surroundings. But it was not long before the region could return to the path of economic growth through new investments, particularly in the automotive sector, and the revitalization of CSN now as a private company (FERREIRA, LEOPOLDI & AMARAL, 2012).

The PVR-RJ has 855,643 inhabitants (IBGE, 2010) divided into 12 counties and is situated in a strategic highway between Rio de Janeiro and São Paulo. In the region, in addition to CSN, there are large industries in many segments, especially MAN Latin America, PSA Peugeot Citroën, Nissan, Saint-Gobain Pipelines, Votorantim Steel, Galvasud, Michelin, Metallurgical Barra do Pirai, AMBEV, P&G, Hyundai Heavy Industries and BR Metals, and a large park of small and medium enterprises with a strong metal-mechanical vocation and recently service.

The nineties were characterized by a structural change in the most dynamic sub-regions of PVR-RJ. While Volta Redonda and its surroundings suffered the consequences of the privatization of CSN, Resende and its influence region entered in a new phase of industrialization, with the implementation of automotive industry. In contrast to what occurred in Volta Redonda, the Resende region began a new

cycle of industrial development, with the installation of two automakers, Volkswagen in 1996 (Current MAN Latin America) and PSA Peugeot Citroën in 2001.

From the 2000s, due to the economic growth experienced by Brazil, a new round of investment from large industries began in PVR-RJ, as CSN's cement factory inaugurated in 2009, the CSN's flat steel plant, scheduled to start operations in 2013, both located in Volta Redonda; the flat steel plant of Votorantim, inaugurated in the city of Resende in 2009; a factory of heavy construction machinery from Hyundai Heavy Industries, inaugurated in 2013; and the new plant Nissan's car in the city of Resende, an investment of \$ 1.3 billion and expected to generate 4,000 jobs and entry into operation from 2014.

Because of its prime location and infrastructure, PVR-RJ is also attracting investments in logistics as: DHL Logistics and Distribution Center of Procter&Gamble, in Itatiaia; Distribution Center of Raia Drugstore, in Barra Mansa; the Distributor from 3Corp Technology, in Resende; and FastBroker (Nestlé) in Volta Redonda.

5.1 The university's rule

At PVR there are two public universities¹. The oldest is the current Regional Campus of Volta Redonda (UFF-PUVR), part of Fluminense Federal University, which has its origins in the School of Industrial and Metallurgical Engineering of Volta Redonda (EEIMVR), created in 1961 as a college named National University of Labor (UNT). Currently, PUVR-UFF has two campuses in city that offer fourteen undergraduate courses, six master's degrees, a doctorate and a number of extension and specialization courses. PUVR-UFF has close to 220 professors in the faculty staff and 8,000 students.

Between 1961 and 1994, CSN was the main partner of UFF-PUVR, hiring graduates, encouraging its engineers to become teachers, funding postgraduate courses in Brazil and abroad. Furthermore, it invested heavily in the laboratories construction and equipment purchasing. These labs allowed the provision of technical services and execution of R&D projects aimed to seeking solutions to technical problems in production. In parallel, the CSN established a center of R&D itself, near the UFF-PUVR and the factory in order to act in a complementary way, in relationship with other institutions, and incorporate the technical and scientific knowledge generated by the university.

¹ There are some private universities also, but the public universities are responsible for most part of research, development and outreach in Brazil.

The Regional Campus in the Middle Paraíba of the State University of Rio de Janeiro (CRMP-UERJ) was created in 1992 after mobilization of municipal government for the installation of a university campus in the city of Resende. The main purpose of creating this hub was to have a public university that was able to provide skilled manpower to the companies, serving also as attractive to new ventures in region. Currently, the CRMP-UERJ has about 500 students enrolled in the Industrial Engineering course, 27 full time professors and 25 hired teachers. Its great advantage is partnerships established with companies to develop research projects together, highlighting the partnerships established with MAN Latin America and Peugeot Citroën.

The public university constitutes the main institutional innovation in PVR-RJ and yet the major role that public universities have played is teaching. Innovation is not yet a reality for these institutions. The University challenge is to extend this positive relationship already established with local society, through education, for activities such as the development of projects in the technical, business development and support public and private management, broadening its scope.

5.2 The local government

Ferreira, Leopoldi & Amaral (2012) studied the relationship of local government and the regional economic development in the southern state of Rio de Janeiro. At this work was presented a summary of the results from interviews with the Secretaries of Economic Development (SMDE) of Barra Mansa, Itatiaia, Resende and Volta Redonda. The work collected the perception of regional government representatives on: 1) the economic structure of these municipalities, 2) the incentives for innovation, 3) university-industry interaction activities, and 4) coordination between the municipalities of PVR-RJ to stimulate Regional Economic Development.

The first observation is that the municipalities surveyed have proven efficient in order that they propose. The strategy of economic development of these four cities follows the logic of attracting investment, especially from outside the region, usually linked to the major capital (as an Industrial Platform Satellite model). In recent years, several projects have been confirmed, with emphasis on heavy equipment factory of Hyundai Heavy, the Nissan's car factory, Droga Raia's logistics center, and the long the flat steel factory of CSN. Another finding, which was unanimous among the four counties surveyed are

actions aimed at improving the workforce skills, with an emphasis on operational and middle levels positions.

In Volta Redonda, economic development issues are related to the fact that most of the available areas of the city are concentrated in the hands of four owners, one being the CSN itself. Although the City Hall is the largest employer, with approximately 13,000 people, the CSN is the economic engine, accounting for nearly 50% of the tax revenue of the municipality and the highest payroll.

The reflection of city's economic development secretary in Volta Redonda reflects the current situation of the municipalities where the RVP-RJ awareness about the importance of articulation exists, but not yet reflected in practical actions to guide the region's development in a coordinated manner among all its municipalities. The main challenge seems to be the knowledge lack of how to develop this integrated regional development. Maybe the problem is less the desire and more on the "how to". Inter-cities integration processes involve a complex web of issues and interests, not always convergent. Finally, it is noteworthy that an organization capable of mediating this process is not easy to find, but this organization can be built, including the university which can be one of the key actors in this process.

6. Analysis of the CSN's trajectory

This item is divided into two parts. One that comes from the viewpoint of production networks and one that addresses the relationships between the actors from the spheres of society.

6.1. From the viewpoint of production networks

With the approach of the production networks, for example, it is possible to understand the changes in the global steel chain, shifting the analysis focus of simple comparison between models of state, national and transnational enterprises to observe the organization of a structured global network.

In the process of CSN's constitution a series of formal and informal networks was built. The company forms part of their suppliers and allocate on its surroundings areas, making considerable part of their purchases in this space and generating economic and social development. The manpower shall be formed locally at all levels and for that such high quality technical schools are comprised as well as the Metallurgical Engineering School which is now part of the UFF. The relationship of UFF and CSN is quite

atypical, perhaps one of the few recorded cases of reverse spin-off where the company originates university.

After privatization in 1994, there is also a review of manpower that is reduced to one third of the previous level and purchases that are being made in national and international market from global suppliers. The result for the city of Volta Redonda and region is a break in the pace of economic development during the nineties. However, since the beginning of the new millennium there is a revival of the city fostered by specialized services industry, less dependent of the company. Two highlights are the medical and hospital sector, which is a benchmark in the region, and the higher education sector.

From a business standpoint, new networks are formed. The company before public and with the focus on the domestic market becomes a global player in the industry. Since 2002, capitalized, it shoots purchases of companies abroad and expanding business in mining, cement and production of special steels.

Based on the Markusen's typology of industrial districts, it is possible to state that there was a change in the strategic profile of the CSN and its economic geography. First, the company migrated from type 4 (state-centered) to type 2 (spoke and hub) with the privatization process. In the last ten years, it has migrated again to a model close to type 3 (Industrial Platform Satellite). An important aspect of this case is that both a state-centered company as a district center-radial develops a culture where it is installed directly related to your industry, then most likely the association "Volta Redonda, a steel town", which spreads throughout the economy (Hotel Sider, Highway of Steel, bus company City of Steel, among others). It's possible to discuss or disagree with the applicability of the Industrial Platform typology, but today the CSN's decision center is no longer in Volta Redonda. Although the company has originated in the city, it's currently a transnational Brazilian capital corporation headquartered in São Paulo, with Volta Redonda as a one of the productive locus only.

6.2 From the viewpoint of university-industry-government

Regarding University-Industry-Government linkages the typical relationship in the phase "company town" can be classified as the configuration type 2 of the Triple Helix in which the Government, in this case through a state owned company, sets the target to companies, university and shapes society as a whole. In the post-privatization period the relationship becomes distant. Several confluence areas of the three

helices spheres are disrupted and renegotiated. The local university loses its primacy in relationships and other institutions are sought. New university-industry bilateral relations are constituted. In recent years, the local university goes through a process of rethinking and creates new dynamic, occupying new spaces, to remain present in the region. Anyway, University-Industry-Government linkages are tenuous without getting to characterize a configuration type 1.

New relationships are being built in which the university approaches the government as a way to think and act in favor of regional economic development, but also as a way of qualifying manpower for the new industrial cycle based on the old model of Satellite Platform Industrial district. This model creates demand for the university, according to the classification proposed by Lester (mainly support the transfer of industries), but also the limits, because there is a tendency of transnational companies brings technology and innovation of their headquarters. Thus, there are opportunities only to small local adjustments, not generating endogenous capacity to innovate and perpetuating the needs of capital and technology.

As for CSN's interest in the university is punctual, maintained contractual relations with various actors, for solving specific problems, without a bond or fidelity to local universities. One must understand that the production model of the company is capital intensive, but the technology is mature and market product stable. Therefore, only incremental innovation processes in search of improving productivity are required. Thus, the expenditure of the corporation with technology development is small and more focused on purchasing equipment.

Bazzo (2010) *apud* Fagundes (2013) identified the development of 93 projects that culminated in patents, from 1982 to 2001. Of this total, 82 were developed through internal sources of the organization and 11 were the result of the development partnerships with external sources, with the participation of four companies and four educational and/or research institutions. The company seeks to develop its technological capabilities preferably with internal resources, which shows, according Bazzo (2010) *apud* Fagundes (2013) a little experience for the management of technological development in cooperation and technology transfer, damaging the innovative potential of the company.

Since 2002, CSN's cooperation network decreased in size, the density increased and the network domain continued under the influence of the company. In addition to reducing the number of partnerships, also decreased the number of patent applications. This scenario can be seen from two different

perspectives: 1) negatively, the company demonstrates a weakness in its internal environment of innovation and not creating the right context for learning and knowledge sharing with external sources; and 2) positively, as a change in the pattern of selection of technologies that will be deposited, indicating that the company has become more careful in selecting the technologies that interest you.

However, new linkages are being created. In 2015, a new agreement between CSN and UFF was signed where the area of new products development and the CSN's technology office looked for UFF's competence in technology and innovation management. It's more a managerial and strategic partnership to maps and understand market than a collaboration to solve technical problems (<http://www.uff.br/?q=uff-e-csn-assinam-acordo-de-cooperacao-tecnica>).

7. Final remarks

The work aimed to analyze the organizational and strategic changes at National Steel Company (CSN), a company created by the Brazilian government and symbol of the country's industrialization process in the twentieth century. The research design was based on analysis of several existing studies, field research through interviews and data collection in the CSN's annual public reports, with reference to the period 2000-2010.

The study supports the notion that between the foundation date and the eighties, CSN has focused all its efforts to improve and modernize its steel production plant, located in the city of Volta Redonda, a city situated in the main axis of development country, between Rio de Janeiro and São Paulo.

The information gathered showed that from 2000, with the aim of adapting the model of selling goods and services, the company actuation ceases to be strictly domestic and start to have global characteristics. CSN becomes to invest in acquisitions nationally and internationally, in modernization of production process, in technological upgrading of existing plants, and especially in new market niches to increase the added value of steel production. This led to work in five different fronts (steel, mining, logistics, cement and energy) and to internationalize itself, which helped to make it one of the largest and most influential holdings of Brazil. However, the steel business is still the core business of the company with about 50% of the gross revenues of the group, but the mining sector has a higher profit margin.

These data show that there was a first transition of company, from local and national, to a transnational business corporation. What is still open is the setting for this group. A second transition from steel to mining is underway, but the result is not yet clear, largely because of the interdependence between the two sectors.

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