The Relation between Regional and Industrial Development — The Role of Public Policies and Social Connections: A First Approach to Some Brazilian Cases

Andréa Santos de Deus e Eduardo Strachman

Abstract

The changes of the last 20 or 30 years has generated heterogeneous consequences, with the exclusion of certain human groups, abandonment of contingents of people and areas, deepening of environment problems in some regions, and, in a global scale. Concomitantly, there is also a flexibilisation of regulation instruments and local institutions, and an important loss of the State-Nations power. Incorporating such concerns, the paper investigates regional and industrial development in some Brazilian cities and regions, comprehending mainly regions of the State of São Paulo, the most developed of Brazil, representing almost 50% of that country's GNP. This concentration is due to the historical formation process of the Brazilian industry and the role of the State of São Paulo in its constitution. This State's industry presents an extensive diversification which embraces many sectors and clusters, in a wide range of activities. In more recent periods, one can notice a significant regional deconcentration process in the industry of the State of São Paulo and of Brazil as a whole, from the City of São Paulo, capital of the State, to the interior of this same State, and also to other States of Brazil.

Key-words: Industrial Organization; Industrial Policy; Economic Development, Regional Economics.

1. Introduction

Immediately after the II World War, several general planning and regional development groups emerged to study problems of regional inequalities and sustainability of economic growth. But, it was only in the seventies, as a consequence of the growing articulation of universities and research centres with industrial activities based upon advanced technology, that some analyses of regional planning started to consider technological variables and innovations among their specific concerns.

As a background of the scenery of the last 20 or 30 years, this age is marked by a crisis in the process of capital accumulation (Davidson, 1992-93) and by the emergence of new technological, economic and social paradigms.[1] These changes have produced heterogeneous implications over distinct human groups and geographical areas, in their forms and in their effects, bringing with them the

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fragmentation of the "world and environment of work" (Benjamin, 1998), with the exclusion of certain human groups; the abandonment of specific areas; the deepening of environment problems in some regions; and, in a global scale, the concentration of wealth in certain companies, countries and strata, with the resulting weakening and impoverishment of a great share of the people and nations of the world.[2]

Such a setting is one of the main causes for the emergence of the political and academic debate emphasizing the role of **specific places** in economic and social constructions.[3] This revival of studies of localities (Swyngedouw, 1989) happens also as a consequence of the flexibilisation of regulation instruments and local institutions,[4] with an important loss of the power of Nation-State . We shall also stress the importance of social contexts, articulations, and institutions (the relevance of local culture; the behaviour of the civil society and productive organizations; the new competition and cooperation forms that originate from the articulation of two factors — social capital and territory, etc.) for the explanation of differences between the development levels and other characteristics of distinct places.[5]

Taking up such concerns, the paper will relate to regional and industrial development in some Brazilian cities and regions, comprehending mainly some regions of the State of São Paulo, representing almost 50% of the Brazilian GNP. As well known, this concentration is due to the historical formation process of the Brazilian industry and the role of the State of São Paulo in its constitution (Cano, 1998a; 1998b). But, we shall also observe that the São Paulo industry presents an extensive diversification which embraces many sectors and clusters, including the same sectors and clusters in different regions, and that this diversification is constituted of economic sectors in a wide range of activities — from traditional industries (garments, for instance) and important agribusiness (agro-industrial) to high tech firms. In more recent periods, however, we can notice a significant deconcentration process in the industry of this State and of Brazil as a whole, from the City of São Paulo, capital of the State, to the interior of the State, and also to other States of Brazil.

The paper is composed of the ensuing parts: in the next section, we make a short retrospection of the current concern with regional development, which has its foundations at least in the 50s. In the third section, we bestow a short analysis of the recent regional transformations in Brazil, especially after the 80s, with special concern with the case of the State of São Paulo. In the fourth part, we introduce some specific cases of regional development in the State of São Paulo, particularly in its most important

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[1] Chesnais (1991; 1994); Dosi *et alii* (1994); OECD (1991; 1992).
[2] Dosi *et alii*, 1990; Harvey, 1989; Swyngedouw, 1989; Amin & Robins, 1994; Storper, 1997; Edquist, 1997, Cooke, 1998.
[3] Castells & Hall, 1993; Markusen, 1995; Gertler, 1995; Oinas, 1995; Storper, 1995; Scranton, 1995; Yoguel, 1998; Garnsey, 1998; Cocco, Galvão & Silva, 1999.
[4] According to Strachman (2001a; 2001b), institutions are defined as rules and patterns of behaviour or interaction among people verified in a society — rules and patterns which must acquire some stability, i.e., need to be repeated, even for a short time span. See also Powell & DiMaggio (1991).
[5] Amin, 2000; Putnam, 1993; Strachman, 2001a.

regions. Finally, in the fifth section, we adduce some implications for public policies of what is discussed along the paper.

2. The Concern with Regional Development

The rebirth of the interest in regional economics shows the growing and general concern with regional disparities (in terms of economic and social development) in several countries, which is spread by several different scientific areas and subjects (geography; economics; sociology; architecture; urbanism; etc.), especially after the 80s and, even more, the 90s.

The regional planning and development models which appeared after WW II, although following diverse theoretical orientations and aiming disparate goals, were all sustained on conceptions of location factors which were a consequence of the fusion of location theory with the multiplier of yield and employment, in the Keynesian tradition (in any of its streams), with a special emphasis in industrialisation (Isard, 1960; Chenery, 1964), but also in themes as inter-industry effects, linkages, unbalanced growth (even with a favourable view), and phases of economic development (Kuznets, 1966; Hirschman, 1958); the idea of relative regional and trade advantages sustained on the availability of specific factors (Ohlin, 1967; Dosi *et alii*, 1990, for a critique), from which resulted the export base theory (North, 1964; Tibeout, 1977); the notion of major activity and polarised regional development (Paelinck, 1977); and the dropping and leakage effects (Hirschman, 1958; Diniz, 2000:6).

Following developments achieved in these models, planning and policy experiences in regional development generalised in the developed countries, chiefly in the USA, United Kingdom, France, Germany and Italy. And after a short time span, in Latin America also emerged programs such as those for the hydrographical basins, in Mexico; the Guayana Region, in Venezuela; the Argentinean Cuyo; and the Brazilian Northeast (Stohr, 1972; Diniz, 2000:6). After the 70s, particularly in the USA, a dynamic motion in the direction of the production of (more) advanced technologies in new places was noticed, in parallel to a deindustrialisation process in certain regions of the country.[6] Such a trend is also verified in other countries, with localization changes occurring in an absolute as well as in a relative form, i.e., some activities not only had their importance diminished in some places in relative terms, but had lost significance in an absolute manner in terms of yields and employments generated. Furthermore, the dispersion of those old and even new productive activities was not limited to specific country(ies), but involved instead displacements to selected loci in the developing countries (the so-called periphery

[6] Storper & Scott (1988:31). In what refers to changes in the location structure of high tech industries in the USA, Storper and Scott (1988) show that the original destiny of the electronics sector in the USA was the great metropolitan regions of Northeast, mainly the area that goes from Massachusetts, New York and New Jersey, to Maryland, in the south direction. After the 70s and, particularly, the 80s, this sector, together with many other high tech ones, concentrated in a series of new centres, as the Silicon Valley, Orange County, Dallas Forthworth and Route 128.

fordism — Harvey, 1989). In some of these cases, although the centre of production was maintained, it lost its regional primacy.

Nevertheless, since the industrial and innovative success of the Silicon Valley, in the USA, and the ever growing relation between Universities and Research Centres, on the one side, with private industrial activities based in advanced technologies, on the other, some regional development studies begun also to take into consideration technological and innovation variables. Notwithstanding, as expected, the then existing theoretical conceptions and the various regional planning experiences did not have an established theoretical paradigm[7] to explain those phenomenas.

So, we shall notice that it was since the transformations in the "global chart" of capitalist production — from its former distribution in the 70s — that some of the most renowned regions in the advanced nations were fiercely defied. Five alternatives then emerged for the several regions: a) some remained quite behind and had extreme difficulties to recover and catch up with the progressive regions;[8] b) some recovered, changing the sectors in which they previously had their specialisation and/or achieving some upturn in the old ones;[9] c) some remained more or less having the same relative importance in general economic and sectoral terms; d) some new regions received old industries and become important industrial loci; and e) some new regions received or even bred new industries — Silicon Valley being the most conspicuous example of this last possibility in a developed country,[10] and the East Asian Newly Industrialised Countries (NICS) being the most noticeable among the developing ones.

Moreover, as we know, the last 20 or 25 years showed huge transformations in technologies — mainly in microelectronics, with its impact spreading to almost every economic sector — to what we should add the outcomes of the growing financial internationalisation (Chesnais, 1994; 1999; Vasconcelos & Strachman, 2002). Nonetheless, in opposition to the idea of a borderless and rather even world in terms of opportunities, governed by an integrated international system which would not differentiate agents because of their national origins, and in which markets of goods and services would progressively take a global character, the process of *mondialisation* (Chesnais, 1994; 1999) presents a

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[7] We can think in Kuhnian Scientific Paradigms (Kuhn, 1962; 1970a; 1970b) or, alternatively, in Lakatosian Scientific Research Programmes (Lakatos, 1970). For the similarity of both approaches, in spite of the many differences among them, cf. Dosi (1984:ch. 2).

[8] Detroit could be an example of this kind of region (Markusen, 1995). See also Abramovitz (1986).

[9] Examples of this alternative may be the *Plan Composants* of the French government, created in 1977, to recover the French industry of integrated circuits, semiconductors and electronics, which taken as a whole produced only half of what was consumed in the country besides being dominated by American firms. The French State made colossal investments in firms with a strong focus in R & D and in manufacture of new products. As well known, this was one of the main causes of the development of the technological pole of Grenoble, furthering many sectors in which the French industry was feeble. Another example is Scotland, which framed the Scottish Development Agency, in 1974, in order to deploy the electronics sector through the attraction of foreign investment. At the end of the 80s, the Silicon Glen was already considered one of the most conspicuous successful examples of an explicitly and strategically designed regional policy based upon selected and discretionary incentives from a State. Cf., for instance, Dunford (1992).

heterogeneous character in regional terms, whether in its form or in its effects. As explained by Benjamin (1998), the so-called globalisation of the great capital brings about sub-products as the fragmentation of what we can call the world of work; the exclusion of great human groups, the abandonment of some regions; the wealth concentration in certain strata, firms and countries; and the increasing fragility of the majority of the national States.

Those consequences occur because the new paradigm introduces a new international technical and economic dynamics which comes together with a growing liberalisation and deregulation, progressively reducing the use of work intensive technologies and of standardised mass production (which characterised the former Kondratieff — Freeman & Perez, 1988), and intensifying the use of information technologies (Harvey, 1989; Lastres et al., 1999:42). And, from our point of view, one of the most important aspects of these transformations is the fragmentation of national spaces. This implies that the process of *mondialisation* can increase the differences between regions in a specific country as well as augment the competition among distinct places (Swyngedouw, 1989:39).

For Swyngedouw (1989), this return of the locality happens as a consequence of the flexibilisation of the regulation instruments and because of the increasing importance and attraction of local institutions in this contradictory context in which some scholars even argue for the complete loss of the power of the State-Nation (Ohmae, 1993). However, Swyngedouw (1989) believes that in such an environment the relevance of specific social and institutional configurations will not disappear, quite to the contrary, they will tend to show an ever raising significance. Exactly in this sense, many authors add intangible variables to these social and institutional factors, such as local culture, institutions, organisation forms, modes of competition and cooperation, etc. (Benko, 1996; Harvey, 1989; Swyngedouw, 1989).

During the 90s, different approaches based upon empirical studies tried to explain the successful examples of sectoral agglomerations and local productive systems. These approaches pointed towards concepts such as industrial districts, clusters, networks, etc., trying to show the relevance of territorial proximity to these systems innovative dynamics. Following such approaches for the understanding of sectoral agglomerations and unequal development among regions, a debate is initiated about endogenous development models as adequate for explaining regional and local developments in this new paradigm. For Benko and Lipietz (1992), this debate is composed of three distinct possible interpretations: first, one using the notions of flexible specialisation and industrial districts. This kind of analysis had its origins in the experience of the so-called Third Italy, stirring up interests in investigating similar regional structures in other countries. These structures are characterised by the great importance displayed by non-strictly economics relations in the local community, explicitly emphasising the roles of human resources and

[10] Saxenian (1991; 1998); Castells & Hall (1993); Oinas (1995); Gertler (1995); Skranton (1995); Storper (1995).

cooperation among agents. Garofoli (1992), for instance, tried to explain the specificity of the Italian districts and evince a paradigmatic case of endogenous development sustained on a system of small firms.

The second line is constituted by industrial organisation and transaction costs analyses elaborated by the Californian School of Scott and Storper (Storper, 1997:35; Storper and Scott, 1998), based upon works of Williamson.[11] For this line of studies, agglomerations emerge from the necessity to diminish transaction costs, which would explain the role of propinquity, reinforcing the relations between a series of specialised producers and users, making possible a generalised accumulation of knowledge. And third, there is the group of scholars which base their writings in the Schumpeterian tradition, stressing the role of technical innovations for regional development. This group underscores (i) that technical knowledge has a set of important elements which are tacit and, so, that proximity can affect knowledge transmission (Foray, 1997); and (ii) that the process of technical change cannot be explained only by some kind of "linear model" in which innovation is understood as a direct upshot of a succession of stages which begin with basic research, followed by applied research, tests, adaptations, and so on (Edquist, 1997).

Albagli (1999), for instance, shows that the debate on the role of innovation in regional development considers that the innovation process results from a mix of research, development and economic and social conditions, which are present in a differentiate manner in each space. This innovation process occurs through the interaction of firms and other agents with their environment, displaying a dynamic character in which cumulativity, that is to say, the reproduction of knowledge both of individual and collective agents, has a fundamental function. Nevertheless, as a matter of fact in many instances there is an important presence of transnational corporations (TCs) in national and local spaces, influencing national macroeconomic policies and showing that an ever enlarging share of the decisions and interactions among agents comes from abroad. This results in a less conspicuous role for the indigenous agents as well as for the national States (deciding, for example, the direction of investments in a national scale). However, conversely, the role of State (Provincial) and City governments is raising, i.e., the role presented by sub-national governments clearly tries to compensate the less conspicuous share of their national counterparts in the formulation and implementation of public policies directed to economic development, also as a consequence of the higher possibility for these sub-national governments transgressing national boarders and interests in the name of their own interests (Ohmae, 1993), whether or not we agree with this behaviour.

3. The Recent Regional Changes in Brazil

In Brazil, this sudden increase in the role of the sub-national governments appears in the progressive importance of the so-called "fiscal war" among sub-national States — which generate great

[11] Cf. Williamson (1979; 1993).

dynamic budget problems for themselves through ad hoc reductions of value added taxes (ICMS),[12] in a State level, and service taxes (ISSQN),[13] in a Municipal level — and also other mechanisms (grants, estate donations, etc.) used to diminish operational costs of big corporations (mostly TCs) and attract them to specific places (Fernandes, Pinho & Côrtes, 2000:83; Arbix, 2000). Such a heightened role of sub-national governments has its origins in the opening of the Brazilian commerce, in the end of the 80s/beginning of the 90s. This was even radicalised with the Real Plan and had colossal deleterious effects over employment and also the sub-national budgets — particularly because of the maintenance of very high interest rates over the public debt (making its expansion explosive).

Thus, State and Municipal governments, in Brazil, suffered a great transformation since the end of the 80s, following an international trend in this direction (Harvey, 1989). The cities, in reality, united their policies to the new stance adopted by the States, adding municipal benefits (like reductions of taxes, estate donations, and publicity of the passivity and low cost of the indigenous workers) to the ones received in the states level. Hence, because of the economic crises and growth of the unemployment that comes with it, some regions and cities introduced manipulations of economic policies in order to attract investments. The policies adopted are quite concentrated in capital donations, contributing for a fiscal war which, as mentioned, spreads beyond the Brazilian territory, in very unequal relations between sub-national governments and TCs, adding more elements to the poor performance of the sub-national governments and to the high cost-benefit relation of such local "development policies".

Moreover, this kind of policies progressively generates less employment, given the international trends of increasing automation — to what we should add the growing capacity of rapid relocation of the new investments, making them less fixed in the long run, and the decreasing repercussions of these investments in the places where they are made, since great shares of them (and of their material and immaterial inputs and flows) come from abroad. So, the multiplier effects over the regional production chains and, even more, over the innovation chains (whether over the capability to innovate or the adoption of innovations in production processes, products, organisations, etc.) are feeble, in some cases almost non existent. But the costs are very high in terms of a smaller budget for investments in education, health, and infrastructure.

But how should one cope with such a situation if regional development is progressively an important agenda[14] for a truer social development, i.e., one which is more systemic, endogenous and with local repercussions? One alternative is to reduce transaction costs through sectoral and clusters

[12] For *Imposto sobre Circulação de Mercadorias e Serviços* (Goods and Services Movement Tax).
[13] For *Imposto sobre Serviços de Qualquer Natureza* (Every Type of Service Tax).
[14] For a discussion, from a political science perspective, of public agendas and political efforts to direct them, cf., for instance, Useem (1983); Muller (1989) and Tapia (1993).

agglomeration, making easier the interactions among agents which are not brought about by market relations, and furthering the emergence of innovations (Dosi, 1988; Lundvall, 1992; Cooke, 1998).

With those questions in mind, Souza and Garcia (1999:305) try to identify potentialities for the formation of specialised sectoral agglomerations in the State of São Paulo, through an analysis of the very complex and diversified productive structure of this State. They emphasise that although we cannot find a clear specialisation pattern in the State of São Paulo taken as a whole, we observe a concentration of specialised producers in specific loci, which thus constitute geographical and sectoral agglomerations of firms.

The study of the State of São Paulo is very important in the Brazilian context, since the share of this State in the manufacturing industry of the nation amounts to almost 50%, although, this share is declining, deconcentrating the Brazilian manufacturing industry both to other States and other regions of the same State.[15]

Table 1

GEOGRAPHICAL DISTRIBUTION OF THE

BRAZILIANMANUFACTURING INDUSTRY

Selected Regions and States (in %)

Regions/States	1970	1975	1980	1985	1990
Northeast (without Bahia)	4.2	4.5	4.4	4.8	4.5
Bahia	1.5	2.1	3.1	3.8	4.0
Minas Gerais	6.4	6.3	7.8	8.3	8.7
Rio de Janeiro	15.7	13.6	10.2	9.5	9.8
São Paulo	58.1	55.9	54.4	51.9	49.2
Grande SP	43.4	38.8	34.2	29.4	26.2
Interior	14.7	17.1	20.2	22.5	23.0
Paraná	3.1	4.0	4.1	4.9	5.7
Santa Catarina	2.6	3.3	3.9	3.9	4.2
Rio Grande do Sul	6.3	7.5	7.9	7.9	7.7
Other States	2.1	2.8	4.2	5.0	6.2
TOTAL	100	100	100	100	100

Source: Negri (1996:143) apud Souza and Garcia (1999:307).

Table 1 displays this fall in the relative share of the manufacturing industry of São Paulo in relation to the national Value Added in the Manufacturing Industry (VAMI), from 581% in 1970 to 49.2% in 1990. We shall underscore that in the Grande (Great) São Paulo the fall was even steeper, from 43.4% of the national VAMI in 1970 to 26.2% in 1990 (Souza & Garcia, 1999:306). On the other hand,

[15] This regional deconcentration is seen, for example, in: 1) the migration of firms — many from the textile sector — from the State of São Paulo to other regions (mainly to the northeast of Brazil) because of reduced work costs, and fiscal and credit benefits; and 2) the relocation of the automobile industry, including of parts of the automotive chain, particularly to regions in the interior of the State of São Paulo, and also to other States of the south and southeast of Brazil (Souza e Garcia, 1999:6).

we can notice a prominent growth in the share of the State's inland, from 14.7% in 1970 to 23% in 1990. The regions of the São Paulo State interior with a more accentuated growth were the ones most industrialised: Campinas, São José dos Campos, Ribeirão Preto and, more recently, São Carlos (Pacheco, 1999).[16]

4. Some Cases of the State of São Paulo

The cities of Campinas, São José dos Campos and São Carlos are displayed in many studies as agglomerations of specialised producers, and can even be classified as technological poles (Souza & Garcia, 1999; Fernandes & Côrtes, 1998, 1999), because of their high tech firms and sectors, and also their strong institutional structure in S & T (Souza & Garcia, 1998:9).

4.1. Campinas

The technological pole of Campinas is strongly specialised in telecommunications and information technologies. As well known, both sectors are based upon a strong tacit technological content, which lean to a spatial concentration of producers. However, this content is complemented by a codified share, generally property of big TCs with global links (Souza & Garcia, 1998, p. 4-5). As a matter of fact, since the 70s and the 80s, corporations like IBM (established in the region in 1971), Bosch and Texas Instruments set up plants in the region of Campinas, contributing in a large extent to generate a collective learning process which begot specific capabilities also in the local firms. This fact seems to be the principal explanation for the establishment of other firms in the region on those years, especially in information technologies, telecommunication and electronic equipments (Souza & Garcia, 1998:7).

The concentration of these producers presents very special characteristics, because of the vertical networks which were established in the region commanded by the biggest firms. This model of productive organisation brought about the constitution and capability of a series of local suppliers of parts, components and services, resulting in benefits caused by specialisation economies and the promotion of learning among the local agents (Souza & Garcia, 1999:16). This process bred two important consequences: (i) the incorporation of some local (small and medium) firms into the supplier network of the leading firms; (ii) an important role in the upbringing of specialised workers with tacit and specific capabilities, after and/or together with years of studies and training in the local Universities and technical institutions. Such a combination of elements originated an endogenous and autonomous process of generation and diffusion of innovations in this "local system of innovation (LSI)"(Edquist, 1997).

[16] For Suzigan et al. (2000), this process of industrial deconcentration in the State of São Paulo can be explained in great part by the better performance of the State's inland, with successful industrial agglomerations which benefit from external economies and local incentives.

More recently, particularly in the 90s, the establishment of new TCs in the region, as, among many others, Lucent Technologies, Avex Electronics, Nortel, Qualcomm and Motorola, together with the rapid opening of the Brazilian commerce, caused important changes in the mode of organisation of the firms which took part in these local supplier networks. This change occurred because the new firms tend to bring their global suppliers with them, i.e., as an outcome of the opening of the Brazilian commerce they could follow a very different strategy from those followed by the firms established in the 70s or 80s. Of course, another result of this general strategy was the loss of the local producers market share.

Furthermore, recent interviews showed that the S & T infrastructure[17] and the workforce accumulated capabilities have been less relevant to attract firms to the region than was formerly thought — the main resources looked for are the physical infrastructure, specifically in assets as the good transport infrastructure (e.g., the quite god road structure of the region is integrated to an international airport). In this same direction, the national and state privatisation of the telecommunication services, together with municipal fiscal benefits attracted to the region some firms of the telecom chain which shall not set up any formal innovation activity in the region, leaving such activities to other international plants. Therefore, in reality, the new firms in the region only assemble goods with high tech components, and many of these components coming from abroad (Souza & Garcia, 1998).

4.2. São José dos Campos

Quite soon after the military coup of March 1964, the Brazilian Federal Government established Embraer (Brazilian Aeronautic Corporation) in 1969, to develop national technological capabilities in aeronautics and afterwards start the production of civil and military aircrafts. Now the technological pole of São José dos Campos is not only directed to aeronautics and armaments, but also made up by telecommunications, autos and electronics (Stefanuto, 1993; Gomes, 1995; Quandt, 1997; Bernardes, 1998; Costa Filho, 2000).

In order to grow and make possible the needed R & D to attain those ambitious aims, aeronautics and armaments need a sophisticated S & T infrastructure and a well trained workforce. So, the Federal Government established some institutions to help these achievements, as the Aeronautic Technological Centre (CTA) and its Faculty, the Aeronautic Technological Institute (ITA), one of the best in the country, and also the Institute for Space Research (INPE). The historical aftereffect of these policies is that now São José dos Campos is the leading high tech region in the nation.

[17] There are many Universities in the region, as the State University of Campinas (UNICAMP), the second most important of Brazil (considering scientific production), the private Catholic University of Campinas (PUCCAMP), and some smaller private Universities, as well as research institutes as the Agronomic Institute of Campinas (IAC), the Food Technology Institute (ITAL), the Centre of Research and Development (for Telecommunications — CPqD/Telebrás), the National Laboratory of Synchrotron Light (LNLS), among many others.

The region's high tech productive organisation model is characterised by a collection of 45 small and medium firms, which gravitate around Embraer. The firm develops its own aircraft projects and engineering, also assembling and integrating systems, structures and components, coordinating vertically a network of global and local suppliers. These local suppliers produce industrial inputs as specialised metal services for the main structure, components, avionics, engineering and software project services, among many others. Most of these suppliers are enterprises established by former employees of Embraer, often with the help of the core firm.

This historical experiment of the Brazilian aeronautic sector had the decisive support of the Federal State, through the Ministry of Aeronautics and some measures directed towards the technological development of the sector, like fiscal policies, State investments, etc. The robust technical infrastructure associated to these policies has generated learning economies and other externalities which benefit the firm in a large scale, making possible its growth and also the achievement of very important technological developments already in the 70s and 80s (Bernardes, 2000).

However, in the 90s occurred a big change in the direction of the national development taken as whole, which reflected in the federal policies for the aeronautic sector and in its core firm. In this sense, probably the most significant measure, the privatisation of Embraer in the beginning of the 90s, had enormous repercussions over the strategy of the firm, which then started to follow a productive restructuring, for example, recurring more decidedly to foreign suppliers. All these transformations generated great instabilities and almost the firm's insolvency, until 1999, when it began to profit from the successful sales of two civil aircrafts, ERJ-145 (for 50 passengers) and ERJ-135 (for 35 passengers). In this same year, the firm turned to be the world leader in regional aircrafts and the fourth largest aircraft manufacturer in the West, behind Boeing, Airbus and the Canadian Bombardier (with which it now has ferocious disputes both for the third place and in the WTO, backed by their respective governments — Bernardes, 2000: 3).

The sales of aircraft contracts signed in 1999 (US$ 6.6 billion) represented a record in the history of Embraer, making it, in that year, the most important export firm in Brazil. Such an achievement represented the sequel of more than 30 years of investments in technology, employment generation, manpower training, new plants, development of suppliers, and so on.

4.3. São Carlos and Ribeirão Preto

The technological pole of São Carlos is known by presenting high tech firms, in sectors like new materials, information technologies, technical instruments, electronics and precision mechanics. Notwithstanding, the study of the high tech firms in the State of São Paulo show that the region of São

Carlos is highly specialised in two sectors: (i) information technologies, and (ii) medical, hospital, and precision instruments and equipments.[18]

Fernandes, Côrtes and Oishi (2000), after the analysis of 136 high tech firms,[19] reached important conclusions about the sectoral and regional concentration of the São Paulo industry:

> "The sector of medical equipment and precision and automation instruments is the first or the second most important in all regions, including the city of São Paulo, with special relevance in São Carlos (41.2%) and Ribeirão Preto (81.8%). In Campinas, the sector of information technologies predominate (34.8%), and in São José [dos Campos] the sector of electronic equipments and communication shares the leadership with the sector of medical and hospital equipments and precision and automation instruments, both comprising one third of the firms of the region,[20] whereas the ABCD,[21] as expected, presents a more diversified distribution by sectors of activity, with the leadership of the machine and equipment sector (with 26.3% of the firms)".

São Carlos and Ribeirão Preto present a higher concentration in a specific sector (the medical and hospital equipments sector), evincing a specialisation level which is not displayed in none of the other regions of the State. In São Carlos, the high tech firms are of micro, small or medium size, being spin-offs of the local Universities (the Federal University of São Carlos — UFSCar — and the University of São Paulo, in its campus of São Carlos), being created whether by (current or former) teachers or alumni of these two important universities (Vieira, 1998:11).

In 1984, as a consequence of the existence of those small and medium high tech firms, the National Research Council (CNPq) set up the ParqTec Foundation – Foundation for the High Tech Park of São Carlos, which had as its main function to improve the structural conditions and stimulate the establishment of high tech firms in the region. Following these targets, two centres linked to this foundation were created to nurse new firms, the Incubator Centre of High Tech Firms (CINET) and the Incubator Centre of Software Firms (SOFTNET), particularly directed to the incubation of software firms, especially those integrated to the federal Government Programs SOFTEX and Genesis Project. Still with the aim to function as an incubator to high tech firms, the State of São Paulo Secretary of Science, Technology and Economic Development constituted the Development Centre for Infant Industries (CEDIN).

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[18] Cf. Fernandes & Côrtes (1998; 1999) and Fernandes, Côrtes & Oishi (2000).

[19] Following the arguments of Bell and Pavitt (1993a; 1993b) that a great share of the innovation activities in the developing countries are in fact related to diffusion, adaptation and improvement of existent technologies, Fernandes, Côrtes and Oishi (2000), apply to their data base three criteria which distinguish high tech firms from others. To say, such firms need to have one or more of the three following conditions: i) R & D inside the firm, even though this R & D may be not formally structured; ii) relations with universities and research centres; and iii) investments in R & D activities, even if these activities are not formalised.

[20] The firms of the sector of precision and automation instruments is particularly comprised in São José dos Campos by spin-offs from Embraer, supplying classified goods and services to this big customer.

[21] This is the region constituted by Santo André, São Bernardo, São Caetano and Diadema, all surrounding the city of São Paulo.

The relations and synergies among distinct high tech firms vary according to the specific activities and products developed. For instance, instrumentation, information technologies, and electronic firms present very deep cooperation and partnership relations, commonly with an ensemble partnership in some projects. Most of the relations among firms of different sectors and the local Universities are not formalised, being based in tacit knowledge and mutual trust, also making possible important information flows. Nonetheless, in the case of more mature sectors, interaction difficulties among the local firms and big corporations prevail, for if, on the one hand, São Carlos attracts high tech firms and sectors because of its S & T infrastructure, well trained workforce and technical culture, on the other hand, in some cases not even rather important customer-supplier relations are set up between firms which establish new plants in the region and the local ones. That is to say, the new plants do not include (and foster) the local capabilities in their supplier network, as is showed clearly by the case of Volkswagen, installed in 1996 in the region, attracted by fiscal benefits from the state and local Governments.

4.4. Some Regions of the State of São Paulo Specialised in Traditional Industries

Many other regions of the State of São Paulo specialises in traditional industries, some virtuously, as Jaú and Birigüi in the leather and shoes sectors; the cities which comprise the so-called Circuito das Águas in sweaters;[22] Ibitinga in knitting products; Itu, Santa Gertrudes, Tambaú, Pedreira and Porto Ferreira in ceramics; and São Bernardo do Campo and Itatiba in furniture. These industries, although less important for the state and the national economies, also comprise sources of dynamism and externalities for the cities and regions in which they localise, counting on a set of specialised small and medium firms, and in a well trained and with specific capabilities workforce (Souza & Garcia, 1998:9).

Other very important examples of the State of São Paulo are the chemical sector, chiefly in the cities of Paulínia, Cubatão and Santo André; and the metallurgical sector, in the ABC,[23] with strong relations with the automotive sector, which was initially established in this region, in the late 50s and 60s, but is now also present in other regions of the State of São Paulo and of Brazil. The metal-mechanic sector concentrates on the regions of Campinas and Piracicaba, and displays a very diversified structure, for whereas the region of Campinas is rather specialised in inputs for the petrochemical pole of Paulínia, in this same region, the production of the region of Piracicaba is addressed to the local alcohol and sugar agribusiness. We shall notice that all these agglomerations are strongly vertical, coordinated by big firms with several subcontracting relationships of different kinds, and an almost complete absence of more cooperative relations (Souza & Garcia, 1999:309).

Finally, it is important to mention the potentialities and the weight of the agribusiness of the State of São Paulo. In the region of Ribeirão Preto, which comprehends also, as underlined above, a

[22] Or "Water Circle", constituted by some resort cities in the mountains.

technological pole for medical, hospital and precision instruments and equipments, is also well known for its huge production of alcohol, sugar, citric fruits, coffee, corn and Soya beans, with a very high mechanisation level and productivity. In the region of Limeira[24] and Bebedouro there is a mighty orange agribusiness, heavily directed to exports, whereas in the regions of the Vale do Ribeira (Circuito das Pedras[25] and Cotia) we can observe the production of fruits, and in the sub-region of Holambra, near the city of Campinas, the production of flowers. In the west of the State, we shall underscore the cattle breeding and the meat and animal products industry, which addresses part of its production to foreign markets, and also the sector of vegetable oils refining, also with a share in the Brazilian exports (Souza & Garcia, 1999:309).

4.5. Americana

The textile pole of Americana, also known as the textile pole of the State of São Paulo, is specialised in the production of plane synthetic textiles. According to the estimates of the union of the local textile firms (SINDITEC), which also comprise firms of the nearby cities of Santa Bárbara D'Oeste and Nova Odessa, in 1994 the region of Americana were responsible for 6% of the physical production of textile fabrics in Brazil, and for more or less 90% of the Brazilian production of plane synthetic textiles (Garcia, 1996:21).

The small and medium firms are responsible for a great share of the region's production, destined primarily to the national market because of the international competition in synthetic textiles, particularly from Asia. That is why the effects of the abrupt commercial opening were so rude for the region, especially when combined with the appreciation of the Brazilian currency after the Real Plan, increasing drastically the imports from Asia of these fabrics.

The textiles production of the region of Americana is based in subcontracting relations with small firms, and in the concentration of inputs and equipment suppliers in some firms; on the other hand, the relation among firms is less cooperative and very unstable. There is no common centre for technology and development of textiles in the region, and the competition capability of the local producers is not supported by collective efficiency gains.

4.6. Pedreira

The economic region of Pedreira expanded around the production of white ceramics, whether of adornments, household utensils, or of ceramic isolators for electricity transmission, etc. The local industry of ceramics established definitely in the 70s and 80s, having as its cornerstone the foundation of Nadir

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[23] The region is constituted by Santo André, São Bernardo and São Caetano.
[24] Also analysed above for its production of precious gems, jewels and ordinary adornments.
[25] Or "Stones Circle".

Figueiredo Indústria & Comércio, which manufactured variegated household utensils in a large scale. After that, many other small firms spread throughout the region, which had even been considered the biggest ceramic utensils producer in South America.

In the 90s, the local ceramics industry faced an unprecedented crisis, strictly related to the economic policy adopted since the beginning of that decade. Several firms were obliged to close (including Nadir Figueiredo) and many workers lost their jobs — there are estimates of a reduction of 40% in the number of jobs, in the apex of the crisis. But since the end of that decade, the local industry achieved a recovery, also because of its partnerships with universities, research centres, and consultants, in order to develop new technologies and attain better product quality (we shall emphasise the interchange with CENCAL PORTUGAL — Centro de Desenvolvimento de Cerâmica, for professional training in ceramics production).

The prospects for the industry are optimistic in the sub-sector of adornments and household utensils as well as in the one of ceramic isolators. This last sub-sector has accomplished some good results, with an increase in sales, productivity, and technical performance of its six producers (three majors) settled in the region. In this respect, the firm Isoladores Santana, one of the most important of Brazil and also a conspicuous exporter, announced investments of US$ 1.66 millions for 2000.

4.7. Franca

The city of Franca is the second most important leather shoes producer of Brazil, just behind the region of the Vale dos Sinos, in the southern State of Rio Grande do Sul. Franca is highly specialised in men's leather shoes, producing both for the national and the foreign markets. The city is responsible for 36% of the employment in the shoes industry of the State of São Paulo, 19.5% of the sector workforce in Brazil, and the greatest share of shoes exports of this State (US$ 113 millions, in 1999 — Suzigan et al., 2000:12).

This productive set up is comprised by small and medium firms distributed along the entire productive chain, from the initial preparation of the leather to the final shoe manufacture (also form other materials), equipments producing for shoes and also the production of parts and other inputs (special glues, etc. — MDICE/SDP, 2001a; 2001b). The manufacturers can profit also from a big workforce with specific capabilities in the sector as well as from productive relations which permit both technical and market flows of information. The firms of the sector can count on a local institutional structure directed to product and process innovations, and also to design developments. They can avail themselves also of other organisations, like the Leather and Shoes Technological Centre (CCTC) of the Technological Research Institute (IPT) of the University of São Paulo (USP), and the Industrial National Service (SENAI), a industrial workforce training institution.

4.8. Votuporanga

The furniture industry of Votuporanga comprehends the second most important concentration of furniture producers in Brazil, surpassed only by Bento Gonçalves, in Rio Grande do Sul. The more or less 350 producers are predominantly comprised by small and medium firms, with a total of only 6,000 workers (Suzigan et al., 2000:11). The producers collective action, coordinated through the local firms associations and the agency in the State of São Paulo of the Service of Support to the Micro and Small Firms (SEBRAE), permitted the development of quality certification programs for inputs suppliers, concentrated on development of capabilities in design, production restructuring, and marketing management. In reality, the necessity to overcome the macroeconomic problems of the 90s as well as firms management issues very much contributed to the development of these programs. And, despite the firms production is mainly directed to the national market, many of these programs helped also to improve their export capabilities.

Suzigan et al. (2000:12) show that local policies to promote the industry as well as partnerships with SENAI for workforce training, and with the Furniture Technological Centre (CETEMO) for technological development, were of fundamental relevance for the achievement of great productivity increases, cost reductions and quality improvements.

4.9. Limeira

The Limeira region, despite presenting a diversified industrial structure with a strong participation of both orange juice producers and metal-mechanic firms, has special advantages and strengths in a quite unknown sector (at least for the majority of researchers), that is to say, the production of gems, jewels and ordinary adornments. As in many other sectors described previously, this one evinces a prominence of small and medium firms, though we can find also some big enterprises. The production is destined generally to the national market, but in 1996 local exports achieved US$ 3 millions, mainly to the USA, Europe, Africa and the Mercosur (Suzigan et. al., 2000:9).

Data presented by Suzigan et al. (2000:9), obtained from the 1997 Annual List of Social Informations (RAIS), disclose that in the 350 firms of the sector, with a total formal employment amounting only to 1,216 persons, the informal work — i.e., without formal contracts — is so significant that estimates of the City Government point to 15,000 workers in that condition.

There are many different types of relations among this sector's firms, from cooperation in exporting efforts and buying of inputs to the organisation of annual fairs, training courses, etc. However,

only one big firm of the sector has an internal department of design, whereas some of the others try to be up to date by sending people to foreign renowned centres of design, mostly in Italy.

5. Implications for Public Policies

There are several implications of what was showed above for innovation regional policies. A series of empirical studies try to devise manners and models to replicate successful productive agglomerations, but these last phenomenas are not so simple to emulate. Thus, the great challenge to those who study the intrinsic regional disparities generated by the excluding character of capital considered as a whole, which manifests also over space, is to contrive a production theory and a model, both in micro and macroeconomic levels, capable of reducing such disparities and of generating (mainly) the virtuous effects of the action of capitals over the regions and societies. One shall observe that in this statement we assume the relevance of any specific productive agglomeration does not depend on its representativity for all the economy of a State, Province or Nation, if it displays an important role in diminishing the socio-economic inequalities of specific localities.

In the Brazilian case, there is a growing intervention of sub-regional (State and Municipal) governments, trying (often in vain) to compensate for the abandonment, by the federal government, of the formulation and implementation of public policies, especially those directed to economic development (Fernandes, Pinho & Côrtes, 2000:83; Arbix, 2000:262). Therefore, the idea of introducing public policies into the attributions of localities is supported by the unremitting economic crises and the ensuing increase in unemployment, but also by the uncertainty about the returns of public expenditures and funds in terms of their consequences over public incomes and technological development. Nonetheless, as we showed above, there is often a great misuse of public funds in such policies, at least when compared to (the expected) returns.

However, there is no way for the public sector evading its role and responsibilities in sustaining innovation and modernisation processes, and consequently in augmenting the productive capacity of a region. The only concern is to try to make a better use of the public funds, achieving the best possible returns for them. In this sense, in the Brazilian case currently emerges a debate over the political and institutional transformations, and their repercussions upon the regional development, since there are many scholars trying to devise a means to stop the fragmentation of the national space, at least as a hidden official policy.

Nevertheless, we have to recognise that a more directed focus in regional and local developments is a great opportunity to improve these repercussions of policies, at least in some cases, making very

[26] Or "Water Circle", constituted by some resort cities in the mountains.
[27] The region constituted by Santo André, São Bernardo and São Caetano.
[28] Also analysed above for its production of precious gems, jewels and ordinary adornments.

important the knowledge accumulation about specific productive agglomerations, for we always shall consider the diverse sectoral characteristics, which implicate also in distinct local needs, when designing new policies. Once more, it is necessary to investigate if the concentrated nature of certain activities in particular regions is a result of technological external economies, of the size of the market or of any other cause, and still after such an investigation, there is the need to evaluate if and how should the public sector intervene.

The international literature (e.g., Cooke, 1998; Morgan, 1993; Scott, 1998) completely discard public policies strongly based in subsidies and other fiscal benefits, recommending instead the establishment and improvement of cooperation networks which include local actors such as public organisms, firms, business associations, unions, universities, etc. However, all these actors need to cope with the fact that many decisions and agreements originate, at least in part, from foreign sources, and that this part is constantly raising, chiefly nowadays (Chesnais, 1994 1999).

The public sector can assume a significant role even in such conditions, for instance, bestowing some critical inputs (as physical and knowledge infrastructures, public organisms for information about markets, technologies, marketing, etc.) quite of general use in the economies or in particular sectors or regions. A second alternative for the governments is to assist in the coordination of decisions among different agents (Chang, 1994a; 1994b), e.g., stimulating the horizontal cooperation of firms in complementary markets, or even among competitors for setting up some important inputs or channels for outputs, but also, in exactly this same last sense, stirring up vertical linkages among users and producers, and so on. The importance of some governance/institutions to reduce opportunistic behaviours is generally recognised in the institutionalist literature (Williamson, 1979; 1993; Chang, 1994b Strachman, 2001a; 2001b).

The State of São Paulo exhibits a diversified industrial sector, with the presence of many distinct productive agglomerations, whether high tech or traditional and mature. The recognisance of such diversities, their history, organisation and culture, constitutes an important asset for improving the policies adopted. Furthermore, the understanding of these several sectors and their specificities can help this State and also the federal government in the design of effective sectoral and regional policies, in an alternative to simple, quite unproductive and short run policies based on fiscal benefits, with all their consequences for the fragmentation of the nation.

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[29] Or “Stones Circle”.

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