

## Toward a new paradigm of industrial organization

The objective of this article is to discuss the restructuring process underway in Brazilian industry, giving special attention to a discussion of inter-firm relations and its impact on employment relations and the labour market.

We start from the viewpoint that the set of technological and managerial innovations, which is diffusing throughout industry world-wide, points toward the establishment of a new paradigm of industrial organisation. This pattern is qualitatively different from the Taylorist-Fordist model of efficiency (based upon the scientific management of labour) which evolved and diffused at the beginning of the Second Industrial Revolution.

The new model began to be established in the 1940s and 1950s, and its diffusion has been accelerated during the crisis of the 1970s. During the 1980s and 1990s this process intensified due to the great competitive pressures stimulated by Japan's entry into the North American and European markets.

The metal-working industries, and especially the automotive industry which was the birthplace of the previous industrial paradigm, has held a privileged position in this process of change. This diffusion process has taken the form of imitation and re-creation, trial and error. Ideas, methods and management techniques have diffused, based largely upon imitation of the so-called "Japanese model". Hence, one can trace a simultaneous diffusion of ideas and new techniques, many of which are in conflict with those traditionally used. More than the introduction of technological innovations, the application of these tools at the firm level signifies a highly complex process of social change, reversing established norms and models of behaviour which were familiar to members of organizations, establishing new systems of authority and control and creating new sources of insecurity and anxiety.

This new form of industrial organization has received various titles in the international literature: Neo-Fordism or Post-Fordism for the French Regulation School; new techno-economic paradigm for the Neo-Schumpeterians; "PIW strategy" in the Scandinavian literature; "flexible specialization" for Piore and Sabel; "systemofacture" for Hoffman and Kaplinsky; "lean production" for Womack from the world automotive study conducted at MIT - yet all have addressed the same phenomenon. All of these schools highlighted the existence of economic advantages in the effective utilization of technological innovations in product, process, and organization.

In terms of the relation client-supplier, the tendency would be the constitution of an integrated system based upon the following elements: geographical proximity, which is vital to reduce freight and inventory costs; a strong integration of the clients' and suppliers' production process since the product development phase (group engineering) until its production; a high level of trust regarding quality as well as delivery dates (which implies establishing a "conglomerate" of firms in a verticalized production chain, where clients monitor the production process of its suppliers). In the Japanese case, in which this system works completely, it assumes almost organic characteristics<sup>2</sup>.

In "lean production", the suppliers are organized hierarchically in functional lines and each one has different responsibilities in production. The first-line suppliers share the product development and

---

<sup>1</sup> Originally published in Portuguese as Gitahy, Leda (1994) "Inovação Tecnológica, Subcontratação e Mercado de Trabalho" in *São Paulo em Perspectiva*, Vol. 8 nr 1, pp 144-153, São Paulo.

<sup>2</sup> Gitahy, L. and Rabelo, F. "Educación y desarrollo tecnológico: el caso de la industria de autopartes", in Gallart, M.A. (ed) *Educación y Trabajo - Desafíos y Perspectivas de Investigación y Políticas para la Década de los Noventa*, Montevideo, Red Latinoamericana de Educación y Trabajo, Ciiid-Cenep/Cinterfor, 1992, pp. 107-141.

work in a system which is extremely integrated with the assembler. Simultaneously, a process of externalization of productive functions from the car manufacturer can be verified, integrating only vertically or maintaining the critical components under strict monitoring. The suppliers' hierarchization produces a structure where first-tier suppliers are clients or control the second-tier or third-tier suppliers, reproducing the relations occurring between the car manufacturers and first-tier suppliers. Among these suppliers, the interaction is more intense in process engineering and manufacturing areas<sup>3</sup>.

In this way, from the technological point of view, the greater proximity between clients and suppliers<sup>4</sup> turns into a fundamental dimension in the firms' competitive strategy, as it allows an effective application of the JIT and the increase of flexibility, in a scenery dominated by diversification and growth based on the exploitation of market niches and smaller production scales.

This process, which took place within a context of more rapid technological change and intensified global competition, induces firms to incorporate new product and process technologies, cut costs and raise the rate of introduction of new models, accelerating the process of generation and diffusion of technology along the production chain. Regarding labour management, it is important to point out that such innovations imply the transformation of a model characterized by the extensive use of semi-skilled labour into another based on the intensive use of skilled, multi-functional and co-operative workers<sup>5</sup>.

The current debate about the social implications of the diffusion process of new technologies is characterized in an enormous range of literature, including a wide variety of approaches and conclusions. Nevertheless, analysing the most recent literature on this theme, several points in common can be identified:

- The current crisis is the result of the exhaustion of the model of growth and of political-social relations established internationally after World War II. This model was associated with a particular techno-economic or industrial organization "pattern" or "paradigm".
- This crisis points toward a process of profound restructuring of the production apparatus and of existing political and social relations, and its analysis cannot be reduced merely to the economic dimension, but must also take into account social, political, and cultural variables.
- To avoid any technological determinism, it is necessary to develop a focus considering the genesis and history of the social production of science and technology.
- A new techno-economic "pattern" or "paradigm" is emerging in this process of change, where the main feature is the incorporation information-intensive technologies based on microelectronics.
- This new pattern accentuates the capitalist tendency to continually raise the technical composition of capital.
- In this re-structuring process, the international division of labour as well as the social and sexual division of labour have been altered, and the social relations of production and of human reproduction (family structures) have been modified.

---

<sup>3</sup> Hoffman, K. and Kaplinsky, R. Hoffman, Kurt and Kaplinsky, Raphael *Driving Force: The Global Re-structuring of Technology, Labour and Investment in the Automobile and Components Industries*, Westview Press, Boulder, 1988 and Womack, J.P, Jones, D.T. and Roos, D. *The machine that changed the world*, Rawson, New York; Collier Macmillan, Toronto; Maxwell Macmillan International, 1990.

<sup>4</sup> Closer assembler-supplier relations are achieved through a basic contract which establishes a price and quality policy, and a system for orders and deliveries over the long-term. This system also fixes a reasonable profit margin for each supplier, characterizing more cooperative and stable relations.

<sup>5</sup> Quality systems, such as Statistical Process Control (SPC) illustrate this issue. The transfer of responsibility for quality to direct production staff, and thereby eliminating the traditional quality control conducted by inspectors, generally implies broad retraining programs.

The empirical findings of recent studies conducted concerning the impacts of the introduction of microelectronics technology point toward a set of heterogeneous and contradictory effects which depend upon the non-linear character of the technological change process and its interaction with the society in which it takes place. Hence, it is possible to affirm that<sup>6</sup>:

- The introduction and effects of new technologies are differentiated according to the specific characteristics of the production process, depending upon the country, region, economic sector and even the diverse segments of the same productive unit.
- The form which this introduction takes depends upon the characteristics of the competitive standards and comparative advantages in different counties, sectors or regions.
- The effects of labour displacement have not necessarily arisen at the place where the new technologies are introduced.
- The determination of new skill requirements does not depend only upon the technological characteristics, but also upon the production and labour markets, organizational structure and union policies.
- It is necessary to link the direct and indirect effects of the transformation process, analysing the inter-relationships between formal and informal labour markets<sup>7</sup>.

Starting from this standpoint, and abandoning the 'straight-jacket' of the polarization between 'positive' and 'negative' effects, it is possible to identify some more general tendencies, at least in relation to serial-production industries.

Regarding employment, the tendency is to reduce the number of workposts, especially those related to direct production, and to raise productivity significantly. While employment curves follow production curves during periods of technological stability, they move apart during periods of technological change, with production output far exceeding employment. This phenomenon is nothing new in the history of capitalism<sup>8</sup> - the difference is expressed, on the one hand, by the pace of diffusion of innovations and, on the other, by the pervasiveness of the technology<sup>9</sup>.

A great change has taken place in the structure of skills. The pace with which new skills are being created, while others become obsolete has accelerated. It is important to observe here that the content of skills is often related to the characteristics of productive processes suffering no significant alterations for long periods of time. This leads to an entire social process<sup>10</sup> of validation and hierarchization of the professions influencing the organization of the labour process up to the curricula of the technical schools<sup>11</sup>. Various studies<sup>12</sup> have pointed toward the fact that these changes

---

<sup>6</sup> Acero, L. *A Methodological Review of Case-Study Work on MRB's Industrial Technologies and Labour Use*. Campinas, NPCT/Unicamp, 1984 (mimeo).

<sup>7</sup> For a discussion of these issues, see: Abreu, A. "Novas Tecnologias e Mercado de Trabalho: as novas formas de assalariamento precário", Project *Mudança tecnológica e natureza do trabalho*, Campinas, NPCT/Unicamp, 1987, mimeo.

<sup>8</sup> The debate concerning work is as old as the Industrial Revolution, emerging with greater intensity during periods of crisis and economic, political and social reorganization. For a review of this debate, see Gitahy, L. "Na Direção de um Novo Paradigma de Organização Industrial?", Caxambu, XVI Encontro Anual da ANPOCS, *GT Processo de trabalho e reivindicações sociais*, October, 1992.

<sup>9</sup> For a discussion concerning the limits of the debate on microelectronics and employment, see Hewitt, T. "Automation in Brazil's Electronics Industry: an overview of trends and the implications for labour", Project on *Educação e desenvolvimento tecnológico: o caso da informatização da indústria no Brasil*, Campinas, NPCT/Unicamp, 1987, mimeo.

<sup>10</sup> This process involves a social, sexual, ethnic and even age-based division of labour, as well as the specific characteristics of the societies in which they take place.

<sup>11</sup> The issue of changing skills, associated with the question of employment, is strategic not only in the sense of understanding the process of restructuring various segments of the labour force, but also for their implications in terms of requirements for the educational system.

demand specific qualities of workers, not merely require that they adapt to these skills, but that they also accept their guidelines: initiative and creativity, ability to work co-operatively in a group, ability for mutual learning in the workplace itself, competence to evaluate your own work and to take measures to improve quality and techniques for the planning and organization of work.

The diffusion of new microelectronics-based technologies has been associated with changes in the labour process, affecting not only its organisation, but also policies for labour management and the structure of employment. In order to discuss this change, it is interesting to review one of the points of convergence in the international literature mentioned above, which refers to the association of growth periods with different techno-economic “patterns” or “paradigms”. With the exceptions of the “theory of the degradation of labour”, which points toward a continued de-skilling of labour or of those which invariably associate technological development with increased skill, other approaches characterize the current moment as one of rupture and analyse the process of change as a counter-point between the previous period and the current tendencies.

Despite the diverse levels of analysis of the studies written on this theme, the idea of a “pattern” or “paradigm” is considered to be useful for analysing the Brazilian case, as it combines social, economic, and technological elements in the same concept.

Carlota Perez<sup>13</sup> defines a technological paradigm as a set of common-sense principles, or an ‘ideal type’, guiding technical and investment decision-making, imposing themselves during a certain period as the most efficient and rational. Although this author is not interested in the social process of generating and diffusing these principles, this definition may be an extremely useful guide to our discussion. What is interesting about this definition of the paradigm as “common-sense principles” which guides decisions and even the use of “ideal types” to analyse processes of change, is that the mobilizing ideologies and the so-called common-sense principles often take a normative format and are based on the codification of some type of socially-mobilizing experience.

The work of Björkman and Lundkvist<sup>14</sup> has been based upon empirical research conducted during the 1970s in Swedish metal-working companies. Their characterization of the methods or strategies of capital accumulation is an attempt to operationalize the discussion of change in work conditions taking place at the time.

Piore and Sabel<sup>15</sup>, based on an historical analysis of the constitution of the mass production system and on the forms of usage and control of the workforce in the USA and Europe, come to the conclusion that the crisis in the late 1960s indicated the limitations of this system and that the decentralization of productive activities, based on technologies assuring greater flexibility, became an option for the companies to recover from the crisis. The main thesis proposed by these authors is that today the craft-system challenges the mass production system as a paradigm for organizing production. For these authors, two production systems<sup>16</sup> confronted each other during the 19th century and the beginning of the 20th century: craft production and mass production, and the latter turned out to be hegemonic for a long period. Thus, if during the boom of mass production craft production remained circumscribed to smaller and fluctuating markets<sup>17</sup> - that did not justify the use

---

<sup>12</sup> For a review of the debate about skills, see: Paiva, V. *Produção e qualificação para o trabalho: uma revisão da bibliografia internacional*, Rio de Janeiro, Instituto de Economia Industrial, UFRJ, text number 14, September, 1989.

<sup>13</sup> Perez, C. *Microelectronica, Ondas Largas y Cambio Estructural: nuevas perspectivas para los países en desarrollo*. SPRU/Sussex, 1984, mimeo.

<sup>14</sup> Björkman, T. and Lundkvist, K. *Från Max till PIA: Reformstrategier inom Arbetsmiljöområdet*, Malmö, Arkiv, 1981 and Björkman, T. and Lundkvist, K. “Work relations, capital accumulation and technological change”. In: Himmelstrand, U. (ed), *The Multiparadigmatic Trend in Sociology*, Uppsala, Almqvist & Wiksell International, 1987, pp. 57-68.

<sup>15</sup> Piore, M and Sabel, C. *The Second Industrial Divide - possibilities for prosperity*, New York, Basic Books, 1984.

<sup>16</sup> Or two alternative forms of conceptualizing efficiency in production organization.

<sup>17</sup> Such as experimental products, luxury articles, special equipment used in mass production and standardized products for fluctuating demand.

of more sophisticated and costly technologies<sup>18</sup>, and as a residual category or a limit to the introduction of mass production equipment<sup>19</sup> - today craft production emerges associated with the use of flexible automation based on microelectronics<sup>20</sup>. It is the emergence of craft production, associated with and advanced by the use of flexible automation based on microelectronics in the countries studied (Japan, Italy, and Germany), that leads the authors to conclude that this system currently challenges that of mass production as a paradigm, allowing the enterprises that use the craft-system to reduce costs and at the same time work with a high degree of flexibility.

Comparing Charts 1, 2, and 3 the similarities (despite the differences) between the characterizations of the three production models can be identified.

CHART 2: TRANSFORMATIONS OF TECHNO-ECONOMIC PARADIGM		
	Old Paradigm	New Paradigm
<b>Characteristics of the products</b>	<ul style="list-style-type: none"> <li>• Energy and materials intensity</li> </ul>	<ul style="list-style-type: none"> <li>• Information intensity</li> </ul>
<b>Characteristics of the production</b>	Mass Production: <ul style="list-style-type: none"> <li>• Economies of scale, based on homogeneity</li> <li>• "Minimum change" strategy</li> <li>• Producer-defined products</li> <li>• Automation</li> </ul>	Flexible Production: <ul style="list-style-type: none"> <li>• Economies of scope or specialization based on flexibility</li> <li>• Rapid technical change strategy</li> <li>• User-defined systems</li> <li>• Systemation</li> </ul>
<b>New concepts for organizational efficiency</b>	Organization of the firm: <ul style="list-style-type: none"> <li>• Analytical model, focuses on parts or elements of processes, it led to detailed definition of tasks, posts, departments, sections, responsibilities and to complex hierarchies</li> </ul> Adapting demand to production: <ul style="list-style-type: none"> <li>• Periodic planning</li> </ul> Management style: <ul style="list-style-type: none"> <li>• Intuition-based skills, that would lead to the right decisions in the face of scant information</li> </ul> System of control: <ul style="list-style-type: none"> <li>• Hierarchical bureaucracies</li> </ul>	Organization of the firm: <ul style="list-style-type: none"> <li>• Systemic model, focuses on links and systems of interrelations for holistic techno-economic coordination, merging activities into one single interactive system: managerial and productive, white and blue-collar, design and marketing, economic and technical</li> </ul> Adapting production to demand: <ul style="list-style-type: none"> <li>• Dynamic "on line" monitoring</li> <li>• A new management style: Information-based skill, a more integrated techno-economics skills and increased creative, intuitive skills</li> </ul> A new system of control: <ul style="list-style-type: none"> <li>• Decentralized networks</li> </ul>

Source: Based on Perez (1985), op. cit., modified.

In order to understand the dynamic of the diffusion of a new paradigm, one must distinguish between different ideas regarding the practice and timing of this process. Distinct differences in time and space exist between the emergence of ideas, the initial experiments to put them into practice, their systematization and diffusion in different societies. The 'success' of these first experiments induced a process of imitation and adaptation, leading to distinct outcomes in different contexts and situations. This process involves new actors, generating support and opposition, whereby new contributions and ideas are either transformed or 'renamed'.

<sup>18</sup> Given its high cost, the use of dedicated equipment is only economically viable when demand reaches a high and stable level, whereby the equipment can yield significant cost reductions. Nevertheless, this rigid automation is not accessible to small firms, resulting in the view that craft production traditionally implies more outdated production techniques.

<sup>19</sup> As in the case of the capital goods industry.

<sup>20</sup> Piore, M. and Sabel C. (ibid).

Hence, in order to analyse the diffusion of the new paradigm in Brazilian industry, it is first of all necessary to distinguish between the so-called “guiding principles” and those practices which actually are implemented. Secondly, one must take into account that re-structuring and implementation is a long and complex process, even in the same firm. Finally, one must identify which dimensions are affected by changes, such as management ideology, organization of the labour process, firm structure (hierarchical levels, organizational structure and systems of authority and control), human resource management policies (career and salary structure, training and use of participatory methods), industrial relations (union relations), and industrial organization (inter-firm relations, client-supplier relations).

CHART 3: THE SECOND INDUSTRIAL DIVIDE

	<b>Mass Production</b>	<b>Flexible Specialization</b>
<b>Size of firm/plant</b>	• Large (the corporation)	• Scope for small and large
<b>Technology</b>	• Specialized dedicated machinery	• General-purpose machinery.
<b>Labour</b>	• Narrowly trained , separation of conception and execution, fragmented and routinized tasks, narrow job classification	• Broadly trained, integration of conception and execution, multi-skilled and varied tasks, broad job classification
<b>Management</b>	• Hierarchical and formal	• Flat hierarchy, informal..
<b>Output</b>	• High volume, limited range of standardized products	• Large and small batch, single units varied/customized products
<b>Competitive behaviour</b>	• Strategy to control market	• Fast adaptation to change, innovation
<b>Institutional framework</b>	• Centralised, national and multinational keynesianism	• Decentralized, local institutions which fuse competition and co-operation
Source: Schmitz, H <i>Flexible Specialization - a new paradigm of small-scale industrialization?</i> University of Sussex, 1988.		

## The diffusion of the new paradigm in Brazilian industry

The diffusion of new technologies based on microelectronics in the Brazilian industry begins in the middle of the 1970s, along with the beginning of the recession and the crisis in the model of industrial relations present during the so-called “economic miracle” period. Facing the economic crisis, the emergence of the labour movement and the process of political liberalization, this model is then questioned by different social sectors (workers, businessmen and State), which do not reach a consensus on which new methods should be adopted. In this context emerge, inside the productive units, different experiences of methods of workforce management (Quality Control Circles, *Kanban*, semi-autonomous groups) and of union-management relationship, such as the factory commissions (Ford, VW etc.), and the process of implementation of new technologies is intensified.

This process is characterized by trial and error, but research conducted in metal-working firms between 1985 and 1991 indicate a clear correlation between the new forms of management and the introduction of new technologies and, in some cases the emergence of a new way of relationship between companies and unions<sup>21</sup>.

In Brazil, the 1970s was characterized as a period of great industrial expansion and, although the symptoms of crisis and economical recession could be felt already in 1974, their negative employment effects were only visible after 1981. In this period, a great expansion in industry and industrial employment is verified, especially in terms of the increase in the amount of workers

<sup>21</sup> Research conducted by Caren Addis, Ruy Quadros Carvalho, João Carlos Ferraz, Afonso Fleury, John Humphrey, Leda Gitahy, Flávio Rabelo, Marcia de Paula Leite, Anne Caroline Posthuma and Elisabeth Bortolaia Silva, among others.

classified as semi-qualified. Another important element was the massive incorporation of women in direct production activities, especially in the metal-working industry

This process occurs under a *competition pattern* basically directed to an internal market in expansion and protected by the import-control politics. The capital-goods sector developed, on the one hand, to meet public-sector demand (large governmental projects in a variety of areas) and, on the other, to meet demand in the durable consumer-goods sector which was also growing. Concerning the *labour management pattern*, we found, in mass-production industries, a model characterized by an extreme parcelization of activities, extensive use of non-qualified work-force, high and induced turnover. To these elements, various authors<sup>22</sup> adds the importance of the use of the labour legislation, which has been in existence since 1937 (and from which only stability and the right to strike were eliminated after 1964) based upon individual labour contracts. They also emphasize the importance of the jobs and wage structures used by large firms and relates the authoritarian character in work relations in the firms to the political context in which they are inserted.

The crisis in the beginning of the 1980s and the process of political liberalization question the foundation of this model. From the point of view of the *competition pattern*, the contraction of the internal market, associated with the issue of the external debt, takes the firms to a new level of competition, in a moment of re-ordering of the markets on the international level. If the problem in the 1970s was producing “quantity”, in the 1980s the keyword turns out to be “quality”. The increase in exports, on the one hand, and, on the other, the increased competition on the internal market made it vital for firms to increase their levels of productivity and efficiency. Concerning the *technological pattern*, we can notice the introduction of product and process innovations (use of systems CAD/CAM/CAE, robots, CNC machine tools, just-in-time, cellular production, group technology, total quality systems using SPC). The change in the *labour management pattern*, though, is the slowest one. It encompasses the implementation of more participative management methods, revision of jobs and wage structures, work-force stabilization policies, ‘democratization’ of the use of restaurants, and greater concern with human-resource management. This change begins in the 1980s and is enhanced in the beginning of the 1990s.

This reality, in which the country’s economic instability and the contraction of the internal market are associated to the intensification of the international competition, has induced firms to restructure, through the introduction of a group of product and process innovations and of relations between clients and suppliers, inspired by the Japanese model. Nowadays, the “just-in-time” (JIT), the *Kanban* and “flexible production” are part of the ordinary vocabulary among professionals in the sector. By the end of the 1970s up to mid-1980s, innovation for many companies signified buying equipment and/or introducing organizational or motivational “programs”, which were often implanted in sectors of companies under the initiative of this or that department, with heterogeneous outcomes<sup>23</sup>. Starting at the end of the 1980s, an increasing number of companies entered a profound re-structuring process, originating from a management decision to introduce a set of inter-related

---

<sup>22</sup> Humphrey, J. *Fazendo o Milagre: controle capitalista e luta operária na indústria automobilística brasileira*, Petrópolis, Vozes/Cebrap, 1982 and Stutzman, E.B.S. *Política empresarial de Controle da Força de Trabalho: rotatividade como dominação*. São Paulo, dissertação de mestrado, FFCH/USP, 1981.

<sup>23</sup> Leite highlights the importance which organizational innovations have taken on in the modernization strategy of companies. After the initial phase in which the modernization efforts have been concentrated on the acquisition of new equipment, companies began to perceive the need for reorganizing production as a fundamental issue, whether because the new production concepts, based upon the principles of flexibility, quality, and speed of the labour process demanded quicker and less rigid forms of labour organization than what was predominant at the time, or because the new forms of labour organization were seen as central even for guaranteeing a more efficient utilization of the new equipment.

Leite, M. “Modernização tecnológica e relações de trabalho no Brasil: notas para uma discussão” in *Outras Falas....em Processo de Trabalho*, Belo Horizonte, Escola Sindical 7 de Outubro, 1992.

innovations. These efforts toward more integrated re-structuring were manifested through the introduction of some type of Total Quality Management program<sup>24</sup>.

A similar phenomenon was observed in British industry, which passed from the partial use of Japanese management methods (especially Quality Control Circles, which were widely diffused in the middle of the 1980s and were increasingly abandoned by companies) to more integrated strategies based upon Total Quality Management Programs. The problems encountered in these initial experiments reflected the clash between traditional principles and the firm structure and the new principles, which created an anomalous situation of duality and conflict. The new programs pointed toward a deeper and more integrated transformation<sup>25</sup>.

Analyses of experiments in companies in São Paulo<sup>26</sup> and in Rio Grande do Sul<sup>27</sup> distinguished three types of company strategies in reaction to the crisis: restrictive, partial, and systemic. In the first case, companies respond with traditional cost-cutting methods; in the second, they partially introduce some technological and organizational innovations; and in the third, they involve a broader change process, through the increasing utilization of new production concepts. The studies indicate better outcomes among companies which have followed the systemic strategy.

It is important to highlight that the modernization process of the Brazilian industry has occurred in a context of crisis, recession, unemployment, and economic instability. This tends to aggravate the level of conflict in industrial relations and the authoritarian bias in the industrial relations culture inherited from the “miracle” period, which hinders the introduction of a more participative and democratic management style. Regarding the educational system, even though it has expanded over the past decade, the quality of teaching has declined and is now a serious problem to be confronted.

In terms of the diffusion of quality programs and new forms of human resource management, the Brazilian situation does not stray far from international standards. The large Brazilian companies (especially the multi-nationals) have sought to introduce the latest human resource management techniques in order to guarantee the success of their quality programs and other organizational innovations. These attempts at modernization were accelerated due to the economic crisis of the 1980s and due to the threat of increased exposure to external competition announced by the Collor government’s industrial policy. Research findings seem to indicate that in Brazil, this process is in a more incipient stage than in the industrialized countries, although this difference is not as significant as some authors would suggest. The diffusion of new organizational techniques and personnel management techniques seems to take place at a slower pace nationally among small and medium firms.

The set of changes which are being introduced in companies, either in a partial form or through broader or “systemic” strategies, implies substantial changes in their traditional forms of organization. Total Quality Programs often appear as a vehicle, or detonator, of this change process. Even though these changes are often incipient or even contradictory (the cohabitation of new and old elements), they have intensified over the last three years. This wave of restructuring, in which the crisis has served as an intense pressure, has implied a tendency in which a company initiates a process of reflection and revision of goals and objectives, often through an external consultant, guided by some type of perception of the guiding principles of the new paradigm.

---

<sup>24</sup> Gitahy, L., Leite, M. and Rabelo, F. “Reestruturação Produtiva e a Empresa: programas de qualidade, políticas de gestão de recursos humanos e força de trabalho”. Projeto *Estudo da competitividade da indústria brasileira*. Bloco temático V, tema 3. Campinas, IE/Unicamp-IEI/UFRJ, 1993, mimeo.

<sup>25</sup> Hill, S. “How do you manage a flexible firm? The Total Quality Model” in *Work, Employment and Society*, 5(3), September, 1991.

<sup>26</sup> Fleury, A.C.C. *Impactos sobre a Organização do Trabalho: Emprego e Renda na Indústria Metal-Mecânica*, São Paulo, Poli/USP, 1988, mimeo.

<sup>27</sup> Ruas, R. “Reestruturação socio-econômica, adaptação das empresas e gestão do trabalho”, paper presented at GT *Cambio Tecnológico, Calificación y Capacitación de la Red Latinoamericana de Educación y Trabajo Ciud-Cenep*, Campinas, March, 1993.

This trend has implied various types of measures, which are worth emphasizing: reduction of hierarchical levels, which is reflected not only in the dismissal of managers and even top executives, but also in the increase in the search for recycling courses of the most diverse nature; change in the structure of jobs and wages, creating new career plans associated with training, even for shopfloor workers and a variety of initiatives (such as “Y” structure careers and Hay systems) pointing toward human resource management policies qualitatively different from those methods used earlier; increase in the importance attributed to management of human resources and training; adoption of programmes for the qualification of suppliers associated with “outsourcing”.

## Industrial restructuring and outsourcing

The outsourcing intensified with the economic crisis and the pressure to reduce costs and increase efficiency, starting with a process of de-verticalization and an externalization of activities. This externalization began in service areas, but also affected productive activities<sup>28</sup>. It is possible to identify different “trajectories” in the outsourcing process. On the one hand, one type of outsourcing is associated with a joint effort between a large and a small firm in order to qualify suppliers and increase their product quality and, on the other hand, other forms are associated with “restrictive” strategies, involving the externalization of activities in order to cut costs through more precarious employment conditions, even risking the quality of services provided.

Recent research points toward the increasing importance of inter-firm relations in Brazil, especially between large and small firms. The search for increased competitiveness leads to the creation of subcontracting networks and new forms of inter-firm relationships with quite heterogeneous characteristics. Two cases clearly illustrate this heterogeneity and complexity: that of the metal-working industry in São Paulo state, especially around the city of Campinas, and the footwear industry in Rio Grande do Sul.

Research conducted in São Paulo state in the autoparts, machine tools, and computer industries<sup>29</sup> pointed toward a complex industrial network where production by large firms is relatively integrated with a significant number of small- and medium-sized suppliers. Despite the fact that most of the large firms are highly verticalized when compared with similar firms in the industrialized countries, this showed a clear tendency toward decentralization. In all of the companies researched, examples were found of large firms helping small suppliers to increase their quality and productivity. Large firms were advanced in certifying their suppliers, which is a necessary step before transferring part of their internal production. A pilot study was conducted in 1988 among six small to medium sized (from 28 to 280 employees) subcontracting firms offering machining services. This pilot study revealed three important conclusions: (1) the subcontracted firms based their competitive advantage on the use of advanced machining technology, all of them employing numerically controlled machine tools; (2) employment in these firms was much more stable during the 1981-1983 recession than in their large clients, a result similar to the one

---

<sup>28</sup> Efforts toward import substitution and nationalization of products and components during a first stage (in the 1970s) led to extreme vertical integration of companies, but also widened the industrial fabric. During the 1980s, a reverse process began to take place, i.e., de-verticalization and externalization of activities.

<sup>29</sup> Gitahy, L.; Rabelo, F. and Costa, M.C. “Inovação tecnológica e políticas de gestão: difusão de novas tecnologias e subcontratação em empresas metal-mecânicas de São Paulo”. XII Encontro Anual da ANPOCS. Águas de São Pedro, October 1988; Gitahy, L.; Rabelo, F. and Costa, M.C. “Technological innovation, industrial relations and subcontracting”. *I Symposium on New technological and Societal Trends* (session IV). Madrid, XII World Sociological Congress, 1990; Rabelo, F. *Automação, Estrutura Industrial e Gestão da Mão-de-Obra: o caso da introdução das máquinas- ferramentas com comando numérico na indústria metal-mecânica*. Campinas, dissertação de mestrado, IE/Unicamp, 1989; Rabelo, F. and Costa, M. C. “Redes de subcontratação e novas tecnologias”. *Seminário Padrões Tecnológicos e Políticas de Gestão*. São Paulo, USP/Unicamp; Gitahy, L and Rabelo, F (1992) (ibid).

mentioned by Brusco<sup>30</sup> in northern Italy; and (3) use of a skilled work force (machine tool operators and machine setters) better qualified in most cases than those employed in the larger clients.

The data concerning the footwear industry in Rio Grande do Sul<sup>31</sup> points toward a different tendency. Concentrated around the city of Novo Hamburgo, the footwear complex could be considered an autonomous manufacturing cluster, with the following socio-economic characteristics: the grouping of many firms in the same sector in one geographical region, a predominance of small and medium firms, vertical division between firms and product specialization, and an extensive network of subcontracting which links large and small firms. The studies showed that this productive group combined advanced forms of flexibility with more rudimentary forms, including even homework. This is the result of the association between new forms of production organization (such as Just-in-time, cellular production, production teams), microelectronics-based automation (not frequently), and precarious and unstable forms of employment. Research in the apparel sector in Rio de Janeiro<sup>32</sup> indicates that in some cases the subcontracting network is strongly based upon precarious forms of employment, such as homework.

Therefore, it is possible to distinguish between different trajectories or models in the subcontracting process. The example of São Paulo seems to indicate a type of subcontracting associated with an articulated effort between large and small firms in order to upgrade suppliers and increase their product quality, becoming similar to flexible specialization. Rio Grande do Sul demonstrated hybrid forms of combining innovations in large and medium firms with precarious forms of what Ruas<sup>33</sup> calls “rudimentary flexibility”, while the example of the clothing industry in Rio de Janeiro is characterized by more traditional forms of precarious employment.

This paper is interested in understanding the consequences of these trajectories or models of subcontracting for the composition of the labour force. Ideally, the new model would imply an incorporation of quality as a goal to be achieved in each stage of the production process, involving greater worker qualification, a flexible organizational structure, and the formation of supplier networks, considered partners. Associated with the traditional strategies of cost reduction, outsourcing often appears to be accompanied by greater precariousness and instability of employment. In this sense, the reduction of formalized employment, with the consequent elimination of costs associated with social benefits, and reducing the unions’ power to interfere in a moment of economic crisis, seems to be the principal attraction for the externalization of production.

## Productive restructuring and the labour market

Although a great deal of research in Brazil has been directed to study how these changes are taking place within companies (intra-firm relations), few studies have examined the decentralization of productive activities (inter-firm relations). Nevertheless, the subcontracting of activities has appeared as an important element in the downsizing strategy of companies to confront the domestic market recession and increased competitiveness on the international market.

---

<sup>30</sup> Brusco, S. “The Emilian model: productive decentralisation and social integration”. *Cambridge Journal of Economics*, nr 6, 1982, pp.167-184.

<sup>31</sup> Ruas, R. (ibid); Ruas, R. “Notas acerca das relações entre trabalho a domicílio, redes de subcontratação e as condições de competição”. In: Abreu, A. R. De P. And Sorj, B. (ed.). *O Trabalho Invisível. Estudos sobre trabalhadores a Domicílio no Brasil*. Rio de Janeiro, Rio Fundo Ed., 1993; Ruas, R. “Redes de Subcontratação e novas tecnologias”. Seminário *Padrões Tecnológicos e Políticas de Gestão*, USP/Unicamp, São Paulo, 1989; Ruas, R. and Antunes, J.R “Novas Formas de Gestão em Indústrias Tradicionais”. *Ciências Sociais Hoje*, Rio de Janeiro. Rio Fundo Ed, 1992.

<sup>32</sup> Abreu, A. R. De P O Avesso da Moda. Trabalho a Domicílio na Indústria de Confecção. São Paulo, Huciec, 1986; Abreu, A.R.P. and Sorj, B. “Trabalho a Domicílio e relações de Gênero. As costureiras externas no Rio de Janeiro” In: In: Abreu, A. R. De P. And Sorj, B. (ed.). *O Trabalho Invisível. Estudos sobre trabalhadores a Domicílio no Brasil*. Rio de Janeiro, Rio Fundo Ed., 1993; Sorj, B. “Travail a Domicile/ Travail Domestique”, *Cahiers du GEDISST*, Paris, Iresco/CNRS, nº 4, 1992.

<sup>33</sup> Ruas, R “Reestruturação ... “. (ibid).

A recent study<sup>34</sup>, comparing the diffusion process of flexible specialization in the cluster of footwear producers in Rio Grande do Sul and in the subcontracting networks in the metal-working industry in the Campinas region, confirmed that the diffusion of innovations associated with the model of flexible specialization in the two clusters involved different trajectories and consequences for employment conditions and for inter-firm relations. An important explanatory factor for these differences is the competitive strategy on the markets in which these firms operated. Two case studies indicate that the process of diffusion of innovations based upon the concept of flexible specialization is indeed taking place, at different speed and with different outcome. These differences can be explained due to the specific characteristics of the two sectors, as well as the dominant competitive strategy – i.e., low prices in the case of the footwear industry and new quality standards (certification under the ISO 9000 norms) in the case of the metal-working industry<sup>35</sup>.

In terms of employment levels, the footwear industry shows rising levels, yet within a context in which the characteristics of subcontracting points toward a clear separation between “core” and “peripheral” workers, in a phenomenon characterized by Ruas as “rudimentary flexibility”<sup>36</sup>. In the case of the metal-working industry in the Campinas region, employment levels are dropping, but the differences between large and small firms are not significant in terms of labour qualification and the nature of the production processes, but are significant in terms of wages and social benefits.

It is worth mentioning at this point that a detailed analysis of employment and wage conditions in the most advanced cluster points toward a situation, where quite reduced levels of stable, polyvalent and co-operative labour in the large firms coexists with labour in the small firms, which is equivalent in terms of skill requirements, yet with lower wages, fewer opportunities for training, and less social benefits. Employment in the small firms in the sample was found to be skilled, less prone to oscillations during periods of crisis, formalized and with higher average salaries than those of other industries and could not be classified as precarious labour. However, this characterizes a qualitatively different situation than that which was predominant prior to the crisis and the beginning of the re-structuring process in the firms.

In the two regions examined, geographical concentration has favoured interaction between the firms and training and research institutions - indeed, the demand for training programs has increased. Co-operative relations between small and large firms in terms of technology and quality is much more intense in the Campinas region. Nevertheless, inter-firm competition as well as the conservative culture associated with the Taylorista/Fordist model of efficiency have made it difficult to construct new modes of co-operation based upon reaping collective efficiencies. On the other hand, economic instability associated with 20 years of crisis, recession, unemployment, and permanent inflation has also made it difficult to establish these relations.

This situation points toward significant modifications on the labour market structure and new challenges for the institutions and social actors involved in this process. On the one hand, the conservative culture of both company and worker unions has made it difficult to negotiate the process of introducing innovations and, on the other hand, the political crisis and the centralizing tradition of the Brazilian State have reduced the possibility of formulating appropriate policies. It is worth emphasizing here, based upon the Italian experience, the importance of regional policies in confronting the challenges posed by the restructuring process.

---

<sup>34</sup> The study was conducted in 24 small and medium companies producing footwear in Rio Grande do Sul, three large metal-working companies in the Campinas region and ten of its micro and small suppliers, in 1993. Gitahy, L. and Ruas, R. *et al.* *Inter-firm relations, collective efficiency and employment in two Brazilian clusters*. Final report for ILO (first draft). Campinas, 1993, mimeo.

<sup>35</sup> The research shows that the quality factor becomes more important in the footwear industry, but low prices still the dominant factor. In the metal-working industries the pressure from the auto-assemblers and the export market for certification by ISO 9000 norms put the quality factor as the central issue for the companies in the sample.

<sup>36</sup> Ruas, R., “Reestruturação ... “. (ibid).