

**“Industrial Restructuring and Inter-Firm Relations in the Auto-Parts Industry  
in Brazil”**

Alice Abreu (UFRJ)  
Leda Gitahy (UNICAMP)  
José Ricardo Ramalho(UFRJ)  
Roberto Ruas (UFRGS)

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## **“Industrial Restructuring and Inter-Firm Relations in Brazil. A Study of the Auto-Parts Industry in the Nineties” \***

Alice Abreu (UFRJ) \*\*

Leda Gitahy (UNICAMP) \*\*\*

José Ricardo Ramalho(UFRJ) \*\*

Roberto Ruas (UFRGS) \*\*\*\*

Traditional productive relations are greatly affected by globalization and the associated international restructuring process. Important changes can be seen in inter-firm relations, in product and labor markets, in worker’s mobility and in skill requirements. At the same time, in a country like Brazil, some forms of flexible production are being established in a context of labor market deregulation and atomization of collective action. These processes have emphasized the necessity of a simultaneous analysis of what is going on inside and outside the firms. For a social scientist, an especially relevant theme is that of the social construction of production networks and the new forms of institutional articulation (Sabel, 1986, 1993a, 1993b, 1994; Gereffi,1994,1995; Doner, 1996, Doner & Hershberg 1996; Schmitz, 1989).

In Brazil, a significant number of recent research has looked at how these changes are developing inside the firms (intra-firm relations).<sup>1</sup> There is, however, much less research on the outsourcing of production activities and inter-firm relations. Since mid 80s, however, the externalization of activities has been an important element in the “rationalization” strategies of Brazilian firms, that faced a crisis in the internal market and increasing international competition. Studies such as Gitahy, Leite & Rabelo (1993) show that to face the economic crisis many firms started introducing new efficiency oriented models and new goals and principles of organization, where externalization of productive activities was an important issue. This process of restructuring is still going on and has been strengthened by the stabilization of the economy in the mid 90s.

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\*\* Federal University of Rio de Janeiro, Brazil. E-mail: [paivabreu@openlink.com.br](mailto:paivabreu@openlink.com.br) and [rramalho@domain.com.br](mailto:rramalho@domain.com.br)

\*\*\* UNICAMP, Brazil. E-mail: [leda@ige.unicamp.br](mailto:leda@ige.unicamp.br)

\*\*\*\* Federal University of Rio Grande do Sul, Brazil. E-mail: [rruas@adm.ufrgs.br](mailto:rruas@adm.ufrgs.br)

<sup>1</sup> See Abramo (1990), Hirata (1992), Castro (1993), Castro & Leite (1993), Abreu (1994) for an analysis of the recent Brazilian production, as well as the papers presented at the Seminars "Padrões Tecnológicos e Políticas de Gestão: Processos de Trabalho na Indústria Brasileira", São Paulo, FFLCH/USP, 1988, and "Padrões Tecnológicos e Processos de Trabalho: Comparações Internacionais", São Paulo, DEP/EPUSP, 1989.

This paper will look at the process of restructuring in the Brazilian auto-parts industry, using data collected in 53 auto-parts firms located in three different regions of Brazil: Campinas (São Paulo), Rio de Janeiro and Porto Alegre (Rio Grande do Sul). Data was collected between August 1996 and May 1997. At Campinas the research studied a medium sized firm producing brakes and 10 of its suppliers (medium and small). At Rio Grande do Sul, the research gathered data on nine auto-parts firms and seven suppliers of three of those firms. At Rio de Janeiro, the research design was different from the two other regions, since all 26 auto-parts firms in activity were interviewed. Of these, however, only nine were direct suppliers to the automobile assemblers; three other supplied parts to other auto-parts firms and the rest worked with the normal consumer market.

Using the concept of productive chain as a reference, the research aimed at looking not only at the level of diffusion of technological and organizational innovations inside the firms but also how these changes affect the reallocation of activities along the production chain. In this sense it was thought that the introduction of strategies of focused production and externalization of activities in the top of the chain would affect the organization structures of the chain as a whole. The main focus of the research was, therefore, inter-firm relations, but it also looked at how these new strategies impact the local labor markets and the local institutions.

The central hypothesis is that the externalization and/or internalization of activities' processes that are being implemented by the large client firms results in a strong re-composition of industrial workers in those sectors. This in turn points to a substantial change in the job and work relations' structures, creating new challenges for the social actors. The final objective of the research is, therefore, to understand the new industrial fabric that is being created by this strong restructuring process and its impact upon the Brazilian working class.

### **The Brazilian automotive industry**

The automotive chain and especially the auto-parts industry have been undergoing a very intense restructuring processes in the last decade. This makes their study especially important and a good example to be studied.<sup>2</sup>

The automotive industry<sup>3</sup> was responsible in 1995 for approximately 3.8% to total GNP and 12.9% of industrial GNP in Brazil (Anfavea e Sindipeças, 1996). It generated a total of 5.4 million direct and indirect jobs,<sup>4</sup> 214 thousand in the auto-part's

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<sup>2</sup> The auto-parts industry and specially the leading firms of this sector are critical to the understanding of the dynamics of technological innovations in the metal-mechanical complex. This industry has a privileged position, between the large auto assembles on the one hand, the large chemical, metalurgical and machine industries on the other, and have an wide range of medium and small firms as supplies. In this sense, innovations in the auto-parts industry affect both upstream and downstream of the industrial matrix.

<sup>3</sup> Motorvehicles, motor-powered agricultural machines and auto-parts.

<sup>4</sup> The upstream and downstream links of the automotive industry involves more than 30 economic sector: mining, steel, glass, tires, chemical products, batteries, alcohol and petrol, transport services, sales,

sector and 115 thousand in the auto assemblers (Anfavea, 1996). In 1989, however, this same sector had been responsible for 7.1% of total GNP and 21.6% of industrial GNP, creating 5.6 million direct and indirect jobs, with 310 thousand in the auto-parts industry and 143 thousand in the auto assemblers' firms. In absolute terms, sales grew from US\$ 24.4 billions in 1989 to US\$ 26 billions in 1995, with production soaring from 1.06 million cars in 1989 to 1.63 million cars in 1994 (and a proposed 2 million this year), while direct employment fell from 453 thousand in 1989 to 329 thousand in 1995. (Anfavea, 1996).

The data presented shows an enormous productivity increase in the last few years, with increase in investments and sales and a sharp decline in employment. This is due to a strong restructuring process, that occurred in a period of crises and economic recession in the internal market associated to an increase in international competition, fostered by the gradual discarding of the import substitution policy. In fact, the nineties will see a new phase of important structural changes in the world automotive industry and in the place occupied by the Brazilian automotive sector in this restructuring process. In the previous decade, firms used export as a way out to the crisis in the internal market. This was especially true in the auto-parts industry. The decade of the 90s, on the contrary, the opening was "to the inside" (importing). These last few years saw a sharp increase in the numbers and in the relative participation of foreign vehicles in the Brazilian consumer market. Also very significant is the constitution of regional blocks, with the Mercosul (Argentina, Brazil, Paraguay and Uruguay) increasing its share of the automotive market and redefining industrial plant's distribution among those countries. (Githay e Bresciani, 1997).

These are the most important tendencies of the decade for the automotive production chain in Brazil:

- \* in the first place, economic stability, associated to a policy of attracting new investments and the pressures for restructuring as a form of facing new international and national competition has resulted in increase investments associate with a strong movement of relocation of the industrial plants in the automotive production chains. In a context of increase production, sales and investments, with decrease and reallocation of employment, (Tables 1, 2 & 4) the location of new plants and the closing of old ones generates an intense dispute between Estates and a growing antagonism between different unions.
- \* in second place, the intensification of competition, both in Brazil and international, has led to a very intense movement of concentration in the auto-part's sector, with joint ventures, acquisitions and closing of firms.
- \* in the third place, there is an important increase in imports, specially direct imports by assemblers, that are larger than exports since 1995 (Table 1 & 2);
- \* finally, another tendency is the increase of the Mercosul countries as markets for auto-parts' exports (Table 5).

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marketing, etc. The auto-parts industry is in a key position between the car assemblers and basic inputs' industries.

### **The auto-parts industry in the three regions**

The three regions show a very different industrial history and this is reflected in the profile of the auto-parts industry in each of them.

The auto-part's industry of Rio de Janeiro is characteristic, in many ways, of an old and decadent sector. It has had an important participation in the constitutive period of the Brazilian automotive industry in the 50s and 60s. One of the first automotive plants, the Fábrica Nacional de Motores, was in Rio and had an important role in the institutionalization of the industry (Ramalho, 1989). The closure of this plant in later years diminished the importance of this sector in the region. The data gathered by the research has shown that one of the firms now in activity was created in 1890, but the majority was created between 1959 and 1980. Of the 26 auto-parts' firms visited, more than half sell in the consumer market and only nine have direct link with the assembly plants in São Paulo. The Rio de Janeiro auto-parts industry however, is facing very important changes, with the installation of several assembly plants in the region or in bordering regions of the Estate: the Volkswagen and Peugeot plant at Resende and the Mercedes Benz plant in the South of the Estate of Minas Gerais.

The metalwork industry of Rio Grande do Sul was born closely related to agricultural production and the firms had different phases of adaptation to the different industrialization periods. The switch to auto-parts started in the 50s and 60s. The nine client firms studied were created between 1887 and 1976, while the six suppliers were created between 1968 and 1993, five of them in the 80s.

The region of Campinas, São Paulo, on the other hand, has a very dynamic industrial sector, that grew steadily even during the 80s, the "lost decade" for most of Brazilian industry. Metalworking industries have a long tradition in the region, going back to the 1930s, when the main national firms of machine tools were created. Other national and multinational groups installed plants in the Campinas region in different phases of the import substitution model, among them the leading auto-parts' firms like Bosch (1958), Clark (1959) and Varga (1945).<sup>5</sup> A large transportation, services and educational infrastructure supports this very dense economic fabric.<sup>6</sup> Campinas also has a privileged location, close to the main industrial centers of the country. It is in this sort of structure, more linked to the ideal of an industrial zone more than to that of an industrial district, that one sees the formation of different types of cooperation networks<sup>7</sup>, linking groups of firms and different technological institutions and services in many areas. This process has been fostered by the geographical location, as well as by the action of local level administration, of universities and other institutions (Ruas *et alli*, 1994).

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<sup>5</sup> Several multinational auto-parts firms came to Brazil following their client firms.

<sup>6</sup> The region of Campinas has several university campi (UNICAMP, USP, UNESP, UFSCar, PUCAMP, UNIMEP, etc), many technological research centers and an important network of technical schools ((SENAI, SENAC, local) and two technological districts (Campinas e São Carlos).

<sup>7</sup> See (Gitahy, Rabelo & Costa, 1988; Rabelo, 1989; Gitahy, Rabelo & Costa, 1990; Gitahy & Rabelo, 1991; Gitahy, Rabelo & Costa, 1992; Ruas, Gitahy, Rabelo e Antunes, 1994).

The small and medium firms studied at Campinas were created between 1951 and 1991. They go through different phases, associated first to the industrial expansion of the late 60s, then to the economic crisis and the “defensive” restructuring to the 80s, already linked to outsourcing of certain activities, and finally to the intensification of the externalization of activities by the large firms from the early years of the 90s. One must remember that the deverticalization of the large firms started on the 80s, promoting the creation of small firms by old workers, with or without help from their former bosses.

The great majority of the owners of the small and medium firms created until mid 80s in Campinas is formed by workers trained in the professional training system (SENAI and technical schools). One such example is the owner of ACP1.6, student of the old Escola Profissional Ferroviária (Railroad Professional School), closed in 1968: “*the great encouragement (to create my firm) was the Railroad Professional School, that had a very strong syllabus, even Latin, several foreign languages and 8 hours of schooling a day, practical and theoretical*”. The owners also had worked in large firms of the region, among which a special place must be given to Robert Bosch, that stimulated the creation of several small firms. It is important to think this in the context of networks of innovation, i.e., of the important of the surroundings formed by these institutions in the constitution of a type of “industrial culture” that stimulates the interest for “my own business” and for investment in technological innovations (the small entrepreneur in the metalwork industry was one of the first to acquire a numerically controlled machine in the 80s).

### **Productive restructuring in the automotive chain**

The Brazilian motorcar industry starts as an international industry. Multinationals were given especial incentives to install plants in Brazil, as part of the imports’ substitution policy then prevailing in the country. From the multinationals point of view, this fitted the new “international division of work”, and access to the large and unexplored internal market of Brazil was an important consideration.<sup>8</sup> This industry will have a steady growth until 1980, based on a protected and expanding internal market. The early 80s will change this situation, with several years of crisis and recession, that led to a 30% reduction of production and employment. The early 80s were also years of important changes in the industry worldwide, with the Japanese entering the American and European markets. All these factors led to the beginning of a restructuring process, with the eventual abandonment of the imports’ substitution policy.

The crisis was confronted with the increase of exports, mainly to Europe and the United States. This in turn led to what has been called a defensive restructuring<sup>9</sup> of the

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<sup>8</sup> The international literature shows that during this period there was a strong restructuring of the world industry with a “new international division of labour”. Several of the large car manufactures from Europe and the United States installed plants in Brazil in the late 50s and were followed by their main auto-parts suppliers. (Githay e Bresciani, 1997).

<sup>9</sup> Brazilian literature defines a “defensive restructuring” when no new plants or equipment/machinery are involved, but mainly changes in organizational and management aspects. This restructuring was strongly influenced by the Japanese model of lean production.

leading firms. Increasing exports as a compensation to the retraction in the internal market was helped by export incentive policies put in practice at that period. This in turn led to a concern with quality<sup>10</sup>, although changes were introduced only partially and more in organizational terms than with large investments in new machinery.

The economic crisis of 1990 to 1992 and the opening up of the Brazilian economy intensified this restructuring process. With economic stability firms made new investments, new firms came to Brazil and there was a strong geographical reallocation of the automotive industry, previously highly concentrated in São Paulo.

The 53 firms studied occupied very different places in the automotive production chain. (See Figure 1). It is therefore interesting to see that all firms visited were introducing some kind of technological and organizational innovation<sup>11</sup>. The reasons given to this were related to costs reduction and quality improvement, although the type of restructuring could vary.

In Rio de Janeiro, 1992 seems to be a critical year for the introduction of changes and the types of changes introduced was related to the links each firm had with the auto-assemblers. Ten of the 26 firms studied have direct links with assemblers, supplying parts to several of the Brazilian auto-assemblers in São Paulo (VW, Ford) and Minas Gerais (Fiat). At least five of these firms did, however sell their products to the consumer markets as well or to other auto-parts firms. At the time of the research, there were no firms producing auto-parts systems, all firms in Rio de Janeiro produced single components. One of the nine leading firms could be called a global firm, since 70% of the production was sold abroad, the remainder directly to auto-assemblers. It also had a global sourcing buying policy, with several European and American suppliers. Only three were second tier firms, supplying other auto-parts enterprises. All other sold directly to the consumer (after sales) market. There was no regional specialization, with a wide range of products being made, all single components, with small value added to the final product.

At Porto Alegre, all nine client firms also pointed out the early 90s (91-94) as the beginning of restructuring. The research also looked at a small number of suppliers, second and third tier firms. In Campinas, the production chain studied was of a brake system for cars and lorries. The client firm had gone through a partial restructuring in the mid 80s, but by early 90s had intensified this process. In the medium and small firms at the second and third tiers levels, parcel restructuring was found, with lots of new machines being bought and then some organizational changes introduced. It seems that these smaller firms were going through the same processes larger firms had gone through in the 80s. Again the reasons given by client firms to intensify their restructuring process were linked to international and national competition and pressures from the auto assemblers in Brazil, that were being themselves submitted to the same pressures.

It was clear that at Campinas the externalization of production activities was something that was going on since the beginnings of the 80s, at least in the larger firms. These early experiences were, however, of partial introduction of deverticalization and

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<sup>10</sup> From 1992, ISO9000 was a requirement of the European market.

<sup>11</sup> Some tables are based on data of 51 firms, since two did not answer the longer questionnaire on innovations and inter-firm relations..

innovation. In the 90s, this movement is intensified in a more structured and systemic way in a very different context, not of crisis but of industrial growth. In this second phase, the externalization of activities is clearly associated to policies of focusing, development and reduction of suppliers and to quality enhancement. This was also true of the larger firms of Rio Grande do Sul. In the Rio de Janeiro auto-parts sector, however, the outsourcing of productive activities is much less frequent. This might be explained by the smaller density of the industrial fabric at the Estate level.

### **Inter-Firm Relations**

Data gathered on inter-firm relations shows that important changes are going on between clients and suppliers. It is possible to identify some general tendencies in progress at the automotive production chain:

In the first place one must stress that the movement of externalization and/or internalization of activities and the resulting redefinition of the division of work among firms in the auto-parts industry is extremely complex, heterogeneous and dynamic. What we are seeing now is the result of a restructuring process that started in the 80s among the large auto-parts firms. This is accentuated in this decade, with flexibilization, cost reduction and focusing being strongly related to quality improvement.

As previous research has shown, however, this is a trial and error process (Gitahy, 1994) and the introduction of these measures will depend on specific conditions and their diffusion along the production chain is very dissimilar. This research provided some information on how and at what degree this processes are disseminated along the chain in the three regions.

The first finding is that outsourcing services like restaurants, cleaning, etc., is very widespread. In all three regions and at all firm sizes, including the very small ones, these services were being externalized.

We also found productive activities being externalized, but this is more diversified among the different firms and seems to depend on a variety of factors, some of which are outside the direct control of the individual firm. Regional differences seem to be especially important in this matter.

It seems in fact that productive outsourcing affects two different types of activities:

- (i) activities related to labor intensive products or processes, that can be located outside the firm without affecting the production flow<sup>12</sup>;
- (ii) activities related to more complex products or processes, on those densely industrialized regions, that are capable of absorbing those activities with efficiency and reliability.

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<sup>12</sup> The client firm of Campinas, for examples, had internalized a process (galvanoplastia) that was being outsourced because it was affecting the flow of production.

Campinas provides some examples of the second type, where small and medium firms outsourced industrial automation projects and machine-tooling activities.<sup>13</sup> The lack of productive outsourcing in Rio de Janeiro, on the other hand, can possibly be explained by the low industrial density of the region.

We were able to identify some variable that seem to be especially important in the definition of how, when and why some production activities were externalized. They are related to the nature and intensity of client/suppliers relations.

- (i) the history of the supply of that service and/or product and the relation between client and supplier, i.e., former experience defining reciprocal reliability;
- (ii) the size of the firms involved, both from the client and the supplier point of view, as well as the position occupied by the firms in the production chain and in which market segment it is located;
- (iii) the share of total outsourcing supplied, from both client and supplier point of view;
- (iv) the type of process and product involved. One must distinguish between direct suppliers, that produce parts of the product or make interventions on it, and indirect suppliers, like maintenance, machine-tooling, projects.<sup>14</sup> Another important aspect is to see how critical the activity is to the production process as a whole.

One clear tendency in all firms visited is the strong pressure from the clients firms to suppliers to have formal quality indicators, i.e., a growing demand for documentation and procedures linked to quality increase in production. This, however, is closely associated with pressure to reduce costs. Both kind of pressures are translated in periodical evaluations and auditing by client firms and by a recent but growing demand for certification (ISO 9000 and QS 9000).

From what we heard, client firms in auto-parts industry have been pressind their suppliers for price reduction, sometimes giving them a goal to reduce a given percentage in a given period. This is certainly a result of their “global sourcing”, made possible by the opening up of Brazilian economu. Suppliers must therefore create conditions to offer better quality, more reliable delivery and lower costs. In this sense, large client firms are seen as a reference for new organizational standards.

One can see clearly some examples of this process in the firms interviewed. At first, the quality control of supplier’s products is made through rejection indicators. The client then starts to make visits to the supplier and help him achieve 100% quality, thus eliminating the control of their product made at the receiving end. The assurance of quality if then followed by periodic evaluation and auditing, that may gradually involve more items and increase in frequency, to finally arrive at a classification of suppliers. From the larger client firms, the aim of this process is clearly to reduce the number of suppliers. The

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<sup>13</sup> At Campinas, it seems all large firms are now outsourcing machine tools (ferramentaria) This is not true of Rio de Janeiro and Rio Grande do Sul.

<sup>14</sup>: This was a distinction made by the firms interviewed.

next step is to demand certification by ISO 9000 norms. This will eliminate the auditing by the client firm, since the auditors will do this job periodically. The larger firms are, in some sense, outsourcing the auditing and evaluation.

In Rio de Janeiro and Rio Grande do Sul, demand for certification is present only in the higher tiers of the chain. In Campinas, however, demand for ISO certification is reaching the other levels, with small second and third tier firms being certified. This is true for direct suppliers, but many indirect suppliers were also preparing themselves for this demand.

Small and medium sized suppliers in Campinas<sup>15</sup>, repeatedly complained, however, that the development programs offered by their client firms did not offer good quality control programs, or at least did not correspond to the level of demands made from them: too many demands, very little help, they said.

Many of these firms -- small and medium second tier suppliers -- are, in fact, in a very difficult position. They usually buy their inputs from large suppliers and sell to large clients, that frequently control their markets and have international links. Their position between two strong poles of the production chain weakens considerably their capacity for negotiation.

Even so, seven suppliers of the Campinas sample had received informal help from their client firms for the solution of problems related to quality, one supplier had received a loan of a measurement equipment to be used in its laboratory for six months. Several other mentioned some type of help by the client firm, either organizing courses or group discussions on quality, either offering to share published material and making links with the University.

The same kind of complaint found in Campinas can be found in Rio Grande do Sul. Once again the pressure for quality from clients is bitterly felt as disproportional to the help received and to the lower prices offered. The smaller firms see this as the result of the pressure their own clients are receiving from the national auto assemblers. But there are exceptions, and some firms did mention machine loans, supervision of processes and projects, financial loans. There is also a case where the small firm is really an extension of the client firm, having all equipment and machinery transferred from the client firm to his plant.

Again the situation in Rio de Janeiro seems to be less advanced than in the other two regions. Among the nine first tier firms, all stated that they were submitted to being audited by their clients, but only one mentioned examples of effective help, like loans of equipment and training for workers. The others mentioned vaguer instances of courses and conferences, informal help and support for certification.

It is important to point out that the nine first tier firms of Rio were in a similar position to the small and medium firms of Campinas. They produced single components

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<sup>15</sup> The Campinas sample was propusefully aimed at the second and third tiers of the chain, trying to look at the weaker links of the production chain. The suppliers were starting their restructuring pressured by their main client firms, the marjority of which were auto-parts firms, but that also included firms from other sectors.

that were sold directly to the large auto-assembler, and bought from large enterprises of basic inputs like steel, etc. Their negotiation capacity was therefore not very high either.

Another issue that indicates a change in client/supplier relation is when there is a joint development of product or process. The client firm of Campinas has this type of relation to its main client and repeats this same relationship to at least three of its suppliers. The other suppliers of this chain said they receive product specifications from their clients and develop the production process themselves.

At Rio de Janeiro, three of the nine first tier firms had a joint developed project with their clients (33%) and other 4 (44%) had developed jointly a product and/or a process. This meant that seven out of the nine firms that a close relationship involving project or product development with at least one of their clients. The other three firms said they had developed a project after receiving the specifications of the product from the client firm. All of them had, therefore, an important level of autonomy in planning their production.<sup>16</sup>

This was also relatively through for the second tier firms in Rio. Two of them had product and process joint development for at least one of their products with at least one of their clients, but were submitted to quality controls by their client firm.

The Rio Grande do Sul sample shows that three of the nine first tier firms mentioned close collaboration activities with their clients. Two of these could be classified as global firms. Of the second tier firms, only one mentioned a straight collaboration with its larger client, a first tier firm in the automotive chain. This firm presented several features usually found higher up in the chain, like the development of a certification project, plans for exporting, expansion plans for the internal market, numerically controlled machinery, a human resource program. The other firm in the sample did not mention any joint development of project or products with their client firms. This was because of the nature of their activities, exclusive or fully developed technology in the case of client firms, extreme simplicity of the process involved in the case of suppliers.

Another tendency that was found looking at the data from the whole sample, was that having flexibility as a major goal has resulted in frequent changes in the production programming and this had a direct effect on suppliers along the production chain. Some suppliers are able to face this instability more easily, but all of the firms mentioned constant changes in orders, making their life very difficult. Some of the firms interviewed were starting to put in practice an external just in time/kanban program with some of their clients. This is also more prevalent in the Campinas region.

Among the firms studied at the Campinas region, JIT/Kanban was used both internally and externally by the client firm, with her own clients and with the suppliers. Of the suppliers, five said they did have JIT/Kanban with some of their clients, and six others were developing or applying an internal JIT in some parts of their production process.

The place in the production chain was again important to explain the differences on the use of JIT/Kanban in Rio de Janeiro's firms. Six of the nine first tier firms had

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<sup>16</sup> All first tier firms had more than one client, i.e., sold their components to different car assemblers. They can, therefore, have different type of relations with each of their clients .

JIT/Kanban, even if with only one of their clients. For of them had JIT in a daily basis, the others less frequently.

At the Rio Grande do Sul sample, flexibility is frequently mentioned as a goal to be attained, but different aspects of the flexible model, like multitasks for workers, internal JIT for parts of the line, were being introduced gradually. Only three client firms had externalized production activities, one of these just the final assembly and packing of the product, both very simple tasks. Among the suppliers, only one could be said to have a real kanban relationship with its client, with low internal stocks, cellular layout, automated machinery and multitask workforce. With the others, one can say there what is in fact happening is a greater restriction in negotiations between clients and suppliers, since prices, deadlines and quality have lower limits of bargaining. Comparing auto-parts with the shoe industry, one could say that for auto-parts the central point of negotiation was establishing deadlines for deliveries, more than costs.<sup>17</sup>

The research also asked about contracts between clients and suppliers. In the majority of cases, especially among medium and small firms, contracts are in fact a buying order, with or without an informal agreement (that may sometimes be written but that has no legal value). What does seems to be happening is that these informal agreements have been more frequent and that they involve more items and more specification details. Formal written contracts were found only among the first tier firms in Rio de Janeiro.

It is possible to confirm, therefore, that important changes in inter-firm relations are happening in the automotive production chain in the three regions. These changes are related basically to questions like externalization/internalization of activities, and reorganization of production due to demands and pressures for quality, flexibilization and costs. It seems that these new demands are followed by changes in the relationship between client and suppliers which include some form of assistance. But this assistance is not seen by suppliers as of equal value to the demands, formalized through auditing and certification.

### **Work and Skills**

It would seem, therefore, that recent restructuring in the automotive chain in the three regions is associated with strong pressures for the employment of formal quality standards, flexibility in production and cost reduction. One can say that this is a consequence of changes in the industry at international level and of the place occupied by the Brazilian nationals and multinationals firms in this setting.

The articulation of these pressures has had great influence on the division of work, both inside and among firms and has affected the kind of skill and workforce in the automotive industry in Brazil. On the one hand these innovations have resulted in a dramatic increase in productivity indicators, but on the other they seem to have intensified work and established higher schooling qualifications for entry in a difficult moment for workers and unions.

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<sup>17</sup> At the shoe industry, price seems to be the central point of negotiations.

The increase in the levels of formal education as a condition for being hired is really significant. First tier firms say they now only hire personnel with 12 years of schooling. Many of the smaller firms now request complete primary school (5 years) degree.<sup>18</sup> Of course these are measures that take some time to have a real impact in the actual workforce of the firm, but there is a clear tendency to increase schooling requirements.

What one does see is a sharp reduction of employment associated to an increase in sales, both at the car industry and the auto-parts sector. This is certainly linked to the flexibilization of production associated to outsourcing since, as we have seen previously, all firms in our sample had externalized some kind of activities in the last 4 or 5 years. At first they outsourced services, but later productive activities were also outsourced, especially the labor intensive ones. It is interesting to mention, however, that we found cases where certain activities were brought into the firm again. In one case the reason for this was explicitly to ensure the flow of production, that had been severely affected by outsourcing some parts of the product.

Automation and the gradual implementation of several activities linked to quality improvement as well as the standardization of quality controls through certification has resulted in the intensification of work and a search for a higher commitment of the workforce. This new worker' profile has affected the requirements for hiring new workers, with higher levels of formal education, but also has brought new investments in training of the existing workforce. Nevertheless, wages seem to be stable and all these changes have not resulted in higher wage levels nor in the concessions of side benefits for the workers. It is worth mentioning, however, that even smaller firms have offered some kind of training to their workers. This is an important change from former studies, where any kind of initiative of this nature was considered as a hindrance to production.

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<sup>18</sup> One must remember that in 1990 70% of the Brazilian industrial workforce had less then 4 years of school.

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| <b>Table 1: Production, Employment, Sales, Investments, Imports, Exports and Productivity in the Brazilian Automotive Industry <sup>(1)</sup> 1970-1995</b> |                     |                               |                  |                            |                               |                              |                                |                                |                                   |                             |   |                               |
|---|---------------------|-------------------------------|------------------|----------------------------|-------------------------------|------------------------------|--------------------------------|--------------------------------|-----------------------------------|-----------------------------|---|-------------------------------|
| Year  | Workforce<br>(1000) | Production<br>(1000<br>units) | Cars/<br>Workers | Exports<br>(1000<br>units) | Exports/<br>Production<br>(%) | Exports<br>/<br>Sales<br>(%) | Exports<br>in US\$<br>millions | Imports in<br>US\$<br>millions | Investment<br>in US\$<br>millions | Investment/<br>sales<br>(%) | Sales in US\$<br>billions<br>Net <sup>2</sup> | Sales/<br>worker<br>US\$ 1000 |
| 1970  | 65,902              | 416,089                       | 6,3              | 0,40                       | 0,09                          | 0,1                          | 8,922                          | 69,128                         | ND                                | ND                          | 8,043   | 122,04                        |
| 1971  | 71,406              | 516,964                       | 7,2              | 1,65                       | 0,32                          | 0,1                          | 12,511                         | 83,205                         | ND                                | ND                          | 9,400   | 131,64                        |
| 1972  | 80,430              | 622,171                       | 7,7              | 13,52                      | 2,09                          | 0,5                          | 54,146                         | 97,642                         | ND                                | ND                          | 10,982  | 136,54                        |
| 1973  | 96,099              | 750,376                       | 7,8              | 24,50                      | 3,20                          | 0,5                          | 62,977                         | 207,542                        | ND                                | ND                          | 12,827  | 133,47                        |
| 1974  | 104,072             | 905,920                       | 8,7              | 64,67                      | 7,07                          | 1,4                          | 203,769                        | 347,947                        | ND                                | ND                          | 14,780  | 142,01                        |
| 1975  | 104,556             | 930,235                       | 8,8              | 73,10                      | 7,84                          | 2,0                          | 334,085                        | 302,439                        | ND                                | ND                          | 16,573  | 158,5                         |
| 1976  | 112,429             | 986,611                       | 8,8              | 80,40                      | 8,11                          | 2,3                          | 385,742                        | 235,088                        | ND                                | ND                          | 16,444  | 146,26                        |
| 1977  | 111,514             | 921,193                       | 8,3              | 70,02                      | 7,60                          | 3,0                          | 490,305                        | 226,314                        | ND                                | ND                          | 16,387  | 146,95                        |
| 1978  | 123,927             | 1.064,014                     | 8,6              | 96,17                      | 9,02                          | 3,4                          | 610,408                        | 292,889                        | ND                                | ND                          | 18,008  | 145,31                        |
| 1979  | 127,081             | 1.127,966                     | 8,9              | 105,64                     | 9,31                          | 4,6                          | 759,717                        | 276,392                        | ND                                | ND                          | 16,587  | 130,52                        |
| 1980  | 133,683             | 1.165,174                     | 8,7              | 157,08                     | 13,47                         | 7,0                          | 1.101,16<br>8                  | 524,185                        | 488,9                             | 3,1                         | 15,657  | 117,12                        |
| 1981  | 103,992             | 780,883                       | 7,5              | 212,68                     | 27,23                         | 13,1                         | 1.566,41<br>5                  | 468,702                        | 644,8                             | 5,3                         | 11,997  | 115,36                        |
| 1982  | 107,137             | 859,304                       | 8,0              | 173,35                     | 20,17                         | 8,4                          | 1.154,83<br>4                  | 318,386                        | 529,6                             | 3,8                         | 13,756  | 128,39                        |
| 1983  | 101,087             | 896,462                       | 8,9              | 168,67                     | 18,81                         | 9,1                          | 1.187,05<br>8                  | 367,729                        | 372,9                             | 2,8                         | 13,020  | 128,79                        |
| 1984  | 107,447             | 864,653                       | 8,0              | 196,51                     | 22,72                         | 11,2                         | 1.433,45<br>0                  | 394,618                        | 292,9                             | 2,3                         | 12,827  | 119,37                        |
| 1985  | 122,217             | 966,708                       | 7,9              | 207,64                     | 21,47                         | 9,8                          | 1.603,73<br>9                  | 435,522                        | 477,9                             | 2,9                         | 16,282  | 133,22                        |
| 1986  | 129,232             | 1.056,332                     | 8,2              | 183,27                     | 17,34                         | 9,5                          | 1.487,56<br>0                  | 656,240                        | 525,8                             | 3,3                         | 15,608  | 120,77                        |
| 1987  | 113,474             | 920,071                       | 8,1              | 345,55                     | 37,55                         | 14,6                         | 2.453,11<br>6                  | 826.327                        | 579,7                             | 3,4                         | 16,777  | 147,84                        |
| 1988  | 112,985             | 1.068,756                     | 9,5              | 320,47                     | 29,98                         | 13,8                         | 2.617,68<br>6                  | 695,606                        | 572,4                             | 3,0                         | 18,941  | 167,64                        |

|      |         |           |      |        |       |      |               |           |        |     |        |        |
|------|---------|-----------|------|--------|-------|------|---------------|-----------|--------|-----|--------|--------|
| 1989 | 118,369 | 1.013,252 | 8,6  | 253,72 | 25,04 | 14,6 | 2.570,00<br>9 | 678,110   | 601,5  | 3,4 | 17,562 | 148,36 |
| 1990 | 117,396 | 914,466   | 7,8  | 187,31 | 20,48 | 14,5 | 1.897,48<br>4 | 733,095   | 789,8  | 6,0 | 13,096 | 111,55 |
| 1991 | 109,428 | 960,044   | 8,8  | 193,14 | 20,11 | 14,2 | 1.915,37<br>6 | 848,699   | 880,1  | 6,5 | 13,462 | 123,02 |
| 1992 | 105,664 | 1.073,861 | 10,2 | 341,90 | 31,80 | 18,0 | 3.012,22<br>5 | 1.078,804 | 908,2  | 5,4 | 16,718 | 158,21 |
| 1993 | 106,738 | 1.391,376 | 13,0 | 331,52 | 23,80 | 13,7 | 2.660,26<br>6 | 1.809,487 | 885,7  | 4,6 | 19,369 | 181,46 |
| 1994 | 107,134 | 1.581,389 | 14,8 | 377,62 | 23,87 | 11,4 | 2.684,91<br>6 | 2.550,476 | 1195,0 | 5,0 | 23,542 | 219,74 |
| 1995 | 104,614 | 1.629,008 | 15,6 | 263,04 | 16,15 | 9,8  | 2.415,07<br>9 | 4.795,300 | 1693,8 | 6,9 | 24,476 | 233,96 |

(1) cars, light commercial vehicles, trucks and buses.

(2) Real prices of 1995 (IGP-DI average) converted in US\$ by exchange rate of December (Bacen).

Source: ANFAVEA (1996)

**Table 2: Employment, Sales, Productivity, Investments, Exports, Imports and Idle Capacity in the Brazilian Auto-Parts Industry - 1974 - 1995**

| Year | Workforce<br>(1000) | Sales in<br>US\$<br>billions<br>Gross <sup>1</sup> | Sales/<br>worker<br>(US\$<br>1000) | Exports<br>Direct/<br>Indirect<br>US\$<br>millions | Imports<br>Value in<br>US\$<br>billions | Exports/<br>Sales<br>(%) | Investments<br>in US\$<br>millions | Investment<br>/ Sales<br>(%) | Idle<br>Capacity |
|------|---------------------|--|------------------------------------|--|---|--------------------------|------------------------------------|------------------------------|------------------|
| 1974 | 200,0               | 2,5  | 12,5                               | 165  |   | -                        | 574                                | 22,9                         | ND               |
| 1975 | 230,0               | 2,7  | 11,7                               | 248  |   | -                        | 229                                | 8,4                          | ND               |
| 1976 | 225,7               | 3,2  | 14,1                               | 287  |   | -                        | 290                                | 9,1                          | ND               |
| 1977 | 235,0               | 3,3  | 14,2                               | 490  |   | 3,1                      | 325                                | 9,8                          | ND               |
| 1978 | 270,0               | 4,4  | 16,3                               | 640  |   | 3,7                      | 227                                | 5,1                          | 16,5             |
| 1979 | 273,0               | 4,8  | 17,9                               | 718  |   | 4,0                      | 265                                | 5,0                          | 20,7             |
| 1980 | 278,6               | 5,3  | 19,0                               | 733  |   | 5,8                      | 284                                | 5,3                          | 20,8             |
| 1981 | 198,4               | 4,3  | 21,9                               | 825  |   | 6,2                      | 226                                | 5,2                          | 33,2             |
| 1982 | 219,5               | 5,0  | 22,7                               | 659  |   | 6,7                      | 271                                | 5,4                          | 29,4             |
| 1983 | 211,0               | 3,7  | 17,8                               | 799  |   | 9,2                      | 189                                | 5,1                          | 30,1             |
| 1984 | 240,1               | 4,8  | 20,1                               | 1265   |   | 15,0                     | 232                                | 4,8                          | 22,3             |
| 1985 | 260,8               | 5,5  | 21,2                               | 1397   |   | 12,7                     | 254                                | 4,6                          | 19,8             |
| 1986 | 291,7               | 6,6  | 22,7                               | 1402   |   | 13,4                     | 430                                | 6,5                          | 15,7             |
| 1987 | 280,8               | 8,3  | 29,7                               | 1697   |   | 16,3                     | 440                                | 5,3                          | 16,8             |
| 1988 | 288,3               | 10,5   | 36,3                               | 2081   |   | 13,1                     | 628                                | 5,9                          | 17,0             |
| 1989 | 309,7               | 15,5   | 50,2                               | 2120   | 0,7                                     | 10,2                     | 1.061                              | 6,8                          | 17,8             |
| 1990 | 285,2               | 12,2   | 42,7                               | 2127   | 0,8                                     | 11,2                     | 987                                | 8,1                          | 25,7             |
| 1991 | 255,6               | 9,8  | 38,3                               | 2048   | 0,8                                     | 13,5                     | 764                                | 7,7                          | 26,9             |
| 1992 | 231,0               | 10,1   | 43,7                               | 2312   | 1,0                                     | 15,1                     | 715                                | 7,1                          | 27,8             |
| 1993 | 235,9               | 13,2   | 55,9                               | 2665   | 1,5                                     | 15,7                     | 702                                | 5,3                          | 19,8             |
| 1994 | 236,6               | 14,3   | 60,4                               | 2985   | 2,0                                     | 15,5                     | 883                                | 6,1                          | 17,3             |
| 1995 | 214,0               | 16,5   | 77,1                               | 3300   | 2,8                                     | 17,0                     | 1.500                              | 9,1                          | 20,0             |

(1) Average exchange rate.

Source: Sindipeças, 1996

| Year | Assemblers | Consumer | Exports | Other Auto-Parts |
|------|------------|----------|---------|------------------|
| 1977 | 72,8       | 18,5     | 3,1     | 5,6              |
| 1978 | 70,7       | 21,6     | 3,7     | 4,0              |
| 1979 | 71,2       | 19,5     | 4,0     | 5,3              |
| 1980 | 70,7       | 18,4     | 5,8     | 5,1              |
| 1881 | 65,0       | 21,6     | 6,2     | 6,7              |
| 1982 | 65,0       | 20,0     | 6,7     | 8,3              |
| 1983 | 62,8       | 22,7     | 9,2     | 5,3              |
| 1984 | 58,9       | 21,6     | 15,0    | 4,5              |
| 1985 | 60,3       | 22,5     | 12,7    | 4,5              |
| 1986 | 56,2       | 25,1     | 13,4    | 5,3              |
| 1987 | 51,3       | 27,2     | 16,3    | 5,2              |
| 1988 | 60,3       | 21,3     | 13,1    | 5,3              |
| 1989 | 59,7       | 24,8     | 10,2    | 5,3              |
| 1990 | 57,7       | 26,0     | 11,2    | 5,2              |
| 1991 | 59,5       | 22,3     | 13,5    | 4,7              |
| 1992 | 60,1       | 20,3     | 15,1    | 4,5              |
| 1993 | 61,6       | 17,5     | 15,7    | 5,2              |
| 1994 | 60,4       | 19,3     | 15,5    | 4,8              |
| 1995 | 58,0       | 20,0     | 17,0    | 5,0              |

Source: Sindipeças, 1996

|                  | SP/Capital |      | SP/ABCD |      | Other SP |      | SP/Interior |      | Other Estates |      |
|------------------|------------|------|---------|------|----------|------|-------------|------|---------------|------|
|                  | 1990       | 1995 | 1990    | 1995 | 1990     | 1995 | 1990        | 1995 | 1990          | 1995 |
| Industrial Units | 38,8       | 33,6 | 18,9    | 18,2 | 14,8     | 15,9 | 16,8        | 19,0 | 10,7          | 13,3 |
| Employment       | 29,3       | 22,6 | 15,5    | 16,9 | 19,5     | 18,4 | 24,1        | 25,7 | 11,6          | 16,7 |

Industrial Units: 549 in 1990 and 548 in 1995  
Employment: 285,2 thousand in 1990 and 214 thousand in 1995  
Source: Sindipeças, 1991 e 1996

| Region/Country              | 85   | 86   | 87   | 88   | 89   | 90   | 91   | 92   | 93   | 94   |
|-----------------------------|------|------|------|------|------|------|------|------|------|------|
| North America (USA, Mx, CA) | 61,8 | 67,0 | 65,9 | 62,4 | 62,2 | 61,3 | 53,8 | 49,2 | 50,3 | 48,9 |
| USA                         | 57,9 | 64,2 | 62,8 | 59,5 | 56,6 | 51,1 | 43,4 | 37,7 | 40,6 | 40,5 |
| México                      | 3,6  | nd   | nd   | nd   | 5,0  | 9,3  | 9,8  | 11,0 | 9,3  | 8,04 |
| Europe                      | 21,2 | 17,5 | 16,8 | 18,8 | 22,7 | 22,3 | 24,4 | 20,2 | 14,1 | 15,0 |
| Germany                     | 4,7  | 4,3  | 3,8  | 5,1  | 6,6  | 8,4  | 9,2  | 9,2  | 7,2  | 7,1  |
| UK                          | nd   | 5,3  | 6,1  | 7,6  | 8,0  | 6,2  | 6,9  | 6,0  | 3,2  | 2,4  |
| Italy                       | 11,6 | 5,7  | 4,8  | 2,9  | 3,5  | nd   | nd   | nd   | nd   | 2,5  |
| South America               | 8,0  | 9,8  | 10,4 | 10,8 | 7,0  | 8,4  | 14,1 | 24,8 | 29,6 | 30,2 |
| Argentina                   | 3,2  | 4,6  | 4,8  | 4,3  | nd   | 3,7  | 7,5  | 18,0 | 22,2 | 23,3 |
| Asia                        | 4,9  | 3,3  | 4,0  | 4,9  | 5,6  | 5,6  | 4,8  | 3,1  | 3,4  | 3,6  |
| Africa                      | 3,3  | 1,7  | 2,1  | 2,3  | 1,8  | 1,7  | 2,2  | 1,9  | 1,8  | 1,6  |
| Central America & Caribbean | 0,8  | 0,7  | 0,8  | 0,8  | 0,7  | 0,7  | 0,7  | 0,8  | 0,8  | 0,7  |
| Exports in US\$ billions    | 1,39 | 1,40 | 1,67 | 2,08 | 2,12 | 2,12 | 2,04 | 2,31 | 2,66 | 2,98 |

Source: Sindipeças, 1996

| Position      | Number of Firms and (%) |                   |                |            |
|---------------|-------------------------|-------------------|----------------|------------|
|               | Campinas/SP             | Rio Grande do Sul | Rio de Janeiro | Total      |
| First Tier*   | 3 (27,4)                | 7 (43,8)          | 10 (38,5)      | 20 (37,7)  |
| Second Tier** | 8 (63,6)                | 3 (18,7)          | 3 (11,5)       | 14 (26,4)  |
| Third Tier*** | -                       | 2 (12,5)          | -              | 2 (3,8)    |
| Consumer      | -                       | 4 (25,0)          | 13 (50,0)      | 17 (32,1)  |
| Total         | 11 (100,0)              | 16 (100,0)        | 26 (100,0)     | 53 (100,0) |

\* First tier firms sell directly to car assemblers. They may also sell to other auto-parts firms and to the consumer market.  
\*\* Second Tier firms sell mainly to other auto-parts producers  
\*\*\* Third Tier firms sell to firms producing parts and components for auto-parts system producers.  
Source: Fieldwork (1996-1997).

| Years          | Number of Firms and (%) |                   |                |            |
|----------------|-------------------------|-------------------|----------------|------------|
|                | Campinas/SP             | Rio Grande do Sul | Rio de Janeiro | Total      |
| Before the 50s | -                       | 1 (6,3)           | 5 (19,2)       | 6 (11,3)   |
| 50s - 70s      | 4 (36,4)                | 9 (56,2)          | 17 (65,4)      | 30 (56,6)  |
| 80s            | 6 (54,5)                | 5 (31,2)          | 2 (7,8)        | 13 (24,5)  |
| 90s            | 1 (9,1)                 | 1 (6,3)           | 1 (3,8)        | 3 (5,7)    |
| NA             | -                       | -                 | 1 (3,8)        | 1 (1,9)    |
| Total          | 11 (100,0)              | 16 (100,0)        | 26 (100,0)     | 53 (100,0) |

Source: Fieldwork (1996-1997).

| Capital property and type of society | Number of Firms and (%) |                   |                |            |
|--------------------------------------|-------------------------|-------------------|----------------|------------|
|                                      | Campinas/SP             | Rio Grande do Sul | Rio de Janeiro | Total      |
| Multinational*                       | 1 (9,1)                 | 1 (6,3)           | 6 (23,1)       | 8 (15,1)   |
| National                             | 10 (90,9)               | 15 (93,7)         | 20 (76,9)      | 45 (84,9)  |
| Total                                | 11 (100,0)              | 16 (100,0)        | 26 (100,0)     | 53 (100,0) |
| Sociedade Anônima                    | -                       | 8 (50,0)          | 8 (30,8)       | 16 (30,2)  |
| Sociedade Limitada                   | 11 (100,0)              | 8 (50,0)          | 18 (69,2)      | 37 (69,8)  |
| Total                                | 11 (100,0)              | 16 (100,0)        | 26 (100,0)     | 53 (100,0) |

\* The firm in Campinas/SP is of American origin, the Rio Grande do Sul's is a subsidiary form a german multinational and the firms at Rio de Janeiro are from American, French, German and Japonese origin.  
Source: Fieldwork (1996-1997).

| Sales<br>US\$ thousand    | Number of Firms and (%) |                    |                |            |
|---------------------------|-------------------------|--------------------|----------------|------------|
|                           | Campinas/SP             | Rio Grande do Sul* | Rio de Janeiro | Total      |
| Up to US\$ 110            | -                       | 2 (12,5)           | -              | 2 (3,8)    |
| US\$ 111 - US\$ 656l      | 1 (9,1)                 | 1 (6,3)            | 1 (3,8)        | 3 (5,7)    |
| US\$ 657 - US\$ 2,000     | 3 (27,3)                | 1 (6,3)            | 4 (15,4)       | 8 (15,1)   |
| US\$ 2,100 - US\$ 10,000  | 3 (27,3)                | 3 (18,7)           | 4 (15,4)       | 10 (18,8)  |
| US\$ 10,100 - US\$ 25,000 | 1 (9,1)                 | 3 (18,7)           | 2 (7,8)        | 6 (11,3)   |
| US\$ 25,100 - US\$ 50,000 | 1 (9,1)                 | 1 (6,3)            | 1 (3,8)        | 3 (5,7)    |
| More than US\$ 50,100     | 1 (9,1)                 | 2 (12,5)           | 1 (3,8)        | 4 (7,5)    |
| NA                        | 1 (9,1)                 | 3 (18,7)           | 13 (50,0)      | 17 (32,1)  |
| Total                     | 11 (100,0)              | 16 (100,0)         | 26 (100,0)     | 53 (100,0) |

\* Some firms at Rio Grande do Sul have the figure for 1995.  
Source: Fieldwork (1996-1997).

| Number of Workers | Number of Firms and (%) |                   |                   |                   |
|-------------------|-------------------------|-------------------|-------------------|-------------------|
|                   | Campinas/SP             | Rio Grande do Sul | Rio de Janeiro    | Total             |
| No workers*       | -                       | 2 (12,5)          | -                 | 2 (3,8)           |
| 1 - 30            | 3 (27,3)                | 4 (25,0)          | 4 (15,5)          | 11 (20,8)         |
| 31 - 60           | 2 (18,2)                | 1 (6,2)           | 5 (19,2)          | 8 (15,1)          |
| 61 - 125          | 1 (9,1)                 | 1 (6,2)           | 4 (15,5)          | 6 (11,3)          |
| 126 - 250         | 3 (27,3)                | 2 (12,5)          | 1 (3,8)           | 6 (11,3)          |
| 251 - 500         | 2 (18,2)                | 4 (25,0)          | 7 (26,9)          | 13 (24,5)         |
| 501 - 1000        | -                       | 1 (6,2)           | 3 (11,5)          | 4 (7,5)           |
| 1001 - 2000       | -                       | -                 | 1 (3,8)           | 1 (1,9)           |
| 2001 - 4000       | -                       | 1 (6,2)           | 1 (3,8)           | 2 (3,8)           |
| More than 4001    | -                       | -                 | -                 | -                 |
| <b>Total</b>      | <b>11 (100,0)</b>       | <b>16 (100,0)</b> | <b>26 (100,0)</b> | <b>53 (100,0)</b> |

\* This is a family firm with no hired workers.  
Source: Fieldwork (1996-1997).

| Period           | Number of Firms and (%) |                    |                   |                   |
|------------------|-------------------------|--------------------|-------------------|-------------------|
|                  | Campinas/SP             | Rio Grande do Sul* | Rio de Janeiro    | Total             |
| Before 1985      | 1 (9,1)                 | -                  | -                 | 1 (2,2)           |
| 1985-1990        | 2 (18,2)                | -                  | 4 (16,7)          | 6 (13,0)          |
| 1991-1993        | 1 (9,1)                 | 3 (33,3)           | 16 (66,6)         | 20 (43,6)         |
| 1994-1995        | 6 (54,5)                | 3 (33,3)           | -                 | 9 (19,6)          |
| 1996-1997        | 1 (9,1)                 | -                  | 1 (4,2)           | 2 (4,3)           |
| NA**             | -                       | 3 (33,3)           | 3 (12,5)          | 6 (13,0)          |
| No Restructuring | -                       | -                  | 2 (3,8)           | 2 (4,3)           |
| <b>Total</b>     | <b>11(100,0)</b>        | <b>9 (100,0)</b>   | <b>26 (100,0)</b> | <b>46 (100,0)</b> |

\* 7 firms of Rio Grande do Sul have no data on restructuring  
\*\* There is no information on when restructuring was started, but restructuring in process  
Source: Fieldwork (1996-1997).

| <b>Table 12: Innovations introduced by the firms<sup>1</sup></b>                   |                         |                      |                |           |
|--|-------------------------|----------------------|----------------|-----------|
|  | Number of Firms and (%) |                      |                |           |
|  | Campinas/S<br>P         | Rio Grande<br>do Sul | Rio de Janeiro | Total     |
| <b>Innovations in Management Policy</b>  |                         |                      |                |           |
| Focusing - products and/or clients   | 3 (27,3)                | 12 (75,0)            | 7 (29,2)       | 22 (43,1) |
| Integration/horizontalization  | 3 (27,3)                | 6 (37,5)             | 9 (37,5)       | 18 (35,3) |
| Reduction of hierarchical levels   | 1 (9,1)                 | 6 (37,5)             | 7 (29,2)       | 14 (27,4) |
| Reduction of workforce   | 2 (18,2)                | 11 (68,7)            | 13 (54,2)      | 26 (51,0) |
| Standardization of Quality Controls  | 10 (90,9)               | 11 (68,7)            | 16 (66,7)      | 37 (72,5) |
| ISO 9000   | 5 (45,5)                | 8 (50,0)             | 9 (37,5)       | 22 (43,1) |
| Training programs  | 8 (72,7)                | 10 (62,5)            | 21 (87,5)      | 39 (76,5) |
| Involvement Programs   | 4 (36,4)                | 6 (37,5)             | 11 (45,8)      | 21 (41,2) |
| Changes in job & wage structure  | 1 (9,1)                 | 3 (18,7)             | 2 (8,3)        | 6 (11,8)  |
| Participation in results   | 2 (18,2)                | 2 (12,5)             | 2 (8,3)        | 6 (11,8)  |
| <b>Innovations in Production</b>   |                         |                      |                |           |
| Cellular layout  | 2 (18,2)                | 6 (37,5)             | 4 (16,7)       | 12 (23,5) |
| Flexible equipment   | 9 (81,8)                | 7 (43,8)             | 11 (45,8)      | 27 (52,9) |
| Total quality control  | 8 (72,7)                | 6 (37,5)             | 10 (41,6)      | 24 (47,0) |
| JIT/Kanban internal  | 7 (63,6)                | 1 (6,3)              | 5 (20,8)       | 13 (25,5) |
| JIT/Kanban external  | 6 (54,5)                | 4 (25,0)             | 2 (8,3)        | 12 (23,5) |
| <b>Innovations in the Organization of Work</b>                                     |                         |                      |                |           |
| Multitask individual posts   | 7 (63,6)                | 5 (31,2)             | 4 (16,7)       | 16 (31,4) |
| Multifunctional groups   | 1 (9,1)                 | 4 (25,0)             | 2 (8,3)        | 7 (13,7)  |
| Quality control by production workers <sup>2</sup>                                 | 7 (63,6)                | 10 (62,5)            | 13 (54,2)      | 30 (58,8) |
| Maintenance by production workers <sup>3</sup>                                     | 9 (81,8)                | 10 (62,5)            | 7 (29,2)       | 26 (51,0) |
| New multifunctional careers  | 1 (9,1)                 | -                    | -              | 1 (2,0)   |
| Incentive bonus  | -                       | 4 (25,0)             | 2 (8,3)        | 6 (11,8)  |
| 1 - Answers are not exclusive. Firms could indicate more than one option.          |                         |                      |                |           |
| 2 - Like visual inspection, measurements, self-control                             |                         |                      |                |           |
| 3 - Like lubrication, periodical cleaning, checking as part of maintenance program |                         |                      |                |           |

| <b>Table 12: Innovations introduced by the firms (continuation)</b>  |                         |                   |                |           |
|--|-------------------------|-------------------|----------------|-----------|
|  | Number of Firms and (%) |                   |                |           |
|  | Campinas/SP             | Rio Grande do Sul | Rio de Janeiro | Total     |
| <b>Innovations in Inter-Firm Relations</b>   |                         |                   |                |           |
| Programs of evaluation and/or development of suppliers   | 10 (90,9)               | 10 (62,5)         | -              | 20 (39,2) |
| Outsourcing of productive activities (by client firms) <sup>4</sup>  | 1 (9,1)                 | 5 (31,2)          | 6 (25,0)       | 12 (23,5) |
| Reception of outsourced production activities (suppliers) <sup>4</sup>   | 10 (90,9)               | 7 (43,8)          | -              | 17 (33,3) |
| Outsourcing of services (clients and suppliers) <sup>5</sup>   | 3 (27,3)                | 7 (43,8)          | 9 (37,5)       | 19 (37,2) |
| Number of Firms  | 11                      | 16                | 24             | 51        |
| <p>4 - Partial or total outsourcing of activities presupposes that it was previously produced inside the firm. Direct production activities add value to the product. Indirect production activities do not add value to the product but are essential to its production (machinetooling, maintenance)</p> <p>5 - Services may include restaurants, cleaning, security, transportation of workers or products, medical assistance, recruitment or selection of workers, accountancy, marketing, sales.</p> <p>Source: Fieldwork (1996-1997).</p> |                         |                   |                |           |

| <b>Table 13: Inter-Firm Relations</b> |                                |                              |                       |              |
|---------------------------------------|--------------------------------|------------------------------|-----------------------|--------------|
| <b>Client/Supplier Integration</b>    | <b>Number of Firms and (%)</b> |                              |                       |              |
|                                       | <b>Campinas/S<br/>P</b>        | <b>Rio Grande<br/>do Sul</b> | <b>Rio de Janeiro</b> | <b>Total</b> |
| <b>Product/Process Development</b>    |                                |                              |                       |              |
| Simple sales order                    | 1 (9,1)                        | 1 (6,3)                      | 17 (70,8)             | 19 [ 37,2]   |
| Especification by Client              | 8 (72,7)                       | 5 [31,2]                     | 5 (20,8)              | 18 [35,3]    |
| Joint Product Development             | 3 (27,3)                       | -                            | 4 (16,7)              | 7 (13,7)     |
| Joint Process Development             | 1 (9,1)                        | -                            | -                     | 1 (2,0)      |
| Joint Product and Process Develop.    | 1 (9,1)                        | 3 (18,7)                     | 5 (20,8)              | 9 (17,6)     |
| NA                                    | -                              | 7 (43,8)                     | 2 (8,3)               | 9 (17,6)     |
| <b>Forms of Help</b>                  |                                |                              |                       |              |
| Formal help for a TCC program         | 1 (9,1)                        | -                            | 1 (4,2)               | 2 (3,9)      |
| Informal help for a TCC program       | 7 (63,6)                       | -                            | 4 (16,7)              | 11 (21,6)    |
| Courses & Training for TCC            | 4 (36,4)                       | 1 (6,3)                      | 4 (16,7)              | 9 (17,6)     |
| Use of laboratories                   | -                              | -                            | 1 (4,2)               | 1 (2,0)      |
| Help for organization of production   | 4 (36,4)                       | 4 (25,0)                     | 1 (4,2)               | 9 (17,6)     |
| Transportation of parts & products    | 4 (36,4)                       | -                            | -                     | 4 (7,8)      |
| Joint in-put buying                   | 1 (9,1)                        | -                            | -                     | 1 (2,0)      |
| Anticipation of payment               | 4 (36,4)                       | -                            | -                     | 4 (7,8)      |
| No assistance whatsoever              | -                              | -                            | 13 (54,2)             | 13 (25,5)    |
| NA                                    | 1 (9,1)                        | 11 (68,7)                    | 2 (8,3)               | 14 (27,4)    |
| <b>Delivery Frequency</b>             |                                |                              |                       |              |
| Daily                                 | 4 (36,4)                       | -                            | 2 (8,3)               | 6 (11,8)     |
| Weeklyl                               | 5 (45,5)                       | -                            | 9 (37,5)              | 14 (27,4)    |
| Monthly                               | 5 (45,5)                       | -                            | 3 (12,5)              | 8 (15,7)     |
| According to orders                   | 2 (18,2)                       | -                            | 8 (33,3)              | 10 (19,6)    |
| NA                                    | -                              | 16 (100,0)                   | 4 (16,7)              | 20 (39,2)    |
| <b>Just-in-time/Kanban</b>            |                                |                              |                       |              |
| In operation                          | 6 (54,5)                       | 2 (12,5)                     | 2 (8,3)               | 10 (19,6)    |
| Planned                               | -                              | 1 (6,3)                      | -                     | 1 (2,0)      |
| No JIT/Kanban                         | 6 (54,5)                       | 9 (56,2)                     | 6 (25,0)              | 21 (41,2)    |
| It does not apply                     | 1 (9,1)                        | -                            | 12 (50,0)             | 13 (25,5)    |
| NA                                    | 1 (9,1)                        | 4 (25,0)                     | 4 (16,7)              | 9 (17,6)     |
| Number of firms                       | 11                             | 16                           | 24                    | 51           |

| <b>Table 14 - Training institutions used by firms</b> |                            |                          |                       |              |
|---|----------------------------|--------------------------|-----------------------|--------------|
| <b>Institutions</b>                                   | <b>Number of firms (%)</b> |                          |                       |              |
|   | <b>Campinas/SP</b>         | <b>Rio Grande do Sul</b> | <b>Rio de Janeiro</b> | <b>Total</b> |
| Senai   | 8 (72,7)                   | 9 (56,2)                 | 13 (54,2)             | 30 (58,8)    |
| Sesi  | -                          | -                        | 3 (12,5)              | 3 (5,9)      |
| Senac   | -                          | 4 (25,0)                 | 1 (4,2)               | 5 (9,8)      |
| Technical Schools                                     | -                          | 6 (37,5)                 | -                     | 6 (11,8)     |
| “Supletivos”  | 1 (9,1)                    | 1 (6,3)                  | 1 (4,2)               | 3 (5,9)      |
| Universities  | 1 (9,1)                    | 7 (43,8)                 | 2 (8,3)               | 10 (19,6)    |
| Sebrae  | 2 (18,2)                   | 1 (6,3)                  | 5 (20,8)              | 8 (15,7)     |
| Consultancys  | 4 (36,4)                   | 5 (31,2)                 | 2 (8,3)               | 11 (21,6)    |
| Financing Institutions                                | 1 (9,1)                    | 1 (6,3)                  | -                     | 2 (3,9)      |
| Other Firms   | 2 (18,2)                   | 7 (43,8)                 | -                     | 9 (17,6)     |
| Unions (workers or firms)                             | 2 (18,2)                   | 7 (43,8)                 | -                     | 9 (17,6)     |
| Do not use  | -                          | 2 (12,5)                 | 9 (37,5)              | 11 (21,6)    |
| No answer   | -                          | 2 (12,5)                 | -                     | 2 (3,9)      |
| <b>Total of firms</b>                                 | <b>11</b>                  | <b>16</b>                | <b>24</b>             | <b>51</b>    |

Source: Fieldwork (1996-1997).

| <b>Table 15 - Training programs offered to workers</b> |  |                          |                       |              |
|--|--|--------------------------|-----------------------|--------------|
| <b>Organized by::</b>                                  | <b>Number of firms (%)<sup>(1)</sup></b> |                          |                       |              |
|  | <b>Campinas/SP</b>                       | <b>Rio Grande do Sul</b> | <b>Rio de Janeiro</b> | <b>Total</b> |
| the client firms                                       | 6 (54,5)                                 | 2 (12,5)                 | 12 (50,0)             | 20 (39,2)    |
| the firm with support of other institutions            | 3 (27,3)                                 | 1 (6,3)                  | -                     | 4 (7,8)      |
| by official training centers (SENAI, SEBRAE, etc.)     | 4 (36,4)                                 | 9 (56,2)                 | 19 (79,2)             | 32 (62,7)    |
| with primary and secondary schools                     | 1 (9,1)                                  | 4 (25,0)                 | 13 (54,2)             | 18 (35,3)    |
| by Universities  | -  | 6 (37,5)                 | 7 (29,2)              | 13 (25,5)    |
| other firms (clients or suppliers)                     | 5 (45,4)                                 | 7 (43,8)                 | 9 (37,5)              | 21 (41,2)    |
| associations or consultancies                          | 4 (36,4)                                 | 5 (31,2)                 | 10 (41,6)             | 19 (37,2)    |
| by the initiative of workers, but paid by the firm     | 2 <sup>(2)</sup> (18,2)                  | -                        | 7 (29,2)              | 9 (17,6)     |
| no training  | 3 (27,3)                                 | 5 (31,2)                 | 3 (12,5)              | 11 (21,6)    |
| no answer  | -  | 1 (11,1)                 | -                     | 1 (2,0)      |
| <b>Total of firms</b>                                  | <b>11</b>                                | <b>9</b>                 | <b>24</b>             | <b>51</b>    |

Source: Fieldwork (1996-1997).

| <b>Table 16 - Content of training programs for workers</b>                    |                     |                   |                |           |
|---|---------------------|-------------------|----------------|-----------|
| Type of course  | Number of firms (%) |                   |                |           |
|   | Campinas/SP         | Rio Grande do Sul | Rio de Janeiro | Total     |
| “Supletivos”(primary and secondary diplomas)                                  | 3(27,3)             | 1 (6,3)           | 15 (60,0)      | 19 (36,5) |
| Mathematics (basic)   | 1 (9,1)             | 5 (31,2)          | -              | 6 (11,5)  |
| Safety at work  | 1 (9,1)             | -                 | 3 (12,0)       | 4 (7,7)   |
| Tecnical/operational <sup>(1)</sup>   | 3 (27,3)            | 7 (43,8)          | 18 (72,0)      | 28 (53,8) |
| Maintenance <sup>(2)</sup>  | 1 (9,1)             | 6 (37,5)          | 11 (44,0)      | 18 (34,6) |
| Kanban  | 1 (9,1)             | -                 | 1 (4,0)        | 2 (3,8)   |
| 5S Program  | 2 (18,2)            | 6 (37,5)          | 4 (16,0)       | 12 (23,1) |
| Courses related to increasing quality <sup>(3)</sup>                          | 6 (54,5)            | 8 (50,0)          | 2 (8,0)        | 16 (30,8) |
| Motivation for quality and productivity                                       | 1 (9,1)             | 8 (50,0)          | 3 (12,0)       | 12 (23,1) |
| Preservação ambiental   | -                   | 1 (6,3)           | 2 (8,0)        | 3 (5,8)   |
| No courses offered  | 3 (27,3)            | 5 (31,2)          | 5 (20,0)       | 13 (25,0) |
| No answer   | -                   | 2 (12,5)          | -              | 2 (3,8)   |
| Number os firms   | 11                  | 16                | 25             | 52        |
| (1) Includes measurement control, desingn, metrology, numerical control, etc. |                     |                   |                |           |
| (2) Courses for maintenance workers or machine operators.                     |                     |                   |                |           |
| (3) Such as FMEA, CEP, ISO 9000, etc.   |                     |                   |                |           |
| Fonte: Pesquisa de Campo (1996-1997).   |                     |                   |                |           |

Figure 1 - Position of Auto-Parts' Firms in the Automotive Production Chain

