Fordism is Alive in Brazil

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1. Introduction

A major change in the industrial labour process is on its way — or is it only a change in the minds of researchers? Until recently, it was thought that the application of Taylorist and Fordist principles of work organisation was in the interest of employers. The relentless drive for increases in efficiency required the separation of conception from execution of work and, wherever possible, the subordination of the worker to the machine. Problems of negligence or sabotage caused by alienated workers were recognised, but job enrichment schemes rarely undermined the prevailing principles of work organisation.

Now the pendulum has begun to swing the other way. Fordism[2] is thought to be passé. This is not just because automation technology does away with fragmented, machine-paced work; the advance of 'dead labour' (machines) at the expense of 'living labour' is clear. The change of thinking concerns how living labour should be organised in order to get the best out of the new technology. The new principle seems to be to integrate skills, to treat labour as a resource to be developed rather than as a cost item to be minimised.

In this article, the issue is examined for the case of Brazil, on the basis of a case study of the automobile industry.[3] The main conclusion is that with the introduction of programmable automation technology, Fordist work organisation has not been superseded but reinforced in the plants examined.

2. Towards Post-Fordism in Advanced Countries

Ever since Henry Ford introduced the moving assembly line, the car industry has been the most vivid example of the real subordination of labour to capital, of the subordination of the worker to the machine.

The moving conveyor offers a technological solution to a central problem in the organisation of work, by 'taking the work to the men instead of the men to the work' [Ford 1922:80]. It provides unambiguous direction as to what operation each worker has to perform and sets the pace at which the work is to be done. 'The net result is the reduction of the necessity of thought on the part of the worker and the reduction of his movement to a minimum' [Ford 1922:80].

Until the 1970s the principles of Fordism guided management world-wide in the car industry and in other mass production industries which make discrete products (as opposed to dimensional products, such as chemicals, cement or steel). The 1980s herald a major change. At least in the advanced countries, programmable automation is taking the car industry into a new stage, where labour is no longer the appendage of the machine. The workers' main task is to monitor the machinery and to maintain it.

So as not to oversimplify the case of the advanced countries, a reminder: the degree to which operations in the car industry can be automated varies in the different sections of the production process. For example, the West German car industry has achieved the following degrees of automation [Koch 1986, Schmitz and Carvalho 1987]:

press shop:	between 45 and 90 per cent
body shop:	between 65 and 85 per cent
final assembly:	between 5 and 25 per cent.[4]

Our concern here is with the nature and organisation of work in the more automated sections. This can be highlighted with the changes in the body shop, particularly in the welding operations, which Jürgens *et al.* [1986:264] summarise as follows:

[1] Comments from John Humphrey and Raphie Kaplinsky are gratefully acknowledged.

[2] In the recent academic debate, the concept of Fordism is used at both the plant level (to refer to the labour process) and at the level of society (to refer to what the regulationist school calls a regime of accumulation). In this paper, Fordism relates to the former, that is, a practice of work organisation found typically in semi-automated mass production. Its main features are the extreme fragmentation and simplification of jobs and the subordination of the pace of work to the mechanised conveyor.

[3] Our research comprised a survey of all Brazilian car producers (carried out during 1988 and in the process of being tabulated), as well as in-depth studies of the two largest plants [see Peliano *et al.* 1988, Carvalho 1987, Schmitz and Carvalho 1987]. The suppliers of auto-parts were not included.

[4] These figures indicate the range of actually obtained (not potential) degrees of automation and are based on information from two German car firms.

> The increasing level of automation leads to a corresponding realignment of the structure of work operations from direct repetitive work linked to the time-cycle of the line towards off-line production activities and maintenance work . . . Welding, soldering, finishing were largely marginalised in the course of the current mechanisation of the body shop. Already, at some firms 95 per cent and more of the welding functions have been automated in the production of standard vehicles. They have been replaced by off-line production activities which require maintenance skills, the monitoring of complex equipment and machine setting.

This is a radical change in the labour process; a move away from a situation in which most workers are engaged in direct handling or processing of products to one in which they are concerned with preparing and monitoring equipment or intervening in the flow of production when problems arise. Maintenance work increases in importance and becomes more demanding; this point is emphasised a great deal by Shaiken *et al.* (1984) in their study of robot welding in a US car plant.

The accumulation of different tasks in one job and the need to exercise discretion in non-predictable situations also feature in the automated sections of car making in France and Italy, according to research by Coriat (1983). Kern and Schumann (1984) report similar findings for the West German car industry, stressing that advances in programmable automation are accompanied by the 're-professionalisation' of work. Coriat (1987) further suggests that the automated production of discrete units is approaching the logic of continuous flow production. This would mean a shift in the focus of production management; the Taylorist/Fordist drive of intensification of work is replaced by an all-out concern with the optimum performance of the machines. Moreover, recent research points out that a great deal of responsibility and initiative needs to be given back to shop-floor workers, if firms want to reap all potential benefits of the new technology, reversing (partially, at least) the increasing separation of head and hand [Tolliday and Zeitlin 1986, Hoffman and Kaplinsky 1988]. In short, the suggestion is that Fordism is being superseded in the automated sections of car production.

3. Selective Automation and the Strengthening of Fordism in Brazil

In contrast with the new trends in the central economies, our research shows that the adoption of programmable automation in the Brazilian car industry is associated with the reinforcement of Fordist work organisation. The new production process of the Brazilian firms presents a much lower level of direct displacement of manual manufacturing operations as compared to the more automated systems found in the advanced countries. However, by affecting transfer operations and production control, selective automation entails increased integration and syncronisation of all manufacturing operations, whether carried out by machines or people. Thus jobs have become more machine-paced than before and Fordism, instead of being overcome, is intensified.

Reasons for and Features of Selective Automation

The adoption of programmable automation in a selective manner by Brazilian firms is the result of the economic and political conditions of the country. First, wages and labour costs are low enough in Brazil not to stimulate extensive substitution of machines for workers; in addition, trade unions are not strong enough to interfere in matters related to work organisation; employers enjoy discretion in defining job content, in allocating workers to jobs and in determining workloads [Silva 1988].

Second, the cost of automation technology is higher in Brazil than in advanced countries [Laplane and Ferreira 1986], partly due to government protection of the electronics sector. Third, the tariff protection reduces the incentive to automate in meeting domestic needs. However, exports have increased substantially, indicating that the industry is subject to international competitive pressure. Fourth, the long economic crisis of this 'lost decade' has restricted industrial investment, with capital employed in modernisation exceeding investment for capacity expansion. All these factors concur to explain why the diffusion of programmable automation is, in comparison with advanced countries, slow in Brazil, particularly if we measure diffusion by the number of installed robots or CNC machine-tools [Edquist and Jacobsson 1988].

In the Brazilian car industry, programmable automation has been adopted to replace only those manufacturing jobs which are either crucial to the quality of products or constitute bottlenecks in the flow of production. The bulk of manufacturing operations continue to be manual. In this respect, a good indicator is the total number of robots projected to operate in Brazilian car plants: approximately 50, as from June, 1989.

However, the number of robots does not capture the essence of automation. Our research shows that the adoption of new technology by Brazilian car producers is more intensive in the functions related to keeping the flow of production moving and to production control. Most plants visited utilise extensively electronically-controlled transfer-lines and automated storage systems; these replace manual transportation and handling jobs, substantially increasing the *integration* of assembly lines (within and between different production departments). Further,

many of these automated transport devices are linked to computerised systems of production control, which can trace the production of each car in the assembly line. Some of the engineers interviewed stressed that, under normal conditions of production, increased integration significantly enhances management control over the flow of production.

The selective use of the new technology yields gains in labour productivity, raw materials savings and improvements in quality. Indeed, the experience of Brazilian car plants suggests that it is possible to reap some of the economic benefits of programmable automation even when it is adopted with much lower levels of labour displacement. Similar results were found in studies on other industries [Prado 1988, Hewitt 1988]. There are grounds to believe that this selective use of the new technology is likely to last for a long time in Brazil, not least because real wages have been and are falling.

Labour Implications: Fordism Invigorated

The partial automation of Brazilian car plants has intensified Fordist practices of work organisation.[5] The basic feature of the new process is the displacement of manual work in certain strategic manufacturing operations and the integration of most remaining jobs into electronically-controlled transfer systems. As a result, the subordination of workers to the mechanised assembly-line is extended to new areas.

The best illustration of the implications for the nature of work and skills can be found in the new body shops. The conventional welding of the bodyframe in Brazilian plants requires special skills which the worker learns on the job. In some critical stages, workers have to manipulate big metal pieces, and weld them together using heavy equipment out of very strenuous positions. Doing this work requires a great deal of physical strength and knowing the ins and outs of each operation. This means that there is a certain diversity of welding tasks along the conventional line, but it also involves great physical strain and health risk.

The new lines do away with the most physically demanding operations. In fact automation is concentrated in those areas, primarily because precision and quality is difficult to achieve with the previous method. In this process the remaining welding tasks become more standardised. The simplification and standardisation of work is a prerequisite for the subordination of most remaining welding jobs to the new automated transfer-lines. These jobs have to be carried out at the pace at which the few robots and other automatic machines work.

[5] For an account of Fordist work organisation and labour relations in the Brazilian car industry of the 1970s, see Humphrey (1982).

As a consequence of both the standardisation and machine pacing of work, the intensification of work has increased. Since work becomes physically lighter, production times for each operation are shortened. Also the porosity of the working day is considerably reduced. A good indicator of the Fordist character of the new labour process is that in one of the car plants time and motion study techniques were introduced only after the installation of the new technology, and were particularly stressed in the new lines [Zilbovicius 1987].

A labour process with these features can be called an 'automated Fordist assembly line' which Coriat (1983) defines as a transitional system. However, in the case of Brazil the idea of transition does not seem to fit well. Operations strategic for quality improvements have been automated while, for the reasons given above, the remaining operations are likely to wait for a long time.

If the consequences for the nature of work are as shown above, we cannot conclude that these are necessary consequences of the new technology. In fact, the new programmable technologies can be used in different ways with different implications for the utilisation of labour and organisation of production. The route taken in Brazil results from a managerial decision. The new technologies open up new possibilities of control over production. Management has seized upon these for reasons which are related to labour relations in the country and particularly to the strong Taylorist/Fordist mentality of Brazilian engineers.

The workers directly affected by the strengthening of Fordist practices are typically in the semi-skilled production jobs category which continues to account for the largest share in the workforce (see Table 1). The rise in semi-skilled jobs in 1986, both in absolute and in relative numbers, shows that the industry still relies heavily on this type of work, since this increase occurred in the year which was the best of the decade in terms of output growth. Table 1 also shows that there was a substantial decrease in the share of unskilled workers due to the displacement of those in charge of transfer and handling operations. Indeed, the absolute number of handling workers decreased by 20 per cent between 1984 and 1986, a period when overall employment levels were recovering. Another important reduction occurred in the share of the managerial and administrative staff. This seems to have been the outcome of the rationalisation which followed the merger between Ford and Volkswagen and of the widespread computerisation of administrative tasks. The share of maintenance jobs grew slightly as well, but not to the point of representing a major change in the structure of employment. However, in the most automated plant the expansion of the maintenance group was impressive, both in

Table 1

Composition of the Workforce in the Brazilian Car Industry 1980/86[1]
(in %)

OCCUPATIONS	*1980*	*1982*	*1984*	*1986*
1. Engineers and Technicians	**10.14**	**10.16**	**8.76**	**8.24**
Engineers	1.17	1.31	0.76	0.59
Electronics specialists	0.03	0.04	0.02	0.01
Systems analysts	0.16	0.29	0.17	0.12
Technicians and draughtsmen	7.21	6.88	6.80	6.75
2. Managerial and administrative staff	**12.91**	**13.19**	**9.08**	**7.40**
3. Blue collar workers and foremen	**72.37**	**71.84**	**78.64**	**80.76**
Foremen	3.28	3.65	4.31	4.37
Skilled machinists	7.62	8.22	9.34	8.33
Mechanical repairers	3.15	3.20	2.67	3.06
Electro-electronics repairers	2.65	2.81	2.51	2.23
Semi-skilled production jobs[2]	27.89	27.17	34.49	38.66
Unskilled workers[3]	8.65	6.12	8.05	6.46

Source: RAIS, Brazilian Ministry of Labour.

[1] Data for 1980/1982 refer to Fiat, GM and Ford whereas 1984/86 data also include VW. Therefore comparisons should be made only between 1980 and 1982 and between 1984 and 1986.

[2] This category includes assemblers, welders and painters.

[3] Unskilled workers include line-feeders, handling workers and cleaning workers.

absolute and in relative terms [Schmitz and Carvalho 1987].

In maintenance, there is a glimmer of post-Fordist employment practices. In contrast with the situation of production workers, the strategic importance of maintenance workers is increasing and the content of their jobs is being enhanced in the new labour process.

The reasons for this are mainly technology related. In the case of the new lines, the cost of breakages, malfunctioning of equipment and stoppages is higher than on the old lines, for several reasons. The high cost of interruption is the new point of vulnerability in production. Hence fast and reliable repair and maintenance has become a priority under production conditions where breakdowns are frequent. The crusade against lost production time is on.

Maintenance workers welcome the new technical challenges of their job, in spite of increased stress stemming from pressures to rectify problems quickly. Indeed, what comes out of our interviews is the upgrading of maintenance skills. Contrary to what the international literature suggests, this is even true for mechanical maintenance. But the main growth area is in electronics. There are new occupations in this field which are more skilled than those concerned with electrical maintenance on the old line. The new knowledge required is both theoretical and practical. Studying the manuals for the electronic equipment is part of the daily work. Then there is a whole range of new practical activities and skills which make electro-electronic maintenance the key point for the continuous functioning of the line. In order to develop maintenance skills, management has stepped up investment in training.

Management's concern with reducing downtime and improving quality brings to the fore the question of trust and reliability of the labour force. Yet, it is here that contradictions arise between production strategy and industrial relations policies. The new goals of production — high quality and minimum interruption — require a high commitment of both maintenance and production workers. In order to develop this commitment, the car firms tried what they call a 'new approach' to industrial relations. In theory this includes management's commitment to the stability of the workforce and the disposition to negotiate with workers' shop-floor commissions on matters of work organisation and labour relations. The change in approach also represents an attempt by industrial relations staff to adapt to the strengthening of the Brazilian auto-workers' organisation.

In practice, however, the 'new approach' has not taken off properly. Fordist work organisation still fuels

conflicts between workers and management. Given the high dependency of production on the work done by manual workers, the level of employment is still geared to the level of output. Thus labour turnover continues to fluctuate along with the economic cycle, though at lower rates. The fragility of the new policy is underlined by an incident in the most advanced car plant: following a strike in 1986, management banned the workers' council (comissão de fabrica) and fired all its representatives. Therefore, in industrial relations terms, there is a blend of old and new. While the promoters of the new approach are likely to increase their influence in management in the years to come, a move away from Fordist work organisation (for production workers) does not seem to be on their agenda.

4. Conclusion

Caution is necessary in generalising from this case study, but it is worth remembering that it focused on the most advanced firms of the largest car industry in the Third World and that the world car industry is at the forefront of the new technological and organisational changes. Certainly, scenarios of rapid diffusion of programmable automation in countries of late industrialisation need to be questioned [Shaiken and Herzenberg 1987, Corona 1986]. With few exceptions, automation is likely to remain selective in these countries for the foreseeable future.

In the course of selective automation, Fordism has been strengthened. In putting forward this conclusion, we are not arguing that Fordism is politically desirable, but that management in the Brazilian car industry perceives it as the most efficient form of work-organisation. A key question is whether this strategy is compatible with maintaining international competitiveness. The answer is not clearcut, but tends towards 'yes'. Exports of Brazilian cars and engines have grown steadily in the last 15 years. However, it is necessary to qualify expansion. The bulk of Brazilian exports continue to go to developing countries. The exports to advanced countries have substantially increased, but in these markets Brazilian cars compete in the lower segments. This seems to be the market strategy ascribed by MNCs to their subsidiaries in Brazil. The search for quality improvements in Brazilian car firms has to be seen in this context.

Even so, there are examples of enormous improvements in the 1980s. For instance, Silva (1988) shows that certain cars made in Brazil score better than their British equivalents in a quality assessment carried out in 1986. Such competitiveness results from a strategy which combines cheap labour, selective automation, the introduction of quality programmes,[6] skill enhancement in maintenance, and Fordist work organisation in production.[7] The particular nature of this combination suggests that the international diffusion of best practices — either technological or organisational — passes through adaptation to the conditions of host countries.[8] To conclude with our main point, at a time when the international debate favours the end of Fordism, we must not lose sight of the fact that Fordist work organisation is being reinforced in some new centres of world industry.

[6] On the utilisation of quality programmes, see Carvalho (1987) and Silva (1988).

[7] This is what our research has revealed about the strategy actually adopted by MNC subsidiaries in Brazil. It is hard to predict whether this strategy would be viable if the Brazilian car industry were to improve even further its competitiveness in order to be able to compete in the most exigent segments of the world market.

[8] This seems to confirm Jürgen's (1989) findings regarding the international adoption of Japanese management techniques.