

# Fordism and New Best Practice: Some Issues on the Transition in Brazil

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## Introduction

This article is an exploratory essay on the possibility of changing the Fordist way of organising production processes towards greater flexibility. The specific issue we seek to explore here is whether the changes that have been occurring in many factories all over the world can be considered a major transformation of the Fordist paradigm or whether, if they have actually occurred, they represent merely a change — whether radical or incremental — within the Fordist mode of production. These questions are treated theoretically in the next section.

In the third section, we try to illustrate some of the changes that have been occurring in some firms in three sectors of Brazilian industry: pulp and paper, footwear, and automobile assembly. These cases have been examined in recent studies but not from the particular perspective mentioned above.

Some conclusions are presented at the end of the article. They are still provisional since precise statements on the transformations we are dealing with require more detailed research and further empirical studies in other sectors. Any generalisation based on these case studies must be treated cautiously, because what is happening in a few factories does not necessarily represent the national situation.

## New Best Practices: Beyond Fordism?

In spite of the differences among authors regarding what has really been happening in the logic of production distribution and consumption in the last 15 or 20 years, it is obvious that something very important has occurred. This involves the way production is organised and the nature of the means of production, as well as the way in which they are combined in the present stage of capitalist production.

Nevertheless, merely noticing that something is changing is not sufficient. In order to evaluate and qualify these changes, it is necessary to:

- (a) identify which kinds of transformation have occurred in production in capitalist economies and firms since the beginning of the 20th century;
- (b) comprehend under which particular conditions the new forms and logic of production

organisation are being defined, redefined and implemented on the shopfloor, as well as at the level of the factory and the firm;

- (c) identify the conditions under which the new technologies and forms of organisation can be diffused in firms, sectors and countries. In other words, what are the particular conditions for the diffusion of the 'new best practice', as compared to the old ones?
- (d) identify areas of conflict between the 'new best practices' and the old practices that continue to be utilised. The transition between old and new practices is characterised by particular environmental conditions in which firms operate. Thus, economic, technological, social, political, organisational and cultural aspects must be taken into account, as well as the particular combination of these aspects which exercise an influence in each sector, firm and factory. It is important to point out that the conditions under which the new best practices were developed cannot be easily reproduced elsewhere. This does not mean that the same conditions must exist to provide change. Rather, it means that to achieve improvements it is always necessary to adapt and often to create anew. The result may sometimes lead to something rather different from what was anticipated.

The old practices have variously been termed 'Taylorist-Fordist Paradigm', 'Fordism', 'Mass Production' or 'Machinofacture', depending on the author. The new practices have also been ascribed differentially, depending on the aspects that each author thinks are more important, 'Post-Fordism', 'Flexible Specialisation', 'Systemofacture', 'Systemation', 'Japanese System', and 'Just-in-Time System'. In this article, we will name — for the sake of simplicity — the old and the new production systems 'Fordism' and 'Flexible Production' respectively. We will try to point to some aspects that must be considered (and further developed) in order to better qualify the differences between the old and the new form, and to understand the constraints and motivations of transition in the Brazilian environment.

Fordism can be regarded as a consistent set of rules that configures a particular form of organising production and as a cultural pattern that has affected

the logic of managerial decision-making since the early 1920s. It has been widely diffused as the paradigm of decision-making in both capitalist economies and centrally planned economies. However, as a concrete form of production and work organisation, Fordism has not been applied in all types of factories and firms. As a set of rules for organisation it was developed to achieve the highest efficiency and the greatest economy of scale in the mass production of discrete, nearly standardised goods. At the same time, its success demanded the growth of a large consumer market for mass produced goods.

However, Fordist practices were not as thoroughly diffused in the processing industries, nor in a wide range of small firms that produced special purpose goods on a one-off basis or in small batches (mainly capital goods). In this sort of production, the skills required from the workforce were completely different from those in the discrete mass production sectors which utilised unskilled workers. Moreover, the flexibility of this kind of production system was, and still is, a major characteristic that has defined the nature of production in these sectors.

Fordism may therefore have become the dominant and most widespread form of production, and non-Fordist forms of organisation may have become dependent on Fordist firms as suppliers. But it is important to note that Fordism did not become the only way of organising production. Even within mass production firms in the automobile sector, pure Fordist principles have not been adopted as 'inflexible laws'. It is illustrative of the fact that some technical knowledge about everyday operations has always remained on the shopfloor, and has been critical for the efficient operation of factories [see Senker 1986].

Although we have dealt only superficially with these points they are important in understanding the emergence of Flexible Production. Whether this represents a real revolution in the capitalist process of production, and whether it is likely that the new paradigm will substitute for Fordism are difficult questions to answer at the moment. This is not only because the diffusion of new forms of organisation is varied, both amongst countries and amongst firms and sectors within countries, but because the new system incorporates some fundamental aspects of the old one, whilst adding new features, so that it is sometimes difficult to distinguish it from the old system. As was pointed out before, even the Fordist paradigm was not homogeneously scattered through the economy.

It is widely believed that it was in Japan that Flexible Production really matured. But it is also important to remember that Japanese firms started by trying to improve the American system of production (namely Fordism), investing in order to eliminate bottlenecks,

quality problems, long set-up times, etc. [see Freeman 1987 and Hoffman 1989].<sup>1</sup> Therefore, the Japanese began to create new answers to old problems in the domain of Fordism, trying to adapt Fordist rules to the Japanese conditions of raw material markets, labour market, economic structure, culture and historical patterns of behaviour, and to the new industrial policy defined by the Japanese state in the 1950s. The mix of specifically Japanese characteristics with the 'state-of-art' of the Fordist practices, plus the insertion of Japan in the international economy at that time, explains the way the new flexible production system began to operate in that country.

Since the mid-1970s, this new system of production has been the most efficient in terms of capacity to react to market fluctuation in situations of saturated demand, in terms of providing a speedy circulation of capital and in the rate of accumulation. It is interesting to note that in the early 1920s Fordism provided similar advantages in the context of the economic situation at that time.

To summarise this discussion, changes are occurring in different ways, on different shopfloors, in different firms and countries. The new system is more evident in precisely those sectors where the old system was used and where management has tried to develop it (as in Japan in the early years of reconstruction). However, accepting that the new system incorporates some features of the old one, it is not possible to conclude that the transition has already happened. Nor is the new configuration of production likely to be homogeneously diffused.

On the other hand, it seems quite clear that, as a framework for thinking and deciding about production and work organisation, the new system is widespread. Thus, there may well be a higher speed of diffusion in the domain of management thinking than in the real organisation of factories. In other words, it seems that along with the new logic for quality management, inventory management, layout, automation, workforce utilisation, reskilling, etc., there is a wide gap between the ideological dissemination of the new system, and the concrete situation in each kind of production process. As we will see, this is readily apparent in the case of Brazilian industry.

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## Three Cases of Technological and Organisational Change in Brazil

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### Pulp and Paper

This sector is illuminating because it is a relatively highly automated one. Continuous flow processes in

<sup>1</sup> It is interesting to note that some of the techniques adopted by Japanese firms and the global policies adopted by Japan just after the Second World War were introduced by American government personnel during the occupation period, as well as by advisers and professors from American Universities [see Freeman 1987].

general, and the pulp and paper sector in particular, can be characterised by a relatively fixed sequence of machines which perform physical and chemical transformations of the raw material into a final product. Thus they can be roughly described by a set of changes in the property of raw material rather than changes in format that characterise both the batch and mass production of discrete products. These 'changes in property' are produced by equipment that embodies a wide range of automatic facilities and automatically performs a sequence of different tasks during the production process. Other examples of this kind of production system are food processing, petrochemicals, steel, glass, and several other basic industries.

From the organisational point of view, the labour skills required in this kind of process are very different from those required in the discrete products sectors. It is very difficult (and generally impossible) to adopt a Taylorist/Fordist model of work organisation in such sectors, since the type and timing of interventions in production are frequently unpredictable. It depends on specific process variables (such as temperature and pressure) which sometimes do not follow the programmed pattern of the process machines. When this happens, operators have to intervene in machine regulation, and this kind of intervention defines the main activities in the continuous flow process plants.

In these cases the labour process can be characterised by a much higher level of skills and self-control initiatives than those in the discrete products sectors. The responsibility and importance of quality aspects of the process have been a crucial issue in these firms from the beginning.

However, the recent wave of technological innovations based mostly on microelectronics has brought some important changes in this kind of production process. In the traditional technology the equipment has been monitored by skilled workers, and now the DDCS (Distributed Digital Control Systems), recently developed by some suppliers, is beginning to automate most of the monitoring activities. These DDCS systems consist of a large set of sensors scattered in the machines and connected to a main computer that can auto-regulate the physical and chemical variables on-line [see Marx 1988 for more details].

### **The Market Strategy Issue**

In Brazil, pulp and paper production is oriented to both the internal and external market. Although the major percentage of production goes to the internal market, increasing attention has been given to the external market for several reasons:

- a decrease in the traditional producing countries as a consequence of environmental controls;
- higher final prices in external markets as compared

to internal prices (which are controlled by government);

good local conditions for growing kinds of wood which offer much higher productivity when compared to those traditionally utilised by foreign competitors;

public incentives providing special credit schemes to this sector.

But in order to sell to the external market, firms have to improve productivity and quality to compete with foreign products. These two objectives can be better achieved through the use of DDCS.

### **The Flexibility Issue**

In the case of pulp and paper production, the DDCS has a limited role to play in flexibility. Each pulp plant produces only one type of pulp and each paper plant produces a very limited variety of papers (the pulp plant is always physically separated from the paper plant). In pulp plants, the DDCS has little to offer as regards product flexibility.<sup>2</sup> Although DDCS could control and monitor a large variety of machine operations in a pulp plant, it has been adopted only in those sectors which are considered by production management as process bottlenecks.

The major objectives that these plants are aiming at with the adoption of DDCS are:

- (i) Quality homogenisation, which differs from higher quality. It is designed to achieve the same characteristics in the final product, whatever raw material is used.
- (ii) Increase in productivity (always for the same product) through the reduction of raw material and process losses.
- (iii) Increase in production control (by centralising control facilities).

Thus, it seems that in this case it is not possible to talk about reduced economies of scale, increase in product flexibility and changes in machine purposes (from specific to general purpose) as regards the adoption of microelectronic tools.

### **The Labour Process and Skills**

DDCS provides the possibility of controlling the equipment from a remote room, since it centralises almost all information and also performs a variety of self controlled interventions. Thus, human intervention is decreasing in these plants. The traditional

<sup>2</sup> It is important to notice the variety of cases within one kind of production type. In the case of the Brazilian food industry, for instance, which is also based on continuous flow process production, DDCS has made possible the minimisation of set-up time since some plants produce different types of products and each one requires specific regulation of temperature, pressure, and so on. In those cases the DDCS can also reprogram process parameters automatically.

responsibility that was given to a work team is now concentrated in a single or double team of operators which can have an overall view of the plant and spends more time in simulations in order to improve the production process.

The training period for these operators is around two to four months in the firms visited and was done on an on-the-job basis. Operators were chosen from those who had more experience with the previous technology. Most workers whose role in the previous technology had been to verify measures and instruments in the field were displaced. But it is still necessary to have more than one skilled worker in the team, since frequently some inspections based on the worker's judgement are required.

Thus, to compare what is happening in this case to the batch and mass production systems we can point to the fact that in this sector, multiskilling and group responsibility have long been important requirements in production. The new technologies based on microelectronics do have some consequences for work organisation. But these plants have never been organised on the basis of the Taylorist/Fordist paradigm. Nor is it possible to observe something similar to Just-in-Time process organisation in either the old or the modern pulp and paper plants.

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## Footwear

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The footwear industry in Brazil includes a very high number of firms which produce leather, sport (canvas and leather), plastic and rubber shoes. For the purposes of this investigation we will consider only the leather footwear industry, although a few firms produce more than one of the types of shoes mentioned. In part this selection is because of space constraints, but it is also because leather shoe factories illustrate best the case of a technologically mature sector which has a strong position in the international market.<sup>3</sup>

Unlike the other sectors analysed here, technological frontiers in the footwear production process are moving at a slow rate and with little integration or automation of the production process. Computer Aided Design (CAD) systems can be used in design, and microelectronics have been applied at a few isolated points of the production process. But these technological changes have little effect in reducing labour intensity. The strongest constraints on a high degree of integration and automation are the absence of homogeneity in leather and the complex movements the shoes have to undertake when they are being manufactured.

The fact that the process is labour intensive has

<sup>3</sup> For more details of this sector see Alves Filho, 1988, where the production of plastic and rubber footwear production is also described.

important consequences. First, the comparative advantage of low wages in Third World countries has determined their role as international suppliers of this product. Second, the industry is highly competitive because there are few entry barriers. Third, the quality of shoes is mainly determined by leather quality and by labour skills. And fourth, the coordination sphere, or more specifically production (and work) management and control, is important in improving the firms' performance.

It is interesting to note that the footwear industry presents a good example of a case where a change from the Taylorist-Fordist way of production towards a more flexible system has at least a theoretical chance of implementation in the future. The design and production of several fashion models, in several sizes, generally in short batches, and produced under customer orders require a great degree of flexibility. But let us see whether a more flexible approach is really being introduced, and under what conditions.

## The Market Strategy Issue

The most important changes that have occurred in the Brazilian factories over the past two decades are the increase of exports and the more intensive use of synthetic materials. These changes opened up the possibility of two basic market strategies for bigger firms: (a) to orient almost all production to export markets, which implies manufacturing large batches of all-leather shoes,<sup>4</sup> and (b) to orient production to the internal market, which implies manufacturing small batches of a wide variety of models, some of them with synthetic components. There are combinations of these strategies, but the changes in the organisation of production which we will illustrate below were implemented by two of the most successful shoe manufacturers; one of them is a follower of the first strategy, the other a follower of the second.

The reasons behind the former strategy are the profitability of the external market (which varies as a function of the exchange rate) and the cost reductions that can be achieved by producing larger batch sizes. The second strategy is justified by the stability of demand from the highest income class of the internal market, especially for fashion models of shoes.

The two manufacturers have implemented two quite different ways of organising production, not only as a function of the strategies above, but also because they implicitly assume two different paradigms of production organisation. It is important to emphasise that the firms do not differ in the process or equipment used. Moreover, both firms are amongst the biggest and most profitable in the industry.

<sup>4</sup> Since nearly 85 per cent of exports are destined for the USA, where the retail network is highly concentrated, followers of this strategy can produce batches of about 3,000 pairs of shoes. This is more than 10 times the average batch size in other firms.

## The Flexibility Issue

The Taylorist-Fordist production paradigm has been applied to the footwear industry from its inception, and there are many reasons for its long experience. The issue which is interesting to highlight here is that economic factors (such as the increase in international competition) did not provide adequate stimulus for a change in the organisation of the production process. On the contrary, as we can observe in the case of one of the biggest shoe exporters, the export-oriented strategy was an opportunity to refine further the Fordist style of organisation. The managers of this firm chose to group together some operations which were separated and individually done beforehand on an assembly line. It is clear that the paradigm of imposed rhythm of work lies behind the logic of these changes.

The other firm, oriented to the internal market, perceived the requirements of more flexibility that this strategy required and reorganised the process (mainly the stitching room) according to manufacturing cells. This was done without any change in the degree of automation. It must be noted, however, that only a few shoe factories have reorganised the production process in this manner, and that the Taylorist-Fordist paradigm is still predominant. We can conclude that flexible organisation in production is still at the beginning of its diffusion process.

## The Labour Process and Skills

The cases described above indicate that there are different ways of organising work and production, even in the context of a traditional technology. As we have mentioned before, work control and production management in the footwear industry have great importance because the rhythm and quality of production is still dependent on the labour force. But in each case this problem has been approached and tackled according to different paradigms.

It is interesting to note that the changes under the same paradigm, as in the case of the exporting manufacturer, are much easier to implement provided that other conditions remain unchanged. The Fordist form of production does not require complex alterations in the management and control of work and production. It does not require big changes in the structure of jobs, in time and method studies, and so on. But the change from the Fordist to a more flexible way of production, as in the case of production cells, requires that almost all production and work organisation has to change accordingly. The allocation of production has to be different, as well as the structure of jobs, the division of work, etc. Therefore, management effort has to be much greater in this last case.

These examples illustrate that although there is a strong requirement for flexibility in the footwear

industry, the rate of diffusion will probably be very slow. The relative success of the Taylorist-Fordist way of organisation, which is supported by other unchanged conditions, provides for some continuity in the leather footwear industry.

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## Automobile Assembly

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The automobile sector in Brazil consists of four transnational firms concerned with car assembly and a wide range of automobile parts firms, some nationally-owned and others transnationals (this excludes the assembly of trucks, buses and other kinds of mobile vehicles).

Zilbovicius (1987) presented the results of a research project carried out between 1986 and 1987 in the biggest site of the biggest assembly firm in Brazil. The case study dealt with the process by which microelectronics-based automation technologies are introduced into the firm, trying to analyse the logic and strategy of the incorporation of the new technology and of some organisational techniques associated with a Flexible Production System. We tried to grasp this logic and strategy by means of an understanding of the role and extent of local engineering directed to the implementation of such technological changes.

As in other countries, it is in the automobile sector that the new automation technologies have been incorporated with greatest speed. Moreover, this sector has been one of the main sources for the diffusion of technologies in Brazil.

Two aspects were considered to be relevant to the understanding of the process of change taking place in the plant and to the definition of the strategy of the company:

- (a) Technological change in the plant is oriented to achieve what might be called 'the international paradigm of the automobile sector'. Briefly, the rigidity that characterised this industry is giving way to flexibility and the systemic integration of all production activities. The new international paradigm is linked to a new competitive situation in the international automobile market, involving supercompetition and market saturation. It is clear that the firms that have adopted the new paradigm more rapidly perform better in productivity and market share.
- (b) The plant studied in Brazil conforms in some respects to these trends. But the conditions in the internal market do not justify the full implementation of this strategy. Because of the technological link between the European headquarters and the Brazilian plant, the technological paradigm is similar, because the main source of technological information for the

Brazilian site is — and was — the parent company. But adjustments have to be made in a situation of rapid change from old to new practices and the affiliate, working in different conditions, has to cope with a different environment. This leads the local managers to fight for an export-oriented strategy as a way of justifying to their headquarters the necessity of increasing the speed of local modernisation — and the corresponding necessity for more investment.

Given this framework, the technological change that is taking place is characterised by an *incremental* adoption of innovations in the direction of automation, without an overall strategy towards systemic, computer integrated automation. This has to do with the instability of the internal market in Brazil and with the consequent lack of interest of the headquarters in high investments. It also reflects the existence of some technological and organisational obstacles, given the present situation of the plant (built in the 1950s, with a rigid layout, little product differentiation, inadequate layout for some new machine systems), that make it difficult to adopt the technological innovations that already exist in the parent's European plants.

Most of the innovations implemented in the manufacturing sphere are linked with the *reduction of lead-times* (set-up times and operation times).<sup>5</sup> Some lead-time reductions, however, are causing increasing levels of intermediate inventories (for example, between presses and body building). This is clearly a consequence of the incremental form in which the new practices are being adopted. Although reducing these intermediate inventories is an aim of the managers, it is not being achieved because of the confusing flow of the process in the existing layout.

Other innovations are justified by the engineers as necessary to *eliminate decision-making processes on the shopfloor*. From what managers said, this must happen 'in order to incorporate the decisions and information into the computerised systems'. But it is not easy to capture the difference in the way workers did their work before the introduction of new programmable equipments (robots, multiwelding machines, etc.). The same engineers observed that there are some places where decisions taken by workers are important (as in the engines line) and can lead to a reduction in reworking. This reduction is another important aim of the firm, as it represents a reduction of work-in-process and better line balance. Other research carried out in the same plant [Carvalho 1987] revealed that the immediate result of the introduction of new equipment and systems was to increase the pace of production — despite the fact that the decision to modernise was taken as a learning

experience.

*Flexibility* is aimed for in two senses: to provide the possibility of short term changes in the mix of products and — more important in this case — to provide for the possibility for future changes in product lines with smaller investments. Although computer controlled machines can achieve a better level of quality, they tend to be used in a rigid way; flexibility will be important only at the moment of changing the product.

In the coordination sphere one of the most important innovations is an information system which is supposed to provide an efficient synchronisation between all the production lines (bodies, engines, wheels, seats, etc.) as well as within each line. This is a very important aspect of flexibility since it allows quick changes in production, decreases losses of materials and integrates all the production flows.

In the design sphere the modernisation that took place was very poor and slow. Some CAD systems are being installed in product and process design areas but in general design occurs abroad or is undertaken without intensive computerisation.

The design sphere has a very important role in the modernisation process. The work of engineers is dependent on the information flow from headquarters. But at the same time, the engineers have (and ought to have) some autonomy in taking decisions about the implementation of innovations, given the differences between a plant that they know very well (most having worked more than 15 years in the company) and the plant where the headquarters' engineers work. However *this autonomy is restricted by the technological choices made by management*. These choices are not explicit for engineers; they try to anticipate them in order to take the decisions expected by management.

In this way, the engineers, and especially the process designers, constitute the heart of the transition in the plant, as they have constant contact with senior management and the long term strategy (even if it is not completely clear to them) of the plant and international group. In addition, they also have contact with the shopfloor and workers. In this way, the process engineers have to develop a new form of technology, in the sense that they are not only 'tropicalising' the technology that comes from abroad (as they did before), but are creating a particular technology that attempts to modernise a 'brownfield' site operating in the context of severe instability.

Finally, it is important to point out that it became quite clear that, along with the modernisation of the factory, a parallel movement of cultural 'modernisation' of engineers and middle managers is occurring. In this way, the changing process depends on the consolidation of an implicit set of values. As one engineer remarked, 'eu penso automatico', which can

<sup>5</sup> See Kaplinsky 1984 for the framework on spheres of production and levels of automation that was used during the research.

be translated 'I think automatically', but can also mean 'I always think in terms of automation'. The new system requires a new framework for thinking, in which local engineers and middle management must believe that the decision is under their control. Without the development of this (implicit) ideology, the changes would be doomed to failure.

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## Some Conclusions

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In this article we have tried to show that the transition from the Fordist/Taylorist approach to Flexible Production is not a trend that can be applied to all sectors, firms and plants.

In Brazil's case, if we consider the main sectors which are facing technological and organisational changes, it is possible to point to two major issues as overall conclusions:

(1) The modernisation wave is taking place mostly in externally oriented sectors (cars and car industry suppliers, military weapons and some others). In general, the traditional sectors do not seem to have strong reasons for changing to flexible production systems, although some specific case studies can show quite different situations.

In the footwear sector changes are occurring in a way which challenges some modern themes. Firms producing for external markets are becoming more and more Fordist while others, oriented to local markets, are trying to implement some new organisational approaches like machine cells and group technology. There are no incentives for the entrepreneurs to adopt microelectronics based machines or to design and implement completely new and modern plants.

(2) There is little evidence of a radical shift towards

flexibility in any sector. Firms are changing in a slow step-by-step pattern, due to local market instability and the restricted supply of capital.

The car industry as a whole presents what is called an international process production paradigm. But although this paradigm affects a specific plant in Brazil, changes are occurring at a slower pace compared to its international affiliates. It is not possible to conclude that this plant has changed its traditional Fordist form of organisation on the shopfloor. Brazil's economic situation and local market instability do not allow more investments in modernisation.

In the case of pulp and paper we can conclude that these plants have never been Fordist/Taylorist in essence and, if some changes are now occurring, they are not related to flexible production, economies of scale or economies of scope.

Of course it is not possible to generalise from these conclusions. As mentioned earlier, we can observe different technological and organisational strategies within the same kind of production process or sectors. These variations increase if we consider firms that differ in size, origin of capital and plant localisation.

Although Flexible Production is becoming real in some specific sectors, places and even countries, all the above factors strongly affect the feasibility and the pace of diffusion of technological and organisational changes. Moreover, benefits of new organisational techniques and technologies do not seem to be appropriate for every firm or sector, whatever its environmental conditions. On the contrary, it depends, at the same time, on the particular situation of each firm (considering its internal and external constraints) and on the logic of the implicit paradigm on which the management bases its decisions and strategies about production organisation.