DYNAMIC CAPABILITIES, GROWTH AND LONG-TERM COMPETITIVENESS OF EUROPEAN FIRMS: A DIAGNOSIS AND THE IMPLICATIONS FOR EU POLICIES

A critical review of the major analytical perspectives on competencies, organisational learning and innovation, and the relationship between technological and organisational change.

by

Bruno Bezza
Faculty of Political Science, D.U. of Industrial Relations
University of Florence at Prato

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Introduction

This critical review sets out the major traditional and contemporary theoretical approaches to sociological, behavioural and organisational studies. The complex material has been divided into different sections encompassing various sociological hypotheses.

The first section is divided into three parts. The first examines studies whose analyses are based on technology and the evolution of skills. Included in this part are the French sociological traditions that culminate with Touraine and the work of Friedman and Naville; the focus of their debate is the destiny of human labour and the historical context of technology. In the second part we analyse the Anglo-American Marxist tradition founded on skills robbery. The essential ideas here are consent, conflict and the dequalification of human labour; not only is technology not contextualised but it is always regarded as exogenous to labour organisation. The third part of the paper focusses on the *new orthodoxy*: flexible lean production, flexible specialisation, industrial districts - the historical alternatives to mass production. Those who have been contributing to this sociological debate come from differing experiences and the solutions and analyses they propose are consequently also different; what unites them is a hyperoptimistic vision of reality that induces them to under-estimate certain organisational phenomena regarding there re-organisation of production and division of labour.

The second section of the paper analyses the organisational project which forms the basis of investigations that business historians, mostly Chandler, have conducted. These investigations are based on the proposition that technological innovation and change come about in response to organisational changes in a firm. Here we come across Chandler's analysis of dynamic capabilities: the relationship between strategy, structure and external capabilities.

Chandler and his school were among the first to demonstrate - supported by powerful empirical evidence - the part played by economies (infrastructures and knowledge banks) and external capabilities (diffused knowledge, local learning etc.) in the growth of a company and in the development of its strategies. The relationship between strategy and structure has taken on an importance that was unknown in the 1970s, despite some noteworthy precedents (Penrose, 1980; Marris, 1966).

Nevertheless Chandler's work was carried out in a context dominated by contingency theory and his earliest works were exclusively limited to analysing large corporations, tracing their origins and the modalities of their economic success. It was not until *Scale and Scope* that he looked beyond the specific situation of the large corporation in the United States.

The third section re-examines organisation and interpretation theory as enunciated by various schools trying to discern the placement and attributes of players. Competencies and tacit skills are revealed here, not only in the more orthodox sociological conceptions but also in the so-called humanistic approaches.

Finally, the fourth section is dedicated to learning methods as found in the studies carried out by Simon, March and Weick. Here, we analyse the oxymoron of organisational learning (Weick and Westley, 1996): "to learn is to disorganise and increase variety; to organise is to forget and reduce variety". We draw attention to a series of tensions between organisation and disorganisation, explanation and exploration, and the need to balance them.

The problem of competencies conditioned by the division of labour and the internal labour market, and which marked out the divisions of organisational boundaries for sociological analysis, has already been tackled by sociological literature itself. In fact sociologists often speak of occupational communities as having their own competencies and distinguishing features and which form their own power groups within an organisation. (Barley,1991; Gherardi, 1990; Kunda, 1986; Van Maanen and Barley, 1984). Within the occupational, professional or practical community, competencies and professionalism, organisational ways of thought and extra-organisational life styles, are all shared. Other disciplines have reinforced these assumptions of organisational sociology; the cultural psychology of organisations, for example, provides a strong cognitive basis for the analysis of work groups in their daily functioning: 'communities of practice' (Zucchermaglio, 1995:246-51). Lave and Wenger (1991) and Jordan (1992) had already emphasised that practical communities are those characterised by long-lasting relationships between people, activities and representational manners and in which informal groups come into being, based on the sharing of methods and procedures of how things should be accomplished and events interpreted.

Turning to organisational competencies, economists and scholars of business phenomena refer to 'competency' as a measure of the efficient utilisation of resources, often in relation to the application of organisational processes designed to help the organisation achieve desired goals. Competencies in that sense are tangible and intangible processes based on information and capabilities that are specific to that firm and that have developed over

time by way of a complex interaction among the firm's human resources (Amit and Schoemaker, 1993; Cohen and Sproull, 1996; Grant and Spender, 1996). This concept of competency in managerial practice represents “what the company knows how to do” and “its limit” (Dosi, Teece and Winter, 1990). Such practices can be identified and recognised on the basis of the standard classification of the firm's activities: for instance, its specific ability to carry out a defined activity such as distribution, marketing or supply. In other instances these practices can be understood as the firm's capacity to improve one activity such as product innovation, flexible production, responsiveness to market needs etc. They can also be understood as the expressive routine of the capacity to change (Teece and Pisano, 1994; Anderson and Tushman, 1990).

If competencies are based on specific abilities then they can generate specific assets, and on that basis the list of competencies has been gradually enriched to include capacity of integration (Lawrence and Lorsch, 1967), flexible integration of external competencies (Grant, 1996), the capacity to assimilate competencies from others (Cohen and Levinthal, 1990) and the capacity to combine and co-ordinate competencies existing in separate organisations or actors (Kogut and Zander, 1992). The list has been enriched to the point where it can be concluded that the competitive advantage of a firm consists of the possession of one or more unique competencies (Prahalad and Hamel, 1990).

Taking another approach, the literature of industrial sociology has concentrated on the actual contents of labour and its implications for the productive process. Only recently has industrial sociology considered organisations in their entirety; for a long time it was the study of occupational communities and working class labour facing technological change that constituted the major thrust of industrial sociology, and consequently the structure of internal labour markets in single firms was studied from the view point of upward mobility and the analysis of working class conflict.

Granovetter (1990) explains that among the sciences the role of economic sociology and still more of industrial sociology, has always been seen as residual (or to use an expression of Albion Small, *a residual science*) within the division of labour (Parsons, 1935). Labour sociology also developed independently of the theoretical debate taking place in economics and sometimes in sociology itself; the end of the neo-classical paradigm in economics and of functional structuralism in sociology renewed interest by sociologists in interdisciplinary co-operation and in overcoming the failure of the ‘economy and society’ research programme laid down by Weber and Parsons (Swedberg, 1987).

This paper has the aim of tracing the most significant elements that have conditioned sociological, historical-economic, and learning analysis outside the strictly economic field over the last fifty years. The key terms we have used to construct our framework of interpretation are:

a. The traditional experience-ability-craft sequence adopted by most of labour sociology, at least up until the 1980s;

b. Strategy, structure and internal/external capabilities; conceptual ensembles that have been adopted by much of the literature dealing with the history of innovations and company history;

c. Variable models and micro-histories which have characterised contingency theory, justifying adoption of the concept of contingency in case analysis;

d. The relationship between means and ends: the crisis of the functionalistic models in sociology and the new theoretical approaches;

e. Organisational learning, i.e. skills and competencies as a collective and not an individual phenomenon.

From our standpoint the individual-organisation dichotomy takes on a particular interest as far as competencies and labour supply are concerned: organisational structure as a specific asset in the process of valorisation of competency, and strategy as the enactment of competencies possessed; the means-and-ends relationship as modalities of acquisition and demonstration of the competencies possessed and finally, organisational learning as a complex procedure for learning something different from what is already known.

Does this come about as an ordered process of implementation of knowledge possessed, or by using mechanisms to remove the knowledge possessed so as to introduce variety and knowledge-disorder?

1. The traditional experience-ability-craft sequence

The key theme of this debate is the relationship between technology and human labour or to be precise, the problem of the evolution of human labour when it faces technological change. Going back to Taylor and the post-Taylorists, the *experience-ability-craft* sequence is probably the most appropriate way of understanding this. For many of those working on these questions, Taylorism and technology are two sides of the same coin even though they have been set out under very different headings such as:

a. The reform of Taylorism (Human Relations);

b. The new humanistically-based managerial styles (Maslow, Herzberg, Likert, Argyris and others);

c. The historical contextualisation of technology and the alienation of working class labour (French sociology - Touraine in particular - Blauner, and others);

d. Skills robbery and 'making out games' (Edwards, Friedman, Roy, Burawoy and Braverman);

e. The new labour and the overcoming of Taylorism (Kern and Schumann);

f. The historical alternatives to Taylorism (Piore, Sabel and Zeitlin).

For a large part of French and Marxist sociology after World War II, industrial labour was assumed to be based on inherited artisan trades that evolved towards new types of crafts characterised by the use of more or less complex machinery that took over earlier skills. For motivationalists and human relations scholars the application of Taylorism to work represented an excess of organisational determinism that ignored human needs and personal growth.

These theorists maintained there was too much emphasis on efficiency (both technological and/or organisational) and not enough on effectiveness and satisfaction (such as personal development, co-operation between individuals and organisations, an ascending scale of needs, design of the organisation, and so on). From the standpoint of competencies analysis the French attitude was no different from the general organisational principles set out by Taylor and Fayol, since with the sole and only partial exception of Touraine, the French still accepted the exogenous nature of technology whilst failing to deal with the non-identification *(alteritas)* between human labour and organisation goals (Alvesson, 1982).

For some radical analysts a relationship connects the alienation of mechanised and compartmentalised industrial work, from which any need for quality or competencies has been eliminated, to the traditional artisan model. De Tocqueville (1835: 577) observed that when a worker is required to specialise in fabricating one single component he "ends up being able to do his job with remarkable agility" but he then "loses the general capacity to face his work with spirit". With an increase in ability comes a decrease in capability. In the 1950s Homans was able to acutely observe that the division of labour contained a limit beyond which it began to reduce its own advantages. Accornero added that in the post-Fordist phase of new modes of lean production, the problem raised by Homans remained exactly as it was. With various differences of emphasis we find the same idea again - well

documented in the literature - set out by Braverman (1974), Blauner (1964), and by Piore and Sabel (1984).

Forcing these analyses somewhat it could be said that the classical theory of organisations both in its English-speaking and French forms (Taylor, 1913, and his followers[1]; Gulik and Urwick, 1937; Urwick, 1945 and Fayol, 1916), did not consider human behaviour a problem. Dissenting attitudes and behaviour that were observed were not the result of irrational attitudes by individuals pursuing strategic behaviour divergent from disciplinary standards, but of poorly devised labour and organisational structures. According to Taylor the human factor could be 'de-problemacised' and 'de-contextualised' by good organisation.

It was not until later that human action as an inherent factor in organisations became the centre of numerous studies (Friedberg,1993). Two opposing schools of thought have emerged in the last forty years. The first has its roots in studies on human relations and is concerned with the progressive broadening of conceptions inherent to motivation, restoring in the individual a minimal threshold of autonomy with respect to his/her psychological needs and personality; this results in the formation of a relatively unpredictable and complex agent (Bennis, 1966). The second is concerned with the relativity of the classic notion of rationality, following a path laid out in the early writings of Simon (1947, 1955b and 1956) and March and Simon(1958).

Technology and the evolution of abilities

The central problem faced by French sociology after the Second World War was a harsh critique of Taylorism (Friedmann, 1963, 1946 and 1964; Friedmann and Naville, 1961; Touraine, 1955; Crozier, 1963) constructed along lines first traced out by Maurice Halbwachs (1913).

The American organisational model (in Europe the Taylorist scientific system of piecework was commonly known as 'American piecework') spread rapidly in all developed countries and reigned unchallenged until the1970s.

As Locke affirms (1996), the Taylorist-Fordist factory was run on the basis of the scientific organisation of labour: a hierarchically-run system neglectful towards its employees in spite the idea of 'human relations'. It was also based on a general-generic

[1] E.g.: F.B.Gilbreth and L.M. Gilbreth (1908a, 1908b, 1909, 1911, 1912, 1914, 1916 and 1917), and H.L. Gantt (1916). For a review on the debate and climate of the era to the dawn of Taylorism see D. Nelson (1975 and 1980) and Wrege and Greenwood (1991).

education that focused on operational research and was taught by excessively technical management schools. In Germany and Japan the conception of management training and owner-manager co-operation was somewhat different from the American Taylorist model followed in most of western Europe. This was partly due to socio-historical factors and partly to differences that go back to a distinction made by Chandler (1990) between the managerially competitive capitalism of the United States and the managerially co-operative system adopted in Germany.

The A-B-C evolutive-technological scheme described by Touraine (1955) for improving the qualification of the working class has affected, in a positivistic sense, the development of many analyses of working class labour. According to Touraine's diagram there is an obligatory sequence of consecutive levels of worker qualification, determined by technological changes in operational machinery: universal and multi-use in phase A, specialised and mono-use in phase B, automatic and transfer in phase C. The artisan of the past corresponds to phase A; the skilled worker (in French, *specialisé*) to phase B and the quality control worker to phase C. Touraine's work gave rise to two main interpretations: the first, strongly positivistic, took his techno-evolutionary analysis to be an irreversible sequence that would bring about the growth of a new 'technicalised' working class (Mallet, 1964)[2] that would co-manage firms. The second interpretation, founded on technological determinism, attitudes, professionalism and class-consciousness, was derived exclusively from technological variables (Pizzorno, 1978; Maurice, 1980).

The data obtained from research in the new area out by Touraine is principally concerned with continuous processes in the steel industry[3] and gave contradictory results with regard to the authors' expectations; it turned out that technical change did not necessarily determine a need for better skills.

At the time, Naville (1961) made a summary of some empirical studies conducted in previous years and concluded that a need for higher qualifications would intensify conflict in the factories. Mallet (1964), in his investigation of some continuous-process plants, concluded that with higher skills, workers would demand participation in management of the firm.

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[2] See the fundamentally important review in P. Thompson (1983).

[3] See Popitz, Bardt, Jüres and Kesting (1957) on the steel industry in Germany; Walker (1956) on an automatised steel mill in the United States; Dofny, Durand, Reynaud and Naville (1957) on the French steel industry and the company case work developed by Bright (1958) in the United States.

In the United States, Blauner published his studies of alienation in four industrial sectors. He also described the continuous-process worker as a new subject spawned by advanced technology whose social personality would be assimilated into that of a new middle class[4].

Marxist tradition and skills robbery

The Marxist tradition of the professionalising contents of labour shows through in the works of Friedman (1977), Zimbalist (1979), Burawoy (1979 and 1985), Edwards (1979), Roy (1952 and 1953) and Braverman (1974). Braverman, probably the most well known, affirms that technological and information technology innovations imply a radical separation of design from labour and are therefore to be seen as the archetypal organisational form of monopolistic capitalism. At the centre of Braverman's analysis is an awareness of the increasing impoverishment of labour skills and of the original competencies possessed by the working class.

With regard to Braverman and remaining within the Marxist persuasion, the English writer Andrew Friedman (1977) and the American Richard Edwards (1979) have expressed other points of view. Friedman sustains that in order to overcome worker resistance to change, management focussed on lowering the level of the skilled worker that had developed during the previous ten years. He highlighted the myth of adaptation in exchange for status, authority and responsibility, classifying it as *responsible autonomy* (Friedman, 1977: 78).

Edwards (1979) concentrated on the control and consent techniques applied to those parts of the working class with the best skills and competencies. According to him we have passed from the direct control of working class labour by the factory bureaucracy to technical and technological controls materially incorporated into the structure of the working process. Along with this in-built technological control come regulations that mark the entry into industrial organisations of what amounts to an autonomous rule of law. As a consequence of this, said Edwards, over the years the conditions that would have permitted the development of worker consent (almost exclusively within the stronger and best protected part of the working class) have consistently increased whilst the weakest and marginal parts have hardly been looked after at all and are not favoured by these new mechanism of consensus.

[4] See the empirical research conducted by Zimbalist to show the increasing dequalification of the working class, 1979.

Labour process theory in the 1980s was dominated by the writings of Michael Burawoy (1979 and 1985). During the 1970s Burawoy decided to make observations as a direct participant and went to work for about a year in an automobile plant, following earlier field research undertaken by Donald Roy (1952 and 1953) who had worked in the same factory in the 1940s under an assumed name.

Roy's most important contribution, from which Burawoy's studies began, described 'making out games'. Bonazzi (1995) brilliantly summed up how these games worked:

1 - Production games originated in worker autonomy. They were spontaneous worker initiatives that take place within the leeway of freedom they had earned by finding ways to get around the formal rules. However the games also involved the participation of the immediately superior levels of the factory hierarchy, who took part knowing this was the most efficient way to keep the workers busy.

2 - Production games were played outside the job description and thus could also be played by those doing the lowest quality, most repetitive jobs; by taking micro-initiatives and using their cunning they too had the opportunity to get involved in something meaningful. For this 'making out' to be successful as a game it was necessary that (i) people would of course want to play it (ii) strategic development of the game would not be impeded by too much uncertainty about available resources (iii) the game did not become so difficult to play that workers would boycott it if, for instance, production targets were set too high.

3 - The games contained a risk: they could turn into a spiral of intensifying work if the Timing and Method Office (TMO) found out they were not challenging enough and decided to cut down the time allowed to 'make out'.

4 - The game depended on continuous conflict between the individual's advantage of meeting the piecework target set, and the group's collective interest at the same time in keeping the quota low. Burawoy claims that this conflict was not regulated by an ideology of exploitation but by the wish to 'make out'. The conflict would start any time management decided to change the rules of the game in a way that was judged unfair.

5 - Production games were ambivalent; on the one hand they gave workers a challenge that made it possible to put up with a tough, unpleasant job; on the other they were the best way the company had of making sure workers would be committed to the job of their own volition.

Burawoy inserts Roy's view of making out games into a more sophisticated theoretical context, determined in part by changes that had come about in the economic-productive setting. The company Roy worked for had in the meanwhile come under the control of a

large multinational with market leadership. Competitive conflicts diminished as the company's investment in technological innovation took on greater importance, leading to increases in productivity that eroded the differences between 'good' and 'bad' jobs. Wages increased and because of the technological innovation, hierarchical pressure was notably reduced; many control operations were no longer delegated down through the hierarchical factory bureaucracy but were built into the new production system. Piecework lost much of its significance due to the effects of technology and the increased number of qualified workers.

In the telescoping of the hierarchy, the higher wages, and the more pervasive and innovative technology that allowed for more reasonable working rhythms and rudimental forms of self-control, Burawoy concluded that since Roy's time there had been an expansion of self-organisation by workers in performing their work.

In a subsequent work, *Manufacturing Consent* (1979) Burawoy (1985), making use of some suggestions put forward by Doeringer and Piore (1971) tackled the problem of the relationship between conflicts and internal labour markets. He saw production norms, codes and procedures in the internal labour market such as internal promotion, as both tacit and explicit systems that can be correlated to professional development and career advancement. The regulation of conflict found in organisational procedures and practices contains an idea of industrial citizenship that offers workers some semblance of social dignity.

For Burawoy, the internal rule of law within a company was an extension of the 'making out' game and would come into play in company bargaining, which could be interpreted as a game that exploited the rules on which production was based.

The arrival of automation brought a crisis in Burawoy's attempts to understand worker consent. Production levels are now no longer negotiated but are pre-established; industrial machinery and organisation of the productive flow set the rhythm. This no longer leaves room for playing with informal accumulations of time which no longer exist. In the post-Fordist era of lean production and automation it is no longer possible to identify 'making out' as the way to achieve worker consent.

Kern and Schumann (1984) tried to address Burawoy's queries, starting from the consideration that in the post-Fordist regime of flexible automation, worker consent (i) is in any case no longer a company cost aimed at increasing personal motivation at work and that (ii) consent can no longer originate as it did in the Taylorist-Fordist regime, out of informal aspects of the productive system (*making out*).

Following Touraine's studies. Kern and Schumann began their own analyses in the 1970s and confirmed there was a trend towards polarisation in the major industrial sectors between a majority of unskilled workers assigned to machine work tasks, and a skilled minority assigned to maintenance and regulation. They reached the conclusion that even taking into account sectorial differences, recent technological innovations favour a generalised requalification which, almost automatically, produces a new way of working. Microchip technology and flexible automation have permitted a systemic integration of various aspects of the production process which has spread through all industrial areas, both advanced and mature.

This optimism of Kern and Schumann regarding the evolution of the quality of work within the productive system and which led them to suggest that the Marxist paradigm of division of labour-authority-exploitation was at an end, was contrasted by the problem of labour made redundant by technology and is eliminated or expelled, with trade union organisations and the modern system of industrial relations working to provide soft landings to ease its negative effects.

Kern and Schumann have been criticised by many. Lutz (1992) observed that it would be more appropriate to speak of computerised neo-Taylorism since there is still a division of labour between skilled and unskilled jobs. Manske (1991) stressed that the systemic links introduced by microchip technology overcame the traditional division between skilled and unskilled work and that moreover, the labour autonomy that was only achieved when control was carried out by workers specifically trained to do it, is now built into the productive process itself and it is therefore wrong to assume labour autonomy is increasing since it is actually tending to diminish. There is every reason to doubt the proposal that a neo-artisan pattern has been discovered, based on worker self-management of production timing.

The new orthodoxy: flexible specialisation and the disappearance of the division of labour

There is one group of authors who although their points of view are divergent, all agree that the division of labour has indeed come to an end. These can be divided into two groups. The first consists of authors who have analysed flexible specialisation in its most extreme form as an overcoming of Taylorism, elevating the production culture found in the new industrial districts to the level of a new ideology; the second see the end of the division of labour in the advent of technological optimism (Kern and Schumann, 1984).

The first (Piore and Sabel, 1983 and 1989; Sabel, 1989; Scott, 1988; Storper and Scott, 1989; Zeitlin,1990) base their assessment of these medium-term outcomes of flexible specialisation on their vast and sophisticated analysis of a wide-ranging sampling of current macro-economic and macro-social transformations. Their conclusion is founded on the idea that there has been a radical shift from one model of industrial development based on mass production to a possible, and even probable future age or regime of flexible specialisation based on flexible technologies, a specialised workforce and new forms of industrial community. The second industrial divide is thus characterised by a complete shift from one technological paradigm to another.

Scott and Storper also draw on this conceptual scheme but their analyses are permeated by the very diverse prospects offered by the political economists of the *Ecole de la Régulation*. Scott and Storper's economic geography mobilises French concepts of 'accumulation regime' and 'regulation mode' to confirm that the real historic break that has taken place represents the end of Fordism whether as a model of accumulation or as a model of regulation. But problems arise in trying to reconcile this point of view (*flexible specialisation*) with that of the French school (*accumulation regime*). Further difficulties arise with the particular interpretation Scott and Storper put on the theory of regulation, which they tend to reduce to a simple variable of the neo-Schumpeterian 'long waves' theory elaborated by C. Perez and C. Freeman (Perez, 1983 and 1985; Freeman and Perez, 1988). In the end the categories of 'accumulation regime' and 'mode of regulation' elaborated by the *régulationistes* supersede neo-Schumpeterian concepts of 'techno-economic spheres' and 'socio-institutional frame'. Storper and Scott's (1989: 22)[5] inference is that the capitalist production apparatus is capable of assuming many alternative technological and institutional configurations and any of these is more or less the same thing as what the theorists of the French school of regulation call *a regime of accumulation and a model of social-regulation.*

We would agree with Amin and Robins (1990) that in the final analysis this is all a complex theoretical syncretism that begins with the ideas of Piore and Sabel and arrives, via

[5] Within the *Ecole de la Régulation* there is not only a functionalistic-structural trend but also another wing that has been more sensitive to the problems of working class organisation and to themes in organisational labour. The works of B. Coriat (1988,1991,1994), of Coriat and Dosi (1994) and more marginally those of J.P. de Gaudemar (1980), reflect a more complex variation of the theory of regulation, strongly influenced and modelled by Italian working class ideas. It should also be noted that some exponents of the regulation point of view, apparently closer to the neo-Schumpetarianism, are extremely prudent with regard to theoretical convergency. For this reason R. Boyer cautions against the economic and technological determinism of the long waves theory (Boyer, 1986).

the economic geography of Scott and Storper, back at the theory of regulation (in its most reductive form) and neo-Schumpeterian 'long waves' theory.

These writers put forward an intriguing concept of flexible specialisation, which they suggest has come into being as a consequence of the crisis of mass production. Markets have become saturated, consumers are asking for specialised and differentiated goods - a demand that mass production cannot satisfy. When we look at the model of Italian industrial districts we can see that their capacity to innovate depends on each firm's internal organisation, its close relations with workers and clients, and its collaboration with other businesses in the same district. All this leads to a type of relationship between businesses that resembles the collegiate relationships practised among expert professionals, and an awareness by the company that its success and survival are tied to the collective efforts of the community to which it belongs. This essential need for collaboration and social solidarity between firms acting in good faith recalls the importance attributed by Dore (1983) to the Japanese notion of 'zeal' as the origin of the present-day trend towards territorial agglomeration.

The same group of authors emphasise the important learning advantages, for instance industrial reorganisation, that can be acquired by industrial and social networks. Since the old hierarchically organised firms based on mass production can no longer adapt to change, there has been a significant reorientation in the organisation of large firms towards de-verticalisation and decentralisation of their operational units, and a dissolution of hierarchies that marks the end of a Tayloristic division of labour and the growth of external sub-supplying relationships.

However this is not the place to discuss the questions of structural transformation and the failure of the market for mass produced goods, for which we would refer the reader to Williams *et al.* (1987). We will consider the explanation of behavioural analysis offered by Piore and Sabel, who claim that the basis for the development of flexible specialisation depends on the strategic considerations of social actors and the tactics they use in particular cases (Sabel, 1989: 53): variable tactics such as trust, solidarity, faithfulness to community, local pride. This is the psychological frame in which Piore and Sabel attempt to get around technological or economic determinism and exalt an approach that is filled with determinism and voluntarism (among the things they exclude from their frame are learning in its various forms - but not learning a trade - development of the individual and company competencies, the relationship between these and segmentation of the working cycle pushed to the limits of technology, the relationship between districts as *quasi*-firm, *quasi*-internal labour markets, and the division of labour).

Within this same area of study but occupying an autonomous position, a group of Italian scholars has investigated the origins and development of these Italian industrial districts. Their work is characterised by a rigorous analysis in Marshallian terms of the external economies of scale enjoyed by producers operating in the same industry (Marshall 1961: 267-277). These researchers (Beccattini, 1987; Bellandi, 1982; Bagnasco, 1977 and Trigilia,1985[6]) stress the role of external economies of scale and the advantages deriving from territorial agglomeration of an economic network: the ease of exchanging ideas, information and goods; the accumulation of professional abilities and capacities; the development of a cultural homogeneity that makes for co-operation, reciprocal trust and consent between entrepreneurs, workers and local government agencies. According to this group the Marshallian explanation is the most appropriate one for investigating the economic dynamics shown by some areas of the 'Third Italy'. Here, each interrelated network of small businesses, able to rely on an inventive artisan tradition, specialises in producing a particular item. This growth of small businesses in Italy is based on numerous factors for success that can be traced back to their capacity to act together as an integrated network of manufacturers[7]. The success factors may be listed as:

a. Economies of scale and goals deriving from the division of labour between one specialised producer and another;

b. Entrepreneurial inventiveness that results when lower middle class traditionalism is combined with the special abilities and technical advantages of artisan production;

c. The local sedimentation of appropriated abilities and the innovative capacity that comes about as a result of agglomeration;

d. The active support that can be relied on from local authorities and other local institutions to provide infrastructure, professional training, financial incentives and other services;

e. The development of shared sales services and export facilities;

f. The creation of a reputation that positions the economic district in the market; and the consolidation of a local culture based on mutual trust and consensus, permitting social collaboration and the exchange of ideas and information.

[6] We cite only those pioneeering works that have opened the way to interpretation of the north-eastern and central regions of the 'Third Italy', characterised by such industrial districts.

[7] In Bologna and Pisa, a group of researchers (Lomi, 1997 and Lipparini, 1998) have overcome the static concept of competencies with artisan origins that have characterised mature industrial districts. They have elaborated an organisational analysis along the lines of neo-institutionalism and dynamic capabilities.

The study by R. Camagni and R. Capello (1988) shows that in Tuscany, for instance, flexibility is enhanced thanks to the high degree of division of labour between many small firms operating as a single highly integrated autonomous and co-operative regional structure. Further north in the Veneto, the factors for success seem to be the low cost of labour, the availability of specialised knowledge, the use of part-time work divided between industry and agriculture, and a diffuse Catholicism that has been fundamental in shaping common social and economic objectives.

These industrial districts seem to depend on the immobile nature of the original competencies and indeed the possibility that such districts could be classified as new structures of concentration and centralisation is not taken into consideration by the small dynamic model of the 'Third Italy'. A report by Signorini (1988), based on data from the Bank of Italy (Banca d'Italia) on technological change in Tuscan businesses confirms a marked slowness by small firms to innovate technologically. This, he notes, puts at risk the survival of minor entrepreneurial traditions in that region and could lead to elitist phenomena of concentration. Other studies show similar trends in the mechanical industry of the Emilia region. Flexibility in the more southern regions comes about thanks to artisan ability, self-exploitation, tax and social security contribution evasion and the use of low-cost child and female labour. There is also one serious problem: will these Marshallian districts, founded on artisan-originated abilities and capabilities - and which according to studies by Sforzi (1989) make up about four-fifths of the Italian economy - really be able to behave differently from the informal economic artisan experiences in other industrialised countries and become internationally competent districts?

Discussion

(to be completed)

2. Strategy and structure, internal and external capabilities

Technological change plays a central role in Chandler's overview of the dynamics of managerial capitalism (1962, 1977 and 1990). The emergence and spread of the modern corporation was a functional response to the organisational demands of wider markets and larger-scale technologies, manifested first in the United States and then globally. Technological innovation in transport and communications created broader markets that made mass production possible, and simultaneously provided techniques of production that

could fully utilise economies of scale and scope. But Chandler's approach, which treats technology essentially as an exogenous variable or 'underlying cause' has generated considerable dissatisfaction.

Many writers, particularly those associated with the 'social construction of technology' school have emphasised that new technologies, including Chandler's telegraphs and railroads, were not simply technical artifacts, but complex systems involving not only artefacts but also competencies, needs and wants, and political regulation. Technology is nothing in itself; authors recognise that technologies can only develop within a wider context of complementary legal, managerial and social and economic structures (Bijker, Hughes and Pitch, 1987; Bijker and Law, 1992).

The conventional neo-classical approach to technology was that individual inventions and innovations might be exogenous and at times fortuitous but taken as a large class, could still be linked as dependent variables to conventional factors such as demand and investment, and thus linked back into the conventional frameworks used to analyse supply and demand. Chandler's attitude to this is ambiguous, asserting the importance of the firm as an actor on the one hand, but recognising on the other the need for successful firms to conform to the pressure of markets. More radical critics like Mowery and Rosenberg (1979)have stressed the dangers of assuming that demand-side forces alone can fully deal with technological change.

They and others have emphasised the role firms play in generating and shaping technological change itself. Rosenberg (1982) has particularly stressed the largely incremental nature of technological change; he comes close to the more theoretical position of Nelson and Winter (1982) who portray firms as persistently groping in the dark for solutions to local problems instead of pursuing rational courses to solve logical or fundamental problems. Along with Dosi (1988), Nelson and Winter therefore emphasise that the technologists tend to focus on much too narrow a range of issues. To take one instance: if the cost of raw materials rises this may focus minds on developing ways of economising on raw materials rather than seeking a technological fix. They add that technological change may actually be the result of the inter-relatedness of systems: an improvement somewhere in one part of a system may outpace slower or older methods in other parts and force upstream or downstream technological innovations to help realise the overall productive potential of the whole system.

The ‘organisational synthesis’

The ‘organisational synthesis’ proposed by Chandler was derived from attempts to understand the dynamics of technological innovation. In Chandler, technology is often considered as an external, independent determinant. Many challenges to this have been advanced in recent work by D. Hounshell and J. Smith (1987), N. Rosenberg (1982), R. Langlois (1992) and others; from another point of view Th. Hughes (1983) and the ’social constructionists’ have advanced further important difficulties for Chandler’s paradigm. The difficulties that arise suggest that the idea of an ‘organisational synthesis’ is no longer adequate to deal with the ever more apparent plurality and complexity of approaches to the writing of business history.

The historical work of Th. Hughes (1983), and Constant (1980 and 1989) and others fits closely into this reading. Against the background of the emergent electrical power industry Hughes suggested that a good deal of technological innovation takes place along advancing salients of progress which also contain various redoubts or setbacks. The task of the innovator would be to remove the ‘reverse salients’ but these cannot be worked out beforehand: they make their appearance in different ways according to the goals and choices of individual firms; the strategies adopted by each firm will lead each to focus on its own type of innovation (Constant, 1989).

Important work by B. Carlson (1991) has shown how firms may bring together previously separated artisan and scientific cultures to develop ways of transforming scientific breakthroughs into profitable innovations. He points out for instance that Thomson, arguably the most prolific inventor in the early age of electricity, did not simply ‘do’ science but used it to develop completely new mechanical and electrical devices. “The electrical industry of the late 19th century” argues Carlson “was based as much on craft knowledge as on scientific theory” (Carlson, 1991: 7).

Carlson’s work, together with that of S. Douglas (1987), R.V. Jenkins (1975) and B. Pfaffenberger (1988) among others, emphasises that technological knowledge has to be embedded within organisations to become effective. To understand innovation it is necessary not only to understand the knowledge but also the institutions within which that knowledge was developed and used. In the distant past, for example, mediaeval clock technology was stimulated and distinctively shaped by monastic culture. More recently, the inventors of radio did not simply create a new technology but designed new business arrangements and formed consumption patterns that made it a marketable commodity.

If studies of the creation and development of new technologies, markets and business institutions are therefore pushing beyond the Chandler paradigm, so are studies of how research is conducted within established large corporations. Chandler (1990) stressed the competitive power of the 'organisational capabilities' that large firms are able to bring to bear on technological development and leaves us in no doubt that large firms can be effective innovators. But he is less clear as to why this should be so. Is it inevitably the case that large firms can handle technological development better than clusters, joint ventures, or networks? Will there not be special conditions that lead hierarchical management structures to actually inhibit or distort innovation? Lazonick's (1992) pursuance of Chandler's work addresses these questions in part by drawing a distinction between adaptive and innovative firms, but he only tends to classify these rather than explain their behaviour.

One of Chandler's most impressive findings is the frequency with which first-movers in three-pronged investments remain industry leaders in the long run, proving themselves capable of innovating and moving into new areas of business. Why did their oligopolistic advantages not result in cautious, adaptive behaviour and decadence? He argues that in practice oligopoly does not lead to negative predatory or exploitative behaviour or where it does, the firm concerned does not prosper for long. The good side of oligopoly is that it enables firms to overcome problems of risk and uncertainty, and to use their large market share and vertical integration to achieve lower costs and higher productivity thanks to administrative co-ordination. As an observation on the rise of big business in America this has effectively withstood scrutiny (Lamoreaux,1985). But the last chapter of *Scale and Scope*, which contains Chandler's powerful critique of the withering away of the organisational capabilities of many of these leading firms by the 1970s and 1980s, still poses awkward questions about the adequacy of the Chandler paradigm as a way of explaining how and why 'organisational capabilities' are so effectively deployed at certain times and yet become corrupted and decayed at others. If firms are in fact bundles of organisational capabilities - or to use Nelson and Winter's (1982) term, of practices and routines - they should always tend to become inert or inflexible.

So even though Chandler's explanation is couched in terms of 'organisational capabilities' and focussed on the internal structural and strategic histories of firms, it remains unclear how far he has actually distanced himself from the neo-classical or transaction-cost type of analysis. What we can say is that just as choices between different markets and hierarchies are themselves ultimately determined by natural market selection, so firms that fail to respond to the requirements of their environment - whether by failing to adapt their

structure to the needs of strategy or by neglecting to keep down their transaction costs - will go under. Perhaps adaptive and innovative behaviour can only be defined after the event.

External and internal capabilities

Following a broadly Schumpeterian tradition, Chandler (1962, 1977 and 1990) and Lazonick (1992) stressed the central role played by large firms in developing efficient organisational forms and capabilities. Their views have often been countered by a Marshallist school of economics that prefers to highlight the role played by 'external economies' operating through competition, and the interaction of firms within markets and networks. Both points of view stress the importance of 'organisational capabilities' but there is vigorous debate about where and how these capabilities are best created.

Light can be shed on some of the more important issues raised in this debate by looking at important recent research into the role played by technological change in the emergence of three new major industries: microcomputers (Langlois, 1992; Langlois and Robertson, 1992), videocassette recorders (Cusumano, Mylonadis and Rosenbloom, 1992; Rosenbloom and Cusumano, 1987), and biotechnology (Bugos, 1992; Fitzgerald, 1990).

Langlois (1992: 2-4) has argued that the Marshallian and Schumpeterian models need not be rigidly counterposed. He asserts that capabilities in the microcomputer industry have developed primarily in a decentralised external market rather than within vertically integrated firms, "a situation exactly the opposite of the picture of progress that Chandler painted in *Scale and Scope*". At that time neither IBM, Apple or Microsoft had been able to become a dominant, oligopolistic 'first mover' but as Langlois stressed, it has often been the dynamic interaction of internal and external capabilities that has proved most productive in achieving it.

Kogut (1996: 248) has argued that the initial growth of US foreign direct investment was related not to economies of size, R&D, or marketing, but to organising principles that were already widely diffused in the American economy. Referring to the sequence shown in Table 1, efforts have been largely addressed to explaining how firms that were initially entrepreneurial then went on to became efficient in organising production, an efficiency that led to the spilling of their investments across borders.

Table 1 - Growth of large firms

Rise of new organizing principles	T_0	T_1	T_2
	Entrepreneurs	Organizing of work	Investments in new Products
		- Rationalization of factories - Cost accounting - Functional control	- R&D and advertising for product development - Diversification - Divisionalization
Approximate date of wide commencement	1885	1900	1950

Source: Kogut (1996)

These historical and statistical results suggest that the rise of American foreign direct investment stemmed from organising principles that were broadly diffused in the US economy. Economies of size do not seem to have been particularly instrumental, although size does provide a critical threshold that permits direct investment. It seems more useful to say that national strength rests on principles developed and expanded both by small and large firms operating within a national industrial network.

In part, a pattern like this is linked to the particular characteristics of products and technologies in an industry. Unlike mass consumer products in sectors such as automobiles or consumer electronics, microcomputers were developed before the extent of their usability had been defined, creating a high level of uncertainty and many changes of direction. Where traditional mass producers had often found they could innovate faster at the centre than their suppliers could on the periphery, the opposite proved to be true in the case of the microcomputer industry. Moreover, the distinctive role played by modular assembly in computer design enhanced the scope for external innovation, since one part of a system could change without all the other parts needing to change along with it.

Our second instance illustrates a different reading of how internal and external capabilities interact (Cusumano, Mylonadis and Rosenbloom, 1992; Rosenbloom and Cusumano, 1987). In contrast to the persistence of open standards and external networks in microcomputers, at an early stage the VCR industry went through a decisive struggle to establish common standards. Large firms battled to establish a dominant product design and then competed by developing superior capabilities in mass producing the product and improving it incrementally.

Sony with its Betamax systems had been the first mover in the industry but was overtaken by the combined operations of JVC and Matsushita, who came in as second

movers with an alternative and better product (VHS) and so captured a position of dominance. In part this was a battle between two organisations or groups that had their own highly developed internal organisational capabilities. Sony established an early lead thanks to its design and production skills but was unable to sustain it in the face of the comparable technical skills of its rivals, wedded to their better mass production capabilities; Matsushita's success was not due to any superiority of the company's internal capabilities. M. Fruin (1992) has shown recently that Matsushita represents *par excellence* the network firm focussed on design and distribution rather than production.

Cusumano, Myoladis and Rosenbloom (1992) stress that in an industry where demand was so enormous and growing so exponentially, the decisive factor was Matsushita's ability to outpace Sony in global commercialisation by creating a network of allied mass producers and distributors in Japan and the United States, linked behind Matsushita's preferred common standard.

As in the computer industry, the interaction of internal and external capabilities proved decisive for VCRs as well. Standards for VCRs were decisively shaped by the external development of complementary products (software, pre-recorded tapes) which created bandwagon effects and network externalities; the capacity of leading firms to relate or ally themselves with these forces proved vital. But comparing Matsushita's success in the VCR industry with what happened in the personal computer industry, the differences were perhaps even more important than the similarities: (i) unlike the PC industry, the mass production of video recording equipment was a demanding, complex product-engineering and manufacturing business – not a component assembly operation - and reliance on decentralised suppliers would have been too hazardous (ii) the nature of the product was fundamentally different: a microcomputer is a system in a box whereas a VCR is ultimately a single appliance. In this sense the videocassette recorder industry did not experience a 'battle of the systems' as the computer industry did, but rather a duel between differentiated though essentially similar technologies. In this sense Sony's key mistake was firstly to have misinterpreted its small technical advantage as a decisive lead in defining the product, and then to have left itself vulnerable to a strategic coalition of other producers who moved more decisively into mass production and distribution.

Our third case study comes from the early years of the American biotechnology industry. In this quintessentially research-driven industry the crucial issue is the the boundaries of the firm. Firms need to innovate continuously in order to guarantee competitive edge and need to be part of a two-way flow between science, research and ideas;

but at the same time they need to be able to control and keep to themselves the fruits of their own innovations. In the telephone industry, AT&T's Bell Laboratories (Temin and Galambos, 1987) resolved a challenge of this kind by going all out for a a massive research monopoly over the whole industry and then aggressively using their technical lead to 'close the system' (Coll, 1986). In microcomputers, as we have seen, various firms considered this route but clones and software piracy made it problematic for them (and Microsoft may only be an example of a short-term success in this area).

A rather different way of explaining the role played by organising principles in the success of an organisation, can be seen in certain parts of the early American biotechnology industry. Our example draws on the work carried out by Bugos (1992) on the chicken-breeding sector of the 1950s and 1960s, but analogous processes can be found in the development of hybrid corn in Illinois in the inter-war years (Fitzgerald, 1990). Bugos showed that in chicken-breeding, the control of genetic variation through hybridisation provided a way of controlling intellectual property that was more powerful than patenting and laid the basis for an industrial structure in which breeding was kept a discrete, independent industry, separate from the otherwise vertically integrated chain of chicken-farming.

The central innovation here was the development of hybridisation from the 1950s on. This not only gave the advantages of genetic uniformity and 'hybrid vigour' but also created a genetic lock on the intellectual property of the whole industry since individual chicken farmers could not use breeding sequences to reproduce the same hybrid pattern. The breeding industry became highly specialised, R&D-led, and hard to get into. Ceaseless research and testing were needed to give producers what they were asking for and to meet the constantly shifting dangers of disease or unanticipated consequences of genetic changes; but by the 1980s, 90% of US broilers was coming from the stock of only half a dozen breeders.

This tight, specialised, research-led sector also provided the base of standardised genetic raw material out of which a vertically integrated mass production chicken farming industry could be developed. A tightly vertically-integrated system of hatching, supplying, housing, processing, branding and distribution grew up dominated by firms like Tyson, Holly Farms, and Perdue, building on the opportunities for standardisation and mass production provided by the genetic controls imposed by breeders, and symbolised by the speedy scientific slaughter of the chicken (dis)assembly lines. Thus in the chicken industry at least, key elements of technology and innovation were obtained from outside and were kept

separate from the giant firms that developed the organisational capabilities of large-scale production and distribution in the sector.

These and other studies[8] raise intriguing questions about the nature of the large corporation and about internal and external sources of innovation. In one case (chicken farming) large firms depended systematically on innovations that were developed externally; in another (PCs) external innovations actually replaced large firms whilst in another (VCRs) the internal organisational capabilities of single firms had to be welded into a *quasi*-global network in order to achieve industry domination.

Though many major firms have been successful in basic invention, most of them have continuously called on outside sources of invention and have concentrated their own efforts on effective commercialisation. The phenomenon of an extra-firm innovational context around the core organisation has persisted strongly throughout the 20th century; in highly developed economies a wide variety of capabilities can become available in markets where they are contracted out or bought in as finished components.

Discussion

(to be completed)

3. Variable models and microhistories: structural contingency theory as a 'normal science'[9]

Within organisational studies, contingency theory has given us a coherent paradigm for analysing organisational structures and has been the analytical frame that has enabled research to move towards constructing a scientifically-founded knowledge base (Donaldson, 1996b).

Where there is a recurring set of relationships between organisational members this can be considered as the structure of an organisation. It includes - but is not restricted to - authority relationships, reporting relationships(referred to the organisation chart) forms of

[8] Other recent works dealing with similar issues include studies of chemical design firms who played a role in the chemical industry analogous to that played by chicken breeders - seeR. Landau and N. Rosenberg (1992); and Ross Thomson's studies (1989 and 1991).

[9] Khun (1962).

behaviour required by the organisation's rules, decision-making patterns such as decentralisation, patterns of communication and other behaviour patterns.

Until the late 1950s, academic writing about organisational structure was dominated by this classical management school (Donaldson, 1995 and 1996a). The classical school held sway for the first half of the century and then began to be increasingly challenged, from the 1930s on, by the human relations school. The human relations school focussed on the individual employee as possessing psychological and social needs; an understanding of these would show how an efficient form of work organisation might emerge from the interplay of group dynamics (Roethlisberger and Dickson, 1939). This would then enable managers to adopt a more considerate approach that would elicit employee co-operation. The focus here was on bottom-up processes of organisation and the benefits of participation in decision-making offered to employees in lower levels of the hierarchy (Likert, 1961).

Contingency theories developed along these lines during the 1950s and 1960s on topics such as small-group decision-making and leadership. Around the end of the 1950s scholars began to apply contingency theory to organisational structure.

The core assumption of this 'structural' contingency theory is that low-uncertainty tasks are most effectively performed by a centralised hierarchy since this is a simple and quick method that allows for close co-ordination at low cost. It reduces structural simplicity and raises salaries but is rewarded by benefits deriving from innovation. When size increases, a compact bureaucracy featuring a tall hierarchy and extensive specialisation replaces a simple centralised structure.

The seminal statement that pioneered the contingency-theory approach to organisational structure was made by Burns and Stalker in 1961. They distinguished between a mechanistic structure in which organisational roles are tightly defined by superiors with a monopoly of organisational knowledge, and a more organic type of structure in which organisational roles are loosely defined and arrived at by discussion among employees; knowledge is dispersed outwards and they are the possessors of the varieties of expertise germane to the organisation's mission.

A few years after Burns and Stalker, Woodward (1965, 1970) developed a chronological typology founded on technical complexity. She identified and ordered basic and discrete types of production according to their degree of complexity:

Small scale (series) production
  Production of units to order
  Prototype production

Fabrication of large equipment by stages
Small scale production to order

Large scale mass production
Large scale (series)production
Large scale (series) assembly-line production
Mass production

Process Production
Intermittent production of chemical products with polyvalent plants
Continuous flow production of liquids, gas and crystalline substances

In her first work Woodward (1958) envisaged a technological determinism (Scott,1981) in which it is the technical requirements of the production process that determine the structural characteristics of an organisation. In general, this type of inquiry provides us with coherent models of technical complexity and characteristics based, for instance, on the length of a chain of command (the hierarchy), the extent of control exercised by top and middle management, the size of the administrative structure and the flexibility of its systems of management (Woodward, 1975: 58).

Perrow (1967, 1970) re-elaborated Woodward's typology and clarified the variables used to distinguish between different systems of technical labour, amplifying her concepts in ways that also permit their application to non-industrial sectors.

Table 2 – The systems of technical labour

Dimensions	**Industrial Examples**	**Non-industrial examples**
Few exceptions and procedures of analysable research	Routine manufacturing: steel plants	Custodial institutions Professional instruction
Few exceptions and procedures of non-analysable research	Artisan sector: glass work	Socialization institutions Schools
Many exceptions and procedures of analysable research	Design firms: heavy machinery	Programmed learning schools
Many exceptions and procedures of non-analysable research	Non-routine manufacturing: aerospace	Therapeutical institutions Psychiatric clinics

Source*:* adapted from Perrow, 1967 and 1970

Perrow identifies two dimensions: (i) the number of exceptional cases found at the workplace or, where non-industrial activities are concerned, the extent to which the research material is initially observed as non-uniform or variable (ii) where there are exceptions, to what degree 'research' or problem-solving processes are conducted in a logical and analytical way or (for non-industrial activities) to what extent the variability of the initial raw data is correctly understood.

In Perrow's forecast, the types of technical labour systems identified differ according to factors such as the localisation of discretion, the distribution of power, the level of interdependence between working groups and the methods of co-ordination used.

A somewhat similar range of typologies, again founded on technological characteristics, was developed by Thompson in 1967:

- *chain technology*: this implies the existence of a serial interdependence: action C can only be completed after action B is over, and action B in its turn is only able to be completed after action A is terminated - and so on (this is the case, for instance, of assembly-line production);

- *mediation technology :* requires standardised operations directed to different end-users (for example; postal and telephone services)

- *intensive technology:* this is based on an extensive range of techniques to bring about changes; selection of the appropriate techniques is determined retro-actively by the product itself (for example where an electronics laboratory develops and tests a new product).

Although these can be taken as the relevant technical systems, Thompson does not clarify the organisational basis on which his classification typology is founded. Scott (1981) assumes it is founded on levels of variabilities or uniformities of the inputs and outputs of a process, namely:

	Inputs	*Outputs*
Chain technology	uniform	uniform
Mediation technology	variable	uniform
Intensive technology	variable	variable

Perrow (1967) argued that knowledge technology should be seen as a contingency of organisational structure: the more categorised the knowledge used in the organisation, the more the organisation can become centralised in its decision-making.

Thompson (1967) suggested that organisations should attempt to insulate their core production technologies inside a closed system so as to render them efficient by buffering the core from the surroundings. External perturbations are then dealt with by forecasting, inventories and other mechanisms. He theorised that interdependencies between activities in the organisational workflow should be handled at different hierarchical levels, and thus generate the design of the organisation.

Jay Galbraith (1973) sets out the fundamental assumptions of contingency theory:
(i) there is no pre-ordained best way to organise any production system;

(ii) not all organisational methods are equally effective;
(iii) the best way to organise a production system will depend on the nature of the environment with which it is intended the organisation will have to interface.

Lawrence and Lorsch (1967) - who originally coined the term *contingency theory* - argue that different environments will call for different responses from the different organisations operating in them: environments that are very unpredictable and exhibit high rates of change in their market conditions or technologies- be it in terms of opportunity or of limits - will require the organisations working in them to face challenges that are of a different order to the challenges faced by organisations which operate in a calm and stable setting. They say the coherence or co-alignment of an organisation with its surrounding environment occurs on two levels: (i) the structural characteristics of each organisational sub-unit adapting to the specific environment with which it is linked; (ii) the differentiation and the methods of integration that characterise the organisation must find ways of adapting to the general environment in which it must operate.

The approach taken by Galbraith (1973 and 1977) is very close to that of the systems design school. Galbraith brings together the concepts of 'environmental uncertainty' and 'information treatment'; uncertainty pervades an organisation and influences both the work and the people doing it. The various structural aspects, including rules, the hierarchy and decentralisation are mechanisms that determine the extent to which the organisation will be able to handle the system data. The task for anyone designing such an organisation is to select the structural apparatus most appropriate for selecting and processing the information needed to do the work.

Environment and an organisation's dependence on it have provided a very interesting way of interpreting trends in organisations. Schematically, following R. Scott (1981) the work done so far in this field can be classified into two fundamental approaches (i) those who conceive of the environment as a source of information and (ii) those who conceive of the environment as a reserve of resources (Aldrich and Mindlin,1978).

Table 3 – Dimensions of uncertainty and dimensions of dependency

Dimensions which condition uncertainty	**Dimensions which influence dependence**
Level of homogeneity-dishomogeneity, complexity, diversity (Dill, 1958; Thompson, 1967)	Level of abundance-scarcity of resources at an environmental level (Pfeffer and Salancick, 1978; Aldrich, 1979)
Level of stability and change, e.g. rate of productive innovation, discontinuity or regularity of change (Lawrence and Lorsch, 1967; Thompson, 1967)	Level of concentration-dispersion of the resources in the environment (Nutter, 1968; Pfeffer and Salancick, 1978)
Level of interconnection-isolation; type of connections with the environment (Pfeffer and Salancick, 1978)	Level of organization-non organization of the environment (Pfeffer and Salancick, 1978)
Degree of organization-non organization of the environment (Jurkovitch, 1974)	

Source: adapted from R. Scott (1981)

Table 3 of course relies on the fact that the dependency of an organisation on its environment will be greater when scarcity of resources, level of concentration and of organisation reach observable levels.

From a review of the numerous attempts to define and measure technology, we find that the concept has been defined in a very extensive way so as to include: (i) the characteristics of the inputs an organisation can use (ii) the characteristics of the transformation process used by the organisation and (iii) the characteristics of the outputs that are then produced by the organisation.

Alongside this interpretation, according to which technologies change in accordance with the phases of the production process, the Aston Group (Hickson, Pugh and Pheysey, 1969)[10] stress that the approaches towards technology vary according to the emphasis placed by researchers on (i) the nature of the material on which their work is based; (ii) the operations or techniques used to carry out the work and (iii) the pre-esisting state of knowledge underpinning the process of transformation.

[10] The Aston Group (Pugh et al.,1969) developed numerous output measurements relating to the notion ofcharter (i.e. social function or objectives) rather than technology. Herehowever, they are assimilated into technology since they are appropriate toit.

Table 4 – Classification of technologies

Technological aspects	*Process phase*		
	Input	*Transformation*	*Output*
Materials	Uniformity of the inputs (Litwak, 1961) Resistance of the materials (Rushing, 1968) Variability of the stimuli (Perrow, 1970)	Number of exceptions (Perrow, 1970) Interchangeability of components (Rackhman and Woodward, 1970)	Fundamental variations of projects (Harvey, 1968) The homogenization or singling out of ambits (Wheeler, 1966) Multiplicity of outputs (Pugh et al. 1969) Personalization of outputs (Pugh et al.)
Operations	Codification, preliminary transformations, simplification of inputs (Thompson, 1967)	Complexity of technical processes (Udy, 1959; Woodward, 1965) Integration of labour flow (Pugh et. al. 1969) Routining of labour (Hage and Aiken, 1969) Automatism of machinery (Amber and Amber, 1962) Interdependence of labour units (Thompson, 1967)	Output control through the gathering of reserves (Thompson, 1967)
Knowledge	Predictability (Dornbusch and R. Scott, 1975) Forecast of the supply flow (Thompson, 1967)	Awareness of cause/effect relationships (Thompson, 1967) Canalization ability of the research processes (Perrow, 1970) Information required for the execution of duties in relation to the information available (Galbraith, 1973)	Interval of retroaction (Lawrence and Lorsch, 1967) Forecast of the demand flow (Thompson, 1967)

Source: adapted from R. Scott, 1975

From the measurements listed in Table 4 we can identify three key variables: (i) complexity and diversity based on the quantity of items that the organisation must deal with simultaneously (ii) uncertainty and unpredictability, because of the variability and unpredictability of the items (iii) interdependence based on the measurement of the relationship between the items that determines the condition of each one.

Studies based on structural contingency theory look at the internal organisational structures of firms and the extent to which efficacy and efficiency depends on variables. These variables include size of the firm, the technologies it uses, the range of products or services it offers, the complexity of these products or services and the degree of activity there is in the sector generally. Efforts to measure and describe organisations in this way remain

deeply indebted to the classical theory of bureaucracy: the principal 'variables' or 'dimensions' by which organisational forms are defined and observed still include in fact: the degree of formalisation, of verticalisation and centralisation, of standardisation, of specialisation and division of labour, the nature and frequency of checks. The most important new innovation has been the ability to understand and demonstrate how these aspects can be combined in different ways to generate what Mintzberg (1979) termed *different organisational configurations, efficient under different circumstances*.

Many of the researchers cited above appear at times to use a mix of open and closed systems within which individuals use information technology to create enabling constructs, whilst also acknowledging the deterministic effects of the hard wiring of the information system on users. Putting it another way, what occurs within a work-group is to some extent determined by the technology, but the individuals within the group still have a certain amount of choice within the constraints imposed by the technology. Those who share this view often build on the socio-technical systems school of Emery and Trist (1965) or on Giddens' (1979) structuration theory.

Taylor and Felten (1993)work with an historical account of how current variations of socio-technical systems came into being. The adherents of this approach place emphasis on the importance of the social structuring of work groups to optimise the fit between technology and humans. Most of the humanistic-orientated models of work group design (Hackman, 1987, 1990; Campion et al., 1993) are consistent with that point of view, whereas work-group researchers following the socio-technical systems school have mostly not focussed on technology. Those who have, including Gutek *et al.* (1986), have studied the implementation of IT in some fifty-five company offices and its relationship to organisational structure in terms of the primary occupational function of the unit (clerical, managerial) and the nature of the technology. The technology was defined in terms of its physical attributes (age, micro or mini). These researchers found some evidence of co-variation of structure and technology but little to prove a relationship between organisational outcome(productivity and satisfaction) and this co-variation.

Discussion

(to be completed)

4. The relationship between means and aims

Actors, rationality and networks

From studies of bounded rationality, in particular by H. Simon (1947 and 1955a), J. March (March and Simon, 1958 and 1993), and R. Cyert (Cyert and March, 1963; Cyert, 1988) the idea emerges that an organisation is a *problem-facing and problem-solving phenomenon*. In an environment that does not completely reveal the available alternatives or the consequences of such alternatives, any organisation has a limited capacity and rationality (bounded rationality) by which to acquire and elaborate information or foresee the consequences of its actions. In order to tackle this problem the organisation needs to develop searching and learning processes alongside its decision-making processes.

With respect to the neo-classical tradition in economics and the functionalistic trend in sociology, this requires the substitution of the criterion of *maximisation of efficiency* with that of *satisfactory performance*. As entities directed towards a presumed objective, organisations need to be continuously evaluated both in terms of the elements composing the task environment (Thompson, 1967) and internal elements as well. Even when we take account of all the adjustments that economic and sociological theories have produced in the last 30 years, we still find two divergent views. One view includes those who maintain that organisations should concentrate on maximizing this approach since they presumably operate on the basis of rationality and efficiency, or at least should try to be functional in the pursuit a specific purpose. The other branch consists of those who believe an organisation should aim at achieving satisfactory or acceptable conditions. The latter approach, linked as it is to the idea of satisfactory performance, is the result of a conception of reality based on the flow of experience which is matured thanks to deductions founded and organised in ad-hoc plans. This approach is based both on the motivations of individuals and the motivations of organisations as a whole. Motivation is explained in terms of the construction of expectations and preferences which often cannot be extrapolated other than by the individuals who produced them. This approach also traces a preferential route that connects decision-making mechanisms to the identification of the conditions of reference and offers an explanation of the relevant differences between organisation and organisation, group and group, individual and individual, and the specificity of each route whether collective or individual.

It seems opportune here to recall the postulates formulated by March and Olsen (1976) as consequent to the decision making process; these lend themselves well to the plurality of goals of individuals working within organisations, namely (i) the opportunity to

accomplish duties, obligations, or the role expectations that come with the job (ii) the opportunity to define the virtues and truths the organisation will choose to interpret events or reveal them (iii) the opportunity to hand out prizes or punishments depending on what happens in the organisation and in so doing create an opportunity to reveal, challenge or reaffirm friendships and show which relationships are based on trust, antagonism, power or status (iv) the opportunity to express or reveal the individual or group interest (v) the opportunity of finding fulfilment by sharing the satisfactions derived from participating in the decision-making process.

As Favereau has shown (1989) the excessive belief in the rational behaviour of actors assumed by many economic theories (such as agency theory and transaction costs theory)seems disproportionate compared with the number and variety of studies by other schools which on the contrary, show the limits there are to the ability of individuals to make calculated decisions. The reasonings, expectations and calculations that the strategic rationality of actors implies do not exclude ignorance, intuition, the weight of history and/or of the institutions, emotions and sentiments (Arthur, 1984; David, 1985; Fineman, 1996). In effect, because of these ways in which rationality is limited it can no longer be allocated to the area of purely instrumental and utilitarian reasoning, nor can it used as a contrast with the ideas of culture, norms, personal or individual and collective qualification (Friedberg, 1993).[11]

Even though they have different attitudes to it both Friedberg (1988) and Granovetter (1985) define the approach taken by Becker (1976), Akerlof (1970 and 1984), Leibenstein (1976) and others as 'psychological revisionism'. This relates to the discussions of Taylorism by the Human Relations school some decades earlier. The discovery of sentiments and needs enriched Taylorism instead of modifying it. Instead of helping overturn methods that had no future, psychological revisionism as seen by Leibenstein (1976) or Etzioni (1988) is involved in the same impasse. It limits itself to supporting the cause of a less economistic vision of man but does not question the value of this vision and even claims there would be no purpose in restructuring research procedures to take account of the complexity of motivation (Simon, 1991).

[11] Friedberg (1993) observes that such a dicotomy has not ceased to structure the field of organisational studies, mainly in the Anglo-Saxon world. Faced by a fall from grace of the techno-economic paradigm, of which contingencies theory is the principle component, a cultural paradigm was affirmed in the 1970s and 1980s that tends to deal with organisations exclusively from the point of view of culture, beliefs, myths, symbols and ceremonies (Louis, 1981; Pondy, Frost et al., 1983; Smirchich and Calàs, 1987; Frost, Moore, Louis, Lundberg and Martin, 1991).

As an important part of the economics of organisations, agency theory in its differing interpretations (Jensen and Meckling, 1976) is unworkable for sociologists in that it relies on an elementary utilitarianism that takes no account of the achievements of theory of choice and bounded rationality. Without denying the contributions made by this theory which highlights the construed, unnatural character of the co-operation on which organisations are based, it seems unrealistic to work with such a large number of models that originate from the starting point of an unlimited rationality.

The analysis of organisations in terms of cost transaction analysis (Williamson, 1975, 1985and 1990) originates from a vision of opportunistic rationality that takes possession of the cognitive patrimony provided by the theory of rational choice. This is derived from a view of how organisations work that overestimates their unity and coherence (Granovetter, 1985; Perrow, 1986) and leads to the conclusion that organisations are coherent and finalised instruments (Favereau, 1989; Ménard, 1990; Friedberg, 1993).

In Granovetter (1988 and 1995) labour relations are interpreted in terms of networks: entrepreneurs are able to gain advantage from the network itself. This approach would imply a redefinition of internal labour markets and an emphasis on refined labour skills. Previously Manwaring (1984) had already tackled this problem, coining the term *external labour market*. Manwaring's thesis is that the advantage offered to employers by being able to have employees' suggestions about who else to hire reflects a fundamentally important double bond: the tacit skills of the workers include the ability to enhance productive efficiency. This is a consequence of the idiosyncratic nature of equipment such as machinery, tools and technology in general, of organisational procedures and the impossibility of transferring those skills other than through daily interaction with other more experienced workers. In that regard Manwaring(1984) and Granovetter (1995) affirm that resorting to the social network of the employees as a recruiting channel is functionally similar to the labour allocation mechanism of internal markets. It assures the availability of insider workers to train and inform new employees and simultaneously takes advantage of an informal system of training on the job. This is activated by networks which spread the values and informal norms that regulate life in the firm, out into the local community, which becomes an essential base for the acquisition of tacit skills (Manwaring, 1984:166-171; Bezza,1996).

All the same this explanation is not above criticism. On the one hand, in agreement with Doeringer and Piore (1971) the authors do not question the assumption that firms are so restricted in their ability to objectify the skills needed by employees that they can only acquire them by relying on processes of spontaneous worker interaction - even if the

acquisition of skills in that way only concerns a limited range of technologies, methods of labour organisation and organisational positions. It completely ignores the fact that there are behavioural limits to productivity (such as motivation to work, punctuality, the ability to take initiatives etc.). The problem of informative asymmetry between the parties and therefore of the credibility or otherwise of the information transmitted, retains all its validity.

In a way, the population-ecology approach to understanding organisations is a branch of structural contingencies theory that transposes, to an interrogation-analysis level, the typical 'garbage can' critique of rationality and 'intentionality' of action and change, as well as the analyses of 'organisational anarchies'. These authors (Hannan and Freeman, 1977, 1984 and 1989; Aldrich, 1979; McKelvey and Aldrich, 1983) in fact strongly emphasise that change is not the result of a planned strategy and is not something expressly sought. Rather it is the outcome of fortuitous events, occurring either by chance or through error. For them this proves they did not allow themselves to be taken in by hypotheses of the rationality of human action (Aldrich, 1979:30). Both these lines of research are part of the anti-rationalistic backlash of the 1970s which was undoubtedly the most dramatic reaction against rational costs/benefits analysis and the dominant *PPBS paradigm* (planning-programming-budgeting-system).

Organisations and alternatives

Several antagonistic solutions to understanding organisations have been proposed for the co-ordination of complex labour. One solution is clan formations (Durkheim,1893; Ouchi, 1980) where kinship ties and trust triumph over skills. A second alternative way of co-ordinating complex labour is to use a labour market. Coase (1937) was the first to propose that organisations and the labour market should be considered as alternative ways of organising labour; his proposal was recently reformulated by Arrow (1974) and Williamson (1975). There is a third alternative according to which professional structures act as a reservoir of skills that can be used to organise the execution of complex tasks. Examples of these are given by Scott (1966) and Freidson (1973).

Perhaps collective skills and capabilities were emphasised only by a few because there was a shift towards looking at contextual factors and internal-external transaction mechanisms. Those who did emphasise them focussed on routines (Nelson and Winter, 1982) and the relationship between strategy, structure, and dynamic capabilities (Chandler, 1962, 1977 and 1990; Dosi, Teece and Winter, 1990; Teece and Pisano, 1994).

Certainly, organisations do place limits and restrictions on human contact and one of the principal advantages of the market, according to some, is the freedom enjoyed by the participant(Friedman, 1962). Analogous advantages are adduced by those who propose networks as alternatives to organisations (Leavitt, 1951, 1964 and 1965; Leavitt, Dill and Eyring, 1973; Trow, 1957). The same type of counterposition is advanced by those who are in favour of flexible specialisation come what may, or who propose pushing the model of productive networks to its extreme logical consequences (Sabel, Piore, Zeitlin, Scott and Stroper).

Discussion

(to be completed)

5. Organisational learning: affirming an oxymoron

No one theory or model of organisational learning has widespread acceptance (Fiol and Lyles, 1985; Barnett, 1994). The confusion goes back three decades to the time when Simon (1969)defined organisational learning as the growth of insight and the successful restructuring of organisational problems by individuals, and which was reflected in the structural elements and outcomes of the organisation itself. In this definition, learning consists of developing insights on the one hand, on the other hand it depends on structural and other-action outcomes. The former is a change in states of knowledge that cannot be clearly apprehended; the latter often involves a change that is more easily visible in terms of its outcome for the organisation. Significantly, the two do not often occur simultaneously, which makes it all the more important to distinguish between them (Fiol and Lyles, 1985).

As a result of this confusion, theorists have referred to learning as (i) new insights or knowledge (Argyris and Schön, 1978; Hedberg, 1981); or (ii) new structures (Chandler, 1962 and 1977); or (iii) new systems (Jelinek, 1979; Miles, 1962); or (iv) mere actions (Cyert and March, 1963; Miller and Friesen,1980); or (v) some combination of these (Bartunek, 1984; Shrivastava and Mitroff, 1982). Such phenomena are referred to as learning (Cyert and March, 1963, Jelinek, 1979); adaptation (Chakravarthy, 1982; Meyer, 1982); change (Dutton and Duncan, 1983; Mintzberg and Waters, 1982); unlearning (Starbuck, Greve and Hedberg, 1978).

In strategic management literature we find a commonly expressed belief that organisations do learn and adapt and that this enhances their ability to survive. It would

follow that we must find a theoretical framework for investigating learning or if such a framework exists, finding ways to improve it. This can be seen by looking at a list of the most important research publications on organisational learning and adaptation since 1985:

Table 5 - A review of organizational learning

Author	*Label*	*Meaning*
Argyris and Schön (1976)	Learning Single-loop Double-loop	 Lower-level cognition Higher-level cognition
Cangelosi and Dill (1965)	Learning Interaction between individual and group adaptation	 Behavioural development Cognitive development
Chakravarthy (1982)	Adaptation	Cognitive development
Cyert and March (1963)	Learning adaptation of goals, attention rules and search rules	 Behavioural development
Daft and Weick (1984)	Learning Action after interpretation	 Behavioural development
Duncan (1974)	Learning Behavioural level Strategy level	 Behavioural development Cognitive development
Duncan and Weiss (1978)	Learning Action-outcome relationships	 Cognitive development
Hedberg (1981)	Learning Habit-forming Discovery	 Behavioural development Cognitive development
Jelinek (1979)	Learning belief sharing	 Cognitive development
March and Olsen (1975)	Learning Rational adaptation Interpretation	 Cognitive development
Meyer (1982)	Adaptation Deviation-reducing Deviation-amplifying	 Lower-level cognition Higher-level cognition
Miles (1982)	Learning Diversification outcomes Planning formalization	 Behavioural development Cognitive development
Miles and Randolph (1980)	Learning Reactive learning Proactive learning	 Behavioural development Cognitive development
Miller and Friesen (1980)	Adaptation Actions	 Behavioural development
Shrivastava and Mitroff (1982)	Learning (Systems) Evolutionary Designed	 Behavioural development Cognitive development

Source: Fiol and Lyles (1985)

Within the category of cognition development it is possible to identify a hierarchy based on level of insight and association-building. There are two general levels, referred to as lower- and higher-level learning:

Lower-level learning: focussed learning that may be mere repetition of past behaviours - usually short term, surface, temporary, but with associations being formed. Captures only a certain element - adjustments in part of what the organisation does. Single-loop and routine level.

Higher-level learning: the development of complex rules and associations regarding new actions. Development of an understanding of causation. Learning that affects the entire organisation. Double-loop learning, central norms, frames of reference, and assumptions changed.

Learning: the development of insights, knowledge, and associations between past actions, the effectiveness of those actions, and future actions.

Adaptation: the ability to make incremental adjustments as a result of environmental changes, goal structure changes, or other changes (Fiol and Lyles, 1985).

In *Organisation Studies* (1993) Dogdson published an overview of organisational learning and in 1996 *Organisational Learning* , edited by M.D. Cohen and L.S. Sproull, once again summed up the studies dedicated to organisational learning up to that point(Huber, 1996).

But merely listing trends in organisational learning research obscures one of its most constant factors: the influence of James G. March. Barnett's (1994) study of the literature identified 17 key publications that were cited 3.876 times between 1956 and 1993. Two works by March and his colleagues accounted for 57% of the citations between 1981 and 1985. From 1991 through 1993, March's work along with that of three of his colleagues accounts for 64%.

In his book Huber (1996) elaborates four constructs integrally linked to organisational learning (knowledge acquisition, information distribution, information interpretation, and organisational memory). He sets out the needs and opportunities for further research and for integrating work already completed. His study differs from previous examinations of organisational learning (such as Fiol and Lyles, 1985; Hedberg, 1981; Levitt and March, 1988; Shrivastava, 1983) being broader in scope and because he evaluates the literature more critically. In particular, Huber notes and attempts to explain the general lack of cumulative work and the lack of syntheses of the work of different research groups. He also notes that so far only a very small proportion of the work has been presented in forms and forums that lend it social or administrative usefulness.

Examination of the literature on knowledge acquisition has confirmed that whilst much has been learned about experimental learning, there is a lack of cumulative work and a lack of synthesis of work by different research groups. Similarly it is found that whilst much has been learned about organisational search, there is a lack both of conceptual work and of

continuing empirical work and an integration with which to create a more mature literature. Congenital learning, vicarious learning and grafting have been found to be information acquisition sub-processes about which relatively little has been learned beyond the fact that they occur.

Table 6 - Constructs and processes associated with organizational learning

Constructs and Processes	*Sub-constructs and sub-processes*	*Sub-constructs and sub-processes*
1.0 Knowledge acquisition	1.1 Congenital learning	1.2.1 Organizational experiments
		1.2.2 Organizational self-appraisal
	1.2. Experiential learning	1.2.3 Experimenting organizations
		1.2.4 Unintentional or unsystematic learning
	1.3 Vicarius learning	1.2.5 Experience-based learning curves
	1.4. Grafting	
	1.5. Searching and noticing	1.5.1 Scanning
		1.5.2 Focused search
		1.5.3 Performance monitoring
2.0 Information distribution		
	3.1 Cognitive maps and framing	
3.0 Information interpretation	3.2 Media richness	
	3.3 Information overload	
	3.4 Unlearning	
	4.1 Storing and retrieving information	
4.0 Organizational memory		
	4.2 Computer-based organizational memory	

Source: adapted from Huber (1996)

The literature on information distribution is rich and mature but one key aspect of information distribution, namely how organisational units possessing information and units needing this information can find each other quickly with a high probability of success, remains unexplored. Information interpretation, as an organisational rather than as an individual process, seems to require empirical work for further advancement. Organisational memory, as a determinant of organisational learning and decision-making, is found to be much in need of systematic investigation.

In 1996 Weick and Westley asserted that:

organising and learning are essentially antithetical processes, that is, the phrase 'organisational learning' qualifies as an oxymoron. To learn is to disorganise and increase variety. To organise is to forget and reduce

variety. In the rush to embrace learning, organisational theorists often overlook this tension, which explains why they are never sure whether learning is something new or is simply warmed-over organisational change. Either way, the reluctance to grapple with the antithesis has led to derivative ideas and unrealised potential (p. 440).

March (1988) had already noted that the spread of knowledge via experience increases the quantity of shared experiences, and that the average performance of the organisations that use this method tends to be better that than achieved by organisations learning in isolation. However in the long term the phenomenon of diffusion by means of experience becomes controversial. As organisations compete they gradually tend to become similar in the decisions they make and in their experience. Information from the learning of one tends to become redundant for the extractable knowledge of what the others have learned, and consequently the distinction between such organisations becomes less evident. As has frequently been noted (Carrol, 1998; Baum, 1996), such historically dependent models subtend either an identity and recognition process of the organisation or else those processes guarantee optimal characteristics to those organisations that survive over time. Summing this up we can say that although experience and imitation-based learning of organisational know-how may often lead to intelligent action it is by no means true this will always be the case. Frequently it can lead to path dependence giving rise to consequential actions in allocating resources, technology choices or to the adoption of strategies based on selecting past events and memories to make predictions that it is known will come true (Weick, 1979 and 1995). Learning from experience can be seen as a circular form of thinking that looks into the past, where confirmation is found for what has happened today; today becomes the confirmation of yesterday. Experience in this sense is very like a self-fulfilling prophecy and this type of path-dependence appears very similar to concatenated behaviour (Bateson, 1951; Weick, 1979).

The deformations and inefficiency of history

We can understand more about organisational behaviour if we consider that reality in organisations and individuals is not only self-constructed as a complex of meanings (Berger and Luckmann, 1966) but is also dealt with metaphorically. The term "reality" is only the definition an individual uses to indicate the world of fluctuating experiences around him. Histories, soliloquies - all the manifestations, verbal or otherwise, of argumentations about decisions, of relations with others and of socialisation in general - are what define knowledge in individuals. In this sense the environment is the output of a process of creation of meaning

in which verbal manifestations and related practices do the work of sustaining and defining this creation (Weick, 1977). Private soliloquies within organisations, for instance, can be affected by different settings such as the operative framework, decision-making activity, or communication. These soliloquies activate, select and conserve the raw data of experience and motivation, and syntactically organise them, rendering them meaningful and complete. People organise reasoning processes privately; they make their cognitions verbally and operationally explicit in whatever ways will support what they believe to be true and will be likely to give them the strength and enthusiasm to complete their actions. They simplify the complexity of the world by adopting metaphors that contribute to the creation of myths and symbols which then institutionalise themselves within organisations (Feldman and March, 1981).

So according to the theorists of decision-making and neo-institutionalism, the environment is activated by the organisation itself. It is the organisation that reads, defines and makes its own environment explicit through metaphors, world-visions and models. According to Weick (1979 and 1995) in attributing meaning to the world, individuals impose their own order on facts; they select, explain and experiment. In order to do this however, they deform the meaning of what has happened in a personally advantageous way, and so distort history.

Table 7 – The distortions of meaning (and of history)

Propositions	*Authors*
1. Whoever takes part in an event tends to over estimate low probabilities and under estimate high probabilities	Lee, 1971
2. Associates higher probabilities with preferable outcomes more than others	Slovic, 1966
3. Considers history from what ever point of view confirms their own beliefs	Deutsche and Gerard, 1995
4. Attributes positive outcomes to the intelligence of his/her own actions and negative outcomes to the actions of others	Ross and Sicoly, 1979
5. Over-estimates his/her own role in the common tasks.	Ross and Sicoly, 1979
6. Over-estimates the probability of events which actually happen and under-estimates the probability of events that do not happen but could have happened	Fischhoff, 1975
7. Mistakes foresight for looking back	Fischhoff and Beyth, 1975

Source: March and Olsen, 1989

Over the past forty years behavioural psychology, cognitive studies, and the general trend of decision-making have highlighted numerous distortions in the attribution of individual and collective responsibility in events, and thus in the construction of meaning and evaluation of the past. March and Olsen (1989) for example, in their work on political

institutions speak, of the inefficiency of history and of the role performed by institutions to identify routines aimed at limiting such distortions. Political institutions and firms both offer important examples of world-order-generating rules of behaviour, standard operative procedures and professional rules. March and Olsen (1989) suggest that the concept of the inevitability of history and its efficiency are based on the optimistic evolutionist principle according to which the development of institutions is seen as a kind of rational calculation of efficiency. The same can be said of the social rules present in communities, in institutions and in firms. It is therefore commonly observed that within an organisation or a social order run according to the old rules, intelligence is acquired by the historical selection of an accumulation of experiences. These theories, the authors feel, have been the cause of social, institutional and organisational immobility.

Discussion

(to be completed)

Conclusions

(to be done)

References

Accornero A. (1994), *Il mondo della produzione,* Il Mulino, Bologna

Akerlof G.A. (1970), "The market for lemons: qualitative uncertainty and the market", in *Quarterly Journal of Economics,* 84

Akerlof G.A. (1984), *An economic theorist's book of tales,* Cambridge University Press, Cambridge MA

Aldrich H. (1979), *Organizations and environments,* Prentice-Hall, Englewood Cliffs

Aldrich H. and Mindlin S. (1978), "Uncertainty and dependence: two perspectives on environment", in L. Karpik (ed.), *Organization and environments,* Sage, Beverly Hills

Alvesson M. (1982), "The limits and shortcomings of humanistic organization theory", in *Acta Sociologica,* 25

Amber G.H. and Amber P.S. (1962), *Autonomy of automation,* Prentice-Hall, Englewood Cliffs

Amin A. and Robins K. (1991), "I distretti industriali e lo sviluppo regionale: limiti e possibilità", in F. Pyke, G. Becattini and W. Sengenberger, *Distretti industriali e cooperazione fra imprese in Italia,* in *Studi e Informazioni*, Quaderno 34

Amit R. and Schoemaker P.J.H. (1993), "Strategic assets and organizational rent", in *Strategic Management Journal,* 14

Anderson P. and Tushman M.L. (1990), "Technological discontinuities and dominant design: a cyclical model of technological change", in *Administrative Science Quarterly,* 35

Argyris C. and Schön D.A. (1978), *Organizational learning,* Addison-Wesley, Reading MA

Arrow K.J. (1974), *The limits of organization,* W.W. Norton & Co., New York

Arthur W.B. (1984), "Competing technologies and economic prediction", in *IIASA Options,* 2

Bagnasco A. (1977), *Tre Italie. La problematica territoriale dello sviluppo economico italiano.* Il Mulino, Bologna

Bagnasco A. and Trigilia C. (1985), *Società e politica nelle aree di piccola impresa: il caso della Valdelsa,* Angeli, Milano

Barley S. (1991), "Semiotics and the study of occupational and organizational cultures, in P. Frost, L.F. Moore, M.R. Louis, C. Lundberg and J. Martin (eds.), *Reframing organizational culture,* Sage, Newbury Park

Barnett C.K. (1994), "Organizational learning theories: a review and synthesis of the literature, in *Academy of Management Review,* manuscript submitted for publication

Bartunek J.M. (1984), "Changing interpretative schemes and organizational restructuring: the example of a religious order", in *Administrative Science Quarterly,* 29

Bateson G.W. (1951), "Conventions of communications: where validity depends on belief", in J. Ruesch and G.W. Bateson (eds.), *Communication, the social matrix of society,* Norton, New York

Baum J.A.C. (1996), "Organizational ecology", in S.R. Clegg, C. Hardy and W.R. Nord (eds.), *Handbook of organizational studies,* Sage, London

Becattini G. (1987), "L'unità d'indagine", in G. Becattini (ed.), *Mercato e forze locali: il distretto industriale,* Il Mulino, Bologna

Becker G. (1976), *The economic approach to human behavior,* University of Chicago Press, Chicago

Bellandi M. (1982), "Il distretto industriale in Alfred Marshall", in *L'Industria,* 3

Bennis W. (1966), *Changing organizations,* McGraw-Hill, New York

Berger P.L. and Luckmann T. (1967), *The social construction of reality,* Anchor Books, Doubleday, Garden City

Bezza B. (1996), *Persone, organizzazione, impresa. Storie, miti e culture nello sviluppo dell'AgipPetroli,* Guerini e Associati, Milano

Bijker E.W., Hughes T. and Pitch T. (eds.) (1987), *The social construction of technological systems. New directions in the sociology and history of technology,* MIT Press, Cambridge MA

Bijker E.W. and Law J. (eds.) (1992), *Shaping technology/building society. Studies in sociotechnical change,* MIT Press, Cambridge MA

Blauner R. (1964), *Alienation and freedom. The factory worker and his industry,* University of Chicago Press, Chicago

Bonazzi G. (1995), *Storia del pensiero organizzativo*, 8a ed., Angeli, Milano

Boyer R. (1986), *La théorie de la régulation: une analyse critique*, Editions La Découverte, Paris

Braverman H. (1974), *Labor and monopoly capital: the degradation of work in the twentieth century*, Monthly Review Press, New York

Bright J.R. (1958), *Automation and management*, Graduate School of Business Administration, Cambridge MA

Bugos G. (1992), "Intellectual property protection in the American chicken-breeding industry", in *Business History Review*, 1

Burawoy M. (1979), *Manufacturing consent*, The University Chicago Press, Chicago

Burawoy M. (1985), *The politics of production: factory regimes under capitalism and socialism*, Verso, London

Burns T. and Stalker G.M. (1961), *The management of innovation*, Tavistock, London

Camagni R. and Capello R. (1988), *Italian success stories of local economic development: theoretical conditions and practical experiences*, mimeo, Istituto di Economia Politica, Università Luigi Bocconi, Milano

Campion M.A., Medsker G.J. and Higgs A.C. (1993) "Relations between work group characteristics and effectiveness: implications for designing effective work group", in *Personal Psychology*, 46

Cangelosi V.E. and Dill W.R. (1965), "Organizational learning: observations toward a theory", in *Administrative Science Quarterly*, 10

Carlson W.B. (1991), *Innovation as social process. Elihu Thomson and the rise of General Electric, 1870-1900*, Cambridge University Press, Cambridge

Carrol G.R. (ed.) (1988), *Ecological models of organizations*, Ballinger, Cambridge MA

Chakravarthy B.S. (1982), "Adaptation: a promising metaphor for strategic management", in *Academy of Management Review*

Chandler A.D. (1962), *Strategy and structure. Chapters in the history of the American industrial enterprise*, MIT Press, Cambridge MA

Chandler A.D. (1977), *The visible hand. The managerial revolution in American business*, Harvard University Press, Cambridge MA

Chandler A.D. (1990), *Scale and scope: the dynamics of industrial capitalism*, Belknap Press, Cambridge MA

Coase R.H. (1937), "The nature of the firm", in *Economica*, n.s., 4

Cohen M.D. and Sproull L.S. (eds.), (1996), *Organizational learning*, Sage, London

Cohen W.M. and Levinthal D.A. (1990), "Absorptive capacity: a new perspective on learning and innovation" in *Administrative Science Quarterly*, 35

Coll S. (1986), *The deal of the century. The break-up of AT&T*, Wiley, New York

Constant E. (1980), *The origins of the turbojet revolution*, J. Hopkins University Press, Baltimore

Constant E. (1989), "Cause or consequence: science, technology and regulatory change in the old business in Texas, 1930-1975", in *Technology and Culture*, april

Coriat B. (1978), *L'atelier et le chronométre: essai sur le taylorisme, le fordisme et la production de masse*, Christian Bourgeois, Paris

Coriat B. (1994), "Taylor, Ford et Ohno: nouveaux developpements dans l'analyse du ohnisme", *Extenso revue*

Coriat B. and Dosi G. (1994), "Learning how to govern and learning how to solve problems: on the co-evolution of competencies, conflicts and organizational routines", *Prince Bertil Symposium*, Stockholm

Crozier M. (1963), *Le phénoméne burocratique*, Edition du Seuil, Paris

Cusumano M.A., Mylonadis Y. and Rosenbloom R. (1992), "Strategic manoeuvring and mass-market dynamics: the triumph of VHS over Beta", in *Business History Review*, 1

Cyert R.M. (1988), *The economic theory of organization and the firm*, MacMillan, New York

Cyert R.M. and March J.G. (1963), *A behavioral theory of the firm*, Prentice.-Hall, Englewood Cliffs

Daft R.L. and Weick K.E. (1984), "Toward a model of organizations as interpretation systems", in *Academy of Management Review*, 9

David P. (1985), "Clio and the economics of QWERTY", in *American Economic Review*, 75

Deutsch M. and Gerard H. (1955), "A study of normative and informational social influences upon individual

judgement", in *Journal of Abnormal and Social Psychology*, 51

Dill W.R. (1958), "Environment as an influence on managerial autonomy", in *Administrative Science Quarterly*, 2

Dodgson M. (1993), "Organizational learning", in *Organization Studies*, 3

Doeringer P. and Piore M. (1971), *Internal labour markets and manpower analysis*, D.C. Heath, Lexington

Dofny J., Durand C., Reynaud J.-D. and Naville P. (1957), *Les attitudes des ouvriers de la sidérurgie en face des changements techniques*, CNRS, Paris

Donaldson L. (1995), "Contingency theory", in D.S. Pugh (ed.), *History of management thought*, Dartmouth Press, Aldershot

Donaldson L. (1996a), *For positivist organization theory: proving the hard core*, Sage, London

Donaldson L. (1996b), "The 'normal science' of structural contingency theory", in S.R. Clegg, C. Hardy and W. Nord (eds.), *Handbook of organization studies*, Sage, London

Dore R. (1983), "Goodwill and the spirit of market capitalism", in *British Journal of Sociology*, 4

Dornbusch S.M. and Scott W.R. (1975), *Evaluation and the exercise of authority*, Jossey-Bass, San Francisco

Dosi G. (1988), "Sources, procedures and microeconomic effects of innovation", in *Journal of Economic Literature*, 26

Dosi G., Teece D. and Winter S. (1990), "Toward a theory of organizational competence", working paper, Università di Roma 'La Sapienza', Dipartimento di economia

Douglas S.J. (1987), *Inventing American broadcasting, 1899-1922*, J. Hopkins University Press, Baltimore

Duncan R.B. (1974), "Modifications in decision structure in adapting to the environment: some implications for organizational learning", in *Decision Sciences*, 705-725

Duncan R.B. and Weiss A. (1979), "Organizational learning: implications for organizational design", in B. Staw (ed.), *Research in organizational behaviour*, Jai Press, Greenwich CT

Durkheim E. (1893), *De la division du travail social*, Alcan, Paris

Dutton J. and Duncan R. (1983), "The creation of momentum for change through the process of organizational sensemaking", unpublished manuscript, Graduate School of Business Administration, New York University

Edwards R. (1979), *Contested terrain. The transformation of the workplace in the twentieth century,* Basic Books, New York

Emery F. and Trist E. (1965), "The causal texture of organizational environments" in *Human Relations,* 18

Etzioni A. (1988), *The moral dimension,* The Free Press, New York

Favereau O. (1989), "Organisation et marché", in *Revue Française d'Economie,* 1

Fayol H. (1916), *Administration industrielle et générale,* Paris

Fineman S. (1996), "Emotion and organizing", in S.R. Clegg, C. Hardy and W.R. Nord, *Handbook of Organization Studies,* Sage, London

Fiol C.M. and Lyles M.A. (1985), "Organizational learning", in *Academy of Management Review,* 4

Fischhof B. (1975), "Hindsight/foresight: the effect of outcome knowledge on judgement uncertainty", in J.H. Harvey, W.J. Ickes and R.F. Kidd (eds.), *New directions in attribution research,* Erlbaum, Hillsdale

Fischhof B. and Beyth R. (1975), "'I knew it would happen.' Remembered Probabilities of once-future things, in *Organizational Behaviour and Human Performance,* 13

Fitzgerald D. (1990), *The business of breeding. Hybrid corn in Illinois, 1890-1940,* Cornell University Press, Ithaca

Follis M. (1998), "Introduzione" to M. Granovetter, *La forza dei legami deboli e altri saggi,* Liguori, Napoli

Freeman C. and Perez C. (1988), "Structural crises of adjustment, business cycles and investment behaviour", in Dosi G. et al. (eds.), *Technical change and economic theory,* Pinter, London

Freidson E. (1973) "Professions and the occupational principle", in E. Freidson, *The professions and their prospects,* Sage, Beverly Hill

Friedberg E. (1993), *Le pouvoir et la règle. Dynamiques de l'action organisée,* Edition du Seuil, Paris

Friedberg E. (1988), "Zur Politologie von Organisationen", in W. Kuepper and F. Ortsmann (eds.), *Mikropolitik,* Westdeutscher Verlag, Opladen

Friedman A. (1977), *Industry and labour. Class struggle at work and monopoly capitalism,* MacMillan Press, London

Friedman M. (1962), *Capitalism and freedom,* Chicago University Press, Chicago

Friedmann G. (1936), *La crise du progrès,* Gallimard, Paris

Friedmann G. (1946), *Problémes humains du machinisme industriel,* Gallimard, Paris

Friedmann G. (1964), *Le travail en miettes,* Gallimard, Paris

Friedmann G., Naville P. (1961), *Traité de sociologie du travail,* 2 vol., Colin, Paris

Frost P.J., Moore L.F., Louis M.R., Lundberg C.G. and Martin J. (eds.), *Reframing organizational culture,* Sage, London

Fruin M. (1992), *The Japanese enterprise system. Competitive strategies and co-operative structures,* Clarendon Press, Oxford

Galbraith J. (1973), *Designing complex organizations,* Addison-Wesley, Reading MA

Galbraith J. (1977), *Organization Design,* Addison-Wesley, Reading MA

Gantt H.L. (1916), *Gantt on Management,* New York

Gaudemar, de J.-P. (ed.), (1980), *Usines de ouvriers: figures du nouvel ordre productif,* Maspero, Paris

Gherardi S. (1990), *Le microdecisioni nelle organizzazioni,* Il Mulino, Bologna

Gilbreth F.B. and Gilbreth L.M. (1908a), *Field System,* Kraus Reprint of New York

Gilbreth F.B. and Gilbreth L.M. (1908b), *Concrete System,* Kraus Reprint of New York

Gilbreth F.B. and Gilbreth L.M. (1909), *Bricklaying System,* Kraus Reprint of New York

Gilbreth F.B. and Gilbreth L.M. (1911), *Motion Study,* Kraus Reprint of New York

Gilbreth F.B. and Gilbreth L.M. (1912), *Primer of Scientific Management,* Kraus Reprint of New York

Gilbreth F.B. and Gilbreth L.M. (1914), *The Psychology of Management*, Kraus Reprint of New York

Gilbreth F.B. and Gilbreth L.M. (1916), *Fatigue Study*, Kraus Reprint of New York

Gilbreth F.B. and Gilbreth L.M. (1917), *Applied Motion Study*, Kraus Reprint of New York

Giddens A. (1979), *Central problems in social theory*, MacMillan, London

Gislain J. and Steiner P. (1995), *La sociologie économique, 1890-1920*, Presses Universitaires de France, Paris

Grandori A. (1995), *L'organizzazione delle attività economiche*, Il Mulino, Bologna

Granovetter M. (1985), "Economic action and social structure: the problem of embeddedness" in *American Journal of Sociology*, 91

Granovetter M. (1988), "The sociological and economic approaches to labour market analysis: a social structural view", in G. Farkas and P. England (eds.), *Industries, firms and jobs: sociological and economic approaches*, Plenum Press, New York

Granovetter M. (1990), "The old and the new economic sociology: a history and an agenda" in R. Friedland and A.F. Robertson (eds.), *Beyond marketplace: rethinking economy and society*, Aldine, New York

Granovetter M. (1995), *Getting a job: a study of contacts and careers*, (II ed.) University of Chicago Press, Chicago

Grant R.M. (1996), "Toward a knowledge-based theory of the firm", in *Strategic Management Journal*, 17

Grant R.M. and Spender J.-C. (eds.), (1996), "Knowledge and the firm", in *Strategic Management Journal*, special issue, 17

Gulick L. and Urwick L., "Notes on the theory of organization" , in L. Gulick and L. Urwick (eds.), *Papers on the science of administration*, Institute of Public Administration, 1937.

Gutek B.A., Sasse S.H. and Bikson T.K. (1986), " The fit between technology and work group structure: the structural contingency approach and office automation", paper presented at *Conference on Technology: its Meaning, Measurement and Impact in the Age of Computerized Work*, Academy of Management, Chicago

Hackman J.R. (1987), "The design of work teams", in J.W. Lorsch (ed.), *Handbook of organizational behavior*, Prentice-Hall, Englewood Cliffs

Hackman J.R. (ed.) (1990), *Groups that work (and those that don't): creating conditions for effective teamwork,* Jossey-Bass, San Francisco

Hage J. and Aiken M. (1969), "Routine technology, social structure, and organization goals", in *Administrative Science Quarterly,* 10

Halbwachs M. (1913), *La classe ouvrière et les niveaux de vie,* Alcan, Paris

Hannan M.T. and Freeman J.H. (1977), "The population ecology of organizations", in *American Journal of Sociology,* 82

Hannan M.T. and Freeman J.H. (1984), "Structural inertia and organizational change", in *American Sociological Review,* 49

Hannan M.T. and Freeman J.H. (1989), *Organizational ecology,* Harvard University Press, Cambridge MA

Harvey E. (1968), "Technology and the structure of organizations", in *American Sociological Review,* April

Hedberg B. (1981), "How organizations learn and unlearn?» in P.C. Nystrom and W.H. Starbuck (eds.), *Handbook of organizational design,* Oxford University Press, London

Hickson D.J., Pugh D.S. and Pheysey D.C. (1969), "Operations technology and organization Structure: an empirical reappraisal", in *Administrative Science Quarterly,* 14

Homans G. (1950), *The human group,* Harcourt Brace World, New York

Hounshell D. and Smith K.J. (1987), *Science and corporate strategy: DuPont R&D, 1902-1980,* Cambridge University Press, Cambridge

Huber G.P. (1996), "Organizational learning. The contributing processes and the literatures", in M.D. Cohen and L.S. Sproull (eds.), *Organizational learning,* Sage, London

Hughes Th. (1983), *Networks of power: electrification in western society,* J. Hopkins University Press, Baltimore

Jelinek M. (1979) *Institutionalizing innovations: a study of organizational learning systems,* Praeger, New York

Jenkins R.V. (1975), "Technology and the market: George Eastman and the origins of mass amateur photography", in *Technology and Culture,* January

Jensen M.C. and Meckling W.H. (1976), "Theory of the firm: managerial behaviour, agency costs and ownership structure", in *Journal of Financial Economics*, 3

Jordan B. (1992), "Artifacts and social interaction in high technology work settings", paper presented to Conference *Organizational learning and technological change*, Siena, September

Jurkovich R. (1974), "A core typology of organizational environments", in *Administrative Science Quarterly*, 19

Kern H. and Schumann M. (1984), *Das Ende der Arbeitsteilung? Rationalisierung in der Industriellen Produktion*, Beck'sche, München

Kuhn T. (1962), *The structure of scientific revolutions*, Chicago University Press, Chicago

Kogut B. and Zander U. (1992), "Knowledge of the firm, combinative capabilities, and the replication of technology", in *Organization Science*, 3 (3)

Kogut B. (1996), "National organizing principles of work and the erstwhile dominance of American multinational corporation", in G. Dosi and F. Malerba, *Organization and strategy in the evolution of the enterprise*, MacMillan, London

Kunda G. (1986), *Engineering culture: control and commitment in a high-tech organization*, Temple University Press, Philadelphia

Lamoreaux N. (1985), *The great merger movement in American business, 1895-1905*, Cambridge University Press, Cambridge

Landau R. and Rosenberg N. (1992), "Successful commercialization in the chemical process industries", in N. Rosenberg, R. Landau and D.C. Mowery (eds.), *Technology and the wealth of nations*, Stanford University Press, Stanford CA

Langlois R. (1992), "External economies and economic progress: the case of the microcomputer industry", in *Business History Review*, 1

Langlois R. and Robertson P.L. (1992), "Networks and innovation in a modular system: lessons from the microcomputer and stereo component industries", in *Research Policy*, 21

Lave J. and Wenger E. (1991), *Situated learning. Legitimate peripheral participation*, Cambridge University Press, Cambridge MA

Lawrence P. and Lorsch J.L. (1967), *Organization and environment. Managing differentiation and integration*, Harvard University Press, Cambridge MA

Lazonick W. (1992), *Business organization and the myth of the market economy*, Cambridge University Press, Cambridge

Leavitt H.J., "Some effects of certain communication patterns on group performance", in *Journal of Abnormal and Social Psychology*, 46

Leavitt H.J., "Unhuman organizations", in H.J. Leavitt and L.R. Pondy (eds.), *Readings in managerial psychology*, Chicago University Press, Chicago

Leavitt H.J. (1965), "Applied organizational change in industry: structural, technological and humanistic approaches", in J. March (ed.), *Handbook of organizations*, Rand McNally, Chicago

Leavitt H.J., Dill W.R. and Eyring H.B. (1973), *The organizational world*, Harcourt Brace Jovanovich

Lee W. (1971), *Decision theory and human behaviour*, Wiley, New York

Leibenstein H. (1976), *Beyond economic man: a new foundation for microeconomics*, Harvard University Press, Cambridge MA

Levitt B. and March J.G. (1988), "Organizational learning", in *Annual Review of Sociology*, 14

Likert R. (1961), *New patterns of management*, McGraw-Hill, New York

Lipparini A. (ed.) (1998), *Le competenze organizzative. Sviluppo, condivisione, trasferimento*, Carocci, Roma

Litwak E. (1961), "Models of bureaucracy which permit conflict", in *American Journal of Sociology*, September

Locke R. (1996), *The collapse of the American management mystique*, Oxford University Press, Oxford

Lomi A. (ed.) (1997), *L'analisi relazionale delle organizzazioni. Riflessioni teoriche ed esperienze empiriche*, Il Mulino, Bologna

Louis M.R. (1981), "Culture in organizations: the need for and consequences of viewing organizations as culture-bearing mileux", in *Human Systems Management*, II

Lutz B. (1992), "The contracditions of post-Tayloristic rationalization and the uncertain future of industrial

work", in N. Altmann, C. Koelher. and P. Meil, *Technology and work in German industry,* Routledge, London

Mallet S. (1964), *La nouvelle classe ouvrière*, Edition du Seuil, Paris

Manske F. (1991), "The end of Taylorism or its transformation?", in *International Journal of Political Economy*, 4

Manwaring T. (1984), "The extended internal labour market", in *Cambridge Journal of Economics,* 8

March J.C. (1988), *Decisions and organizations,* Oxford University Press, Oxford

March J.G. and Olsen J.P. (1975), "The uncertainty of the past: Organizational learning under ambiguity", in *European Journal of Political Research,* 3

March J.G. and Olsen J.P. (1976), *Ambiguity and choice in organizations,* Universitetsforlaget, Oslo

March J.C. and Olsen J.P. (1989), *Rediscovering institutions. The organizational basis of politics,* The Free Press, New York

March J.G. and Simon H.A. (1958 and 1993), *Organizations,* Wiley, New York

March J.G. and Simon H.A. (1993), "Organizations revisited", in *Industrial and Corporate Change,* 3

Marris R. (1966), *The economic of 'managerial' capitalism,* ed. rev., MacMillan, London

Marshall A. (1961), *Principles of economics,* 9 ed., MacMillan, London

Maurice M. (1980), "Le determinisme technologique dans la sociologie du travail (1955-1980)" in *Sociologie du travail,* 1

McKelvey B. and Aldrich H. (1983), "Populations, natural selection and applied organizational science", in *Administrative Science Quarterly*, 28

Ménard C. (1990), *L'économie des organisations,* La Découverte, Paris

Meyer A. (1982), "Adapting to environmental jolts", in *Administrative Science Quarterly*, 27

Miles R.H. (1982), *Coffin nails and corporate strategies,* Prentice-Hall, Englewood Cliffs

Miles R.H. and Randolph W.A. (1980), "Influence of organizational learning on early development", in J.H.

Kimberly and R.H. Miles (eds.), *The organizational life cycle*, Jossey-Bass, San Francisco

Miller D. and Friesen P.H. (1980), "Momentum and revolution in organization adaptation, in *Academy of Management Journal*, 23

Mintzberg H. (1979), *The structuring of organizations*, Prentice-Hall, Englewood Cliffs

Mintzberg H. and Waters J. (1982), "Tracking strategy in an entrepreneurial firm", in *Academy of Management Journal*, 25

Mowery D. and Rosenberg N. (1979), "The influence of market demand upon innovation: a critical review of some recent empirical studies", in *Research Policy*, 8, reprinted in N. Rosenberg, *Inside the black box: technology and economics*, Cambridge University Press, Cambridge

Naville P. (1961), *L'automation et le travail humaine*, CNRS, Paris

Nelson D. (1975), *Managers and workers: origins of the new factory system in the United States, 1880-1920*, University of Wisconsin, Madison

Nelson D. (1980), *Frederick W. Taylor and the rise of scientific management*, Board of Regents of University of Wisconsin, Madison

Nelson R.R. and Winter S. (1982), *An evolutionary theory of economic change*, Belknap Press, Cambridge MA

Nutter G.W. (1968),"Concentration", in *International Encyclopaedia of the Social Sciences*, Crowell-Collier & MacMillan, New York

Ouchi W. G., "Markets, bureaucracies and clans", in *Administrative Science Quarterly*, 25

Parsons T. (1935), "Sociological elements in economic thought: II. The analytical factor view" in *Quarterly Journal of Economics*, 49

Penrose E. (1980), *The theory of the growth of the firm*, 2nd edition, B. Blackwell, Oxford

Perez C. (1983), "Structural change and assimilation of new technologies in the economic and social system", in *Futures*, 5

Perez C. (1985), "Microelectronics, long waves and world structural change: new perspectives for developing countries", in *World Development*, 3

Perrow C: (1967), "A framework for the comparative analysis of organizations", in *American Sociological Review*, April

Perrow C. (1970), *Organizational analysis: a sociological view*, Wadsworth, Belmont

Perrow C. (1986), *Complex organizations. A critical essay*, (III ed.) McGraw Hill, New York

Pfaffenberger B. (1988), "The social meaning of the personal computer, or why the personal computer revolution was no revolution", in *Anthropological Quarterly*, 61

Pfeffer J. and Salancick G.R. (1978), *The external control of organizations*, Harper & Row, New York

Piore M. and Sabel C. (1983), "Italian small business development: lessons for U.S. industrial policy", in J. Zysman and L. Tyson (eds.), *American industry in international competition: government policies and corporate strategies*, Cornell University Press, Ithaca

Piore M. and Sabel C. (1984), *The second industrial divide*, Basic Books, New York

Pizzorno A. (1978), *Le due logiche dell'azione di classe*, reprinted in A. Pizzorno, *I soggetti del pluralismo. Classi, partiti, sindacati*, (1980), Il Mulino, Bologna

Pondy L.R., Frost P.J. et al. (ed.) (1983), *Organizational symbolism*, Jay Press, Greenwich

Popitz H., Bahrdt H.-P., Jueres E.A. and Kesting H. (1957), *Das Gesellschaftsbild des Arbeiters. Technik und Industriearbeit*, Berlin

Prahalad C.K. and Hamel G. (1990), "The core compentence of the corporation", in *Harvard Business Review*, 68

Pugh D.S., Hickson D.J.,, Hinings C.R. and Turner C. (1969), "The context of organization structures", in *Administrative Science Quarterly*, 14

Rackham J. and Woodward J. (1975), "The measurement of technical variables", in J. Woodward (ed.), *Industrial organization: behaviour and control*, Oxford University Press, London

Roethlisberger F. and Dickson W.J. (1939), *Management and the worker*, Harvard University Press, Cambridge MA

Rosenberg N. (1982), *Inside the black box: technology and economics*, Cambridge University Press, Cambridge

Rosenbloom R. and Cusumano M.A. (1987), "Technological pioneering and competitive advantage: the birth of the VCR industry", in *California Management Review,* 4

Ross M. and Sicoly F. (1979), "Egocentric biases in availability and attribution", in *Journal of Personality and Social Psychology,* 37

Roy D. (1952), "Quota restriction and goldbricking in a machine shop", in *American Journal of Sociology,* 57

Roy D. (1953), "Work satisfaction and social reward in quota achievement", in *American Sociological Review,* 18

Rushing W.A. (1968), "Hardness of material as an external constraint on the division of labour in manufacturing industries", in *Administrative Science Quarterly,* 13

Sabel C. (1989), "Flexible specialisation and the re-emergence of regional economies", in P. Hirts and J. Zeitlin (eds.), *Reversing industrial decline? Industrial structure and policy in Britain and her competitors,* Berg, Oxford

Scott A.J. (1988), "Flexible production systems and regional development: the rise of new industrial spaces in North America and Western Europe", in *International Journal of Urban and Regional Research,* 2

Scott R.W. (1966), "Professionals in bureaucracies: areas of conflict" in H.M. Vollmer and D.L. Mills, *Professionalization,* Prentice-Hall, Englewood Cliffs

Scott R.W. (1975), "Organizational structure", in *Annual Review of Sociology,* 1

Scott R.W. (1981), *Organizations. Rational, natural and open systems,* Prentice-Hall, Englewood Cliffs

Sforzi F. (1989), "The geography of industrial districts in Italy", in E. Goodman (ed.), *Small firms and industrial districts in Italy,* Routledge, London

Shrivastava P. (1983), "A typology of organizational learning systems", in *Journal of Management Studies,* 20

Shrivastava P. and Mitroff I.I. (1982), "Frames of reference managers use: a study in applied sociology of knowledge", in R. Lamb (ed.), *Advances in strategic management,* Jay Press, Greenwich CT

Signorini L.F. (1988), "Innovation in Tuscan firms", paper presented to the Regional Science Association's European Summer Institute, 17-23 July, Arco (Italy)

Simon H.A. (1947), *Administrative behavior,* MacMillan, New York

Simon H.A. (1955a), *Models of man. Social and rational: mathematical essays on human behavior in a social setting*, Wiley, New York

Simon H.A. (1955b), "A behavioral model of rational choice", in *Quarterly Journal of Economics*, 69

Simon H.A. (1956), "Rational choice and the structure of the environment" in *Psychological Review*, 63

Simon H.A. (1991), "Organizations and market", in *Journal of Economic Perspectives*, 2

Slovic P. (1966), "Value as determiner of subjective probability", in *IEEE Transactions on Human Factors in Electronics*, 1

Smirchich L. and Calàs M.B. (1987), "Organizational culture: a critical assessment", in F.M. Jablin (ed.), *Handbook of organizational communications*, Sage, Beverly Hills

Starbuck W.H., Greve A. and Hedberg B. (1978), "Responding to crises", in *Journal of Business Administration*, 2

Storper M. and Scott A.J. (1989), "The geographical foundations and social regulation of flexible production complexes", in J. Wolch and M. Dear (eds.), *The power of geography: how territory shapes social life*, Unwin Hyman, Boston MA

Swedberg R. (1987), "Economic sociology: past and present", in *Current Sociology*, 35

Taylor F.W. (1913) ed. 1947, *Scientific management*, Harper and Brothers, New York

Teece D. and Pisano G. (1994), "The dynamic capabilities of the firm: an introduction", in *Industrial and Corporate Change*, 3

Temin P. and Galambos L. (1987), *The fall of the Bell system: a study in prices and politics*, Cambridge University Press, Cambridge

Thompson J.D. (1967), *Organizations in action*, McGraw-Hill, New York

Thompson P. (1983), *The nature of work. An introduction to debates on the labour process*, MacMillan, London

Thomson R. (1989), *The path to mechanized shoe production in the United States*, North Caroline University Press, Chapel Hill

Thomson R. (1991), "Crossover inventors and technological linkages: American shoemaking and the broader economy, 1848-1901", in *Technology & Culture*, October

Tocqueville de, A. (1835), ed. it. 1990, *Viaggio in America, 1831-1832*, Feltrinelli, Milano

Tolliday S. (1996), "Beyond the 'Organizational synthesis': paradigm and theory in recent American business history", in T. Szmrecsànyi and R. Maranhão (eds.), *Història de empresas e desenvolvimento economico*, Editora Hucitec Fapesp, Sao Paulo

Touraine A. (1955), *L'évolution du travail ouvrier aux Usines Renault*, CNRS, Paris

Trigilia C. (1998), *Sociologia economica. Stato, mercato e società nel capitalismo moderno*, Il Mulino, Bologna

Trow D.B. (1957), "Autonomy and job satisfaction in task-oriented groups", in *Journal of Abnormal and Social Psychology*, 54

Udy S.H. jr. (1959), *Organization of work*, Human Relations Area Files Press, New Haven

Urwick L. (1945), *The elements of administration*, Harper & Brothers, New York

Van Maanen J. and Barley S. (1984), "Occupational communities", in B.M. Staw and L.C. Cummings (eds.), *Research in organizational behavior*, JAI Press, Greenwich

Walker C.R. (1957), *Toward the automatic factory*, Yale University Press, New Haven

Weick K.E. (1977), "The spines of leaders", in M.W. McCall Jr and M.M. Lombardo (eds.), *Leadership: where else can we go?*, Duke University Press, Durham

Weick K.E. (1979), *The social psychology of organizing*, Newbery Award Records Inc., Reading MA

Weick K.E. (1995), *Sensemaking in organizations*, Sage, London

Weick K.E. and Westley F. (1996), "Organizational learning: affirming an oxymoron", in S.R. Clegg, C. Hardy and W.R. Nord (eds.), *Handbook of organization studies*, Sage, London

Wheeler S. (1966), "The structure of formally organized socialization settings", in O.G. Brim and S. Wheeler (eds.), *Socialization after childhood*, J. Wiley, New York

Williams K. et al. (1987), "The end of mass production", in *Economy and Society*, 3

Williamson O.E. (1975), *Markets and hierarchies*, The Free Press, New York

Williamson O.E. (1985), *The economic institutions of capitalism, Firms, markets, relational contracting*, The Free Press, New York

Williamson O.E. (1990), "The firm as a nexus of treatises: an introduction", in M. Aoki, B. Gustaffson and O.E. Williamson, *The firm as a nexus of treatises*, Sage, London

Wrege C.D. and Greenwood R.G. (1991), *Frederick W. Taylor. The failor of scientific management: myth & reality*, Business One Irvin, Homewood

Woodward J. (1958), *Management and technology*, HMSO, London

Woodward J. (1965), *Industrial organization: theory and practice*, Oxford University Press, London

Woodward J. (1970), *Industrial organization: behaviour and control*, Oxford University Press, London

Zeitlin J. (1990), "The third Italy: inter-firm cooperation and technological innovation", in R. Murray (ed.), *Technology strategies and local economic intervention*, Spokesman Books, Nottingham

Zimbalist A. (1979), *Case studies on the labor process*, Monthly Review Press, New York

Zucchermaglio C. (1995), "Studiare le organizzazioni. Apprendimento, pratiche di lavoro e tecnologie nei contesti organizzativi", in C. Pontecorvo, A.M. Aiello and C. Zucchermaglio (eds.), *I contesti sociali dell'apprendimento*, Edizioni Universitarie di Lettere Economia e Diritto, Milan