DYNAMICS OF STRATEGY:
A FEEDBACK APPROACH TO CORPORATE STRATEGY-MAKING

Vittorio Coda
Full Professor
ISEA
Università Luigi Bocconi
Viale Isonzo, 23
20135 Milano
tel +39 02 5836 2523
fax:+39 02 5836 2530
vittorio.coda@uni-bocconi.it

Edoardo Mollona[1]
Associate Professor
Department of Computer Science
Università degli Studi di Bologna
Mura Anteo Zamboni, 7
40127 Bologna
edoardo.mollona@uni-bocconi.it
emollona@cs.unibo.it
tel +39 051 209 4883
fax +39 051 209 4510

Introduction

The article analyses a company's strategic management processes. The objective is to propose a dynamic model to explain how does a company's realised strategy emerge from interactions of purposes, tensions, and pressures dynamically interplaying. The aim is at contributing in two directions. First, we expect the model will be useful to management as a reference frame for understanding and efficiently governing the dynamics of the company system and of the strategy actually applied, both in cases in which the aim is to transform it radically, and when it is to be innovated by means of gradual evolutive innovation. Second, the model constitutes a set of hypotheses to orient further empirical and theoretical analysis.

The analysis which we conduct, examining theoretic contributions and empirical settings, is

[1] The author has used the contribution of the CNR fund entitled "New dynamic models for understanding and planning company strategy. From resource accumulation systems to organisational learning" (CNRC004195_002).

strongly influenced by the assumption that the subject of the strategic government of companies may benefit from a systemic approach which considers the dynamic interaction among the many processes which impact a company's situation. Markedly, the strategic processes we focuse on are the learning processes which lie at the origin of top management's strategic intents; the managerial processes in which top management's actions are made clear; the organisational behaviour imposed by companies' top management or which develop independently of the latter. All these processes unfold in environmental contexts which are usually intensely changeable.

2. The strategic management process in literature

Documentation on the strategic management process has attempted to ask itself what the strategic management of a company means, how the (realised) strategy is evaluated, how the (intentional) strategy is defined and what the other relevant activities are in the strategic management process.

In particular, in an attempt to answer the above questions, the theoretical contributions on the subject of strategic management have been characterised by the position they have assumed with respect to the following problems:

1. interpretation of the strategic management process as a purely analytical-rational process or as a complex learning by doing process;
2. interpretation of the strategic management process as a top-down or bottom-up process;
3. interpretation of the role of top-management in governing the process.

For example, in the Harvard tradition, which gave rise to the schools which Mintzberg (1990) re-christened Design School [Andrews 1971] and Planning School [Ansoff, 1965, 1979, 1984, 1991], the strategic management process is of an analytic-rational type in its formulation phase and also in its realisation phase (this latter essentially intended as the design and implementation of an organisational structure, in the broad sense, logically descending from the content of strategic choices). This set-up is decidedly top-down and is based on the hypothesis that the decisions are totally rational and the realisations are logically consequential.

Normann [1977] highlights the fact that the formation of the business idea (in other words of a successful strategy or entrepreneurial formula in companies is always a learning by doing process. With Mintzberg [1978, 1979, 1984, 1991] the separation between thought and action was eliminated; strategy is the resultant of a learning process which proceeds along a parallel path: that of a decided strategy which embodies the top-down, analytical-rational aspect and that of an emergent strategy, the fruit of a trial by error process in which there is a strong bottom-up component (see Figure 1).

According to Bower [1970], Burgelman [1983a, b, c, 1991, 1994] and Noda & Bower [1996], the strategic process is essentially a bottom-up one in which the CEO, although, on the one hand, playing a fundamental role in establishing a company's strategic and organisational context, in which the strategy takes shape, on the other, limits himself to "adjusting" company strategy a posteriori, relying on and rendering official the results of the strategies which have survived the selective pressure of the company's strategic and organisational context. Within this group of contributions, which intend strategy as the result of a continuous learning process rather than as the result of an a priori analytical process, we may also position the contribution of Quinn [1980, 1981], which sees strategy as a logical incrementalism process in which company leaders channel flows of activity and events into conscious strategies[2].

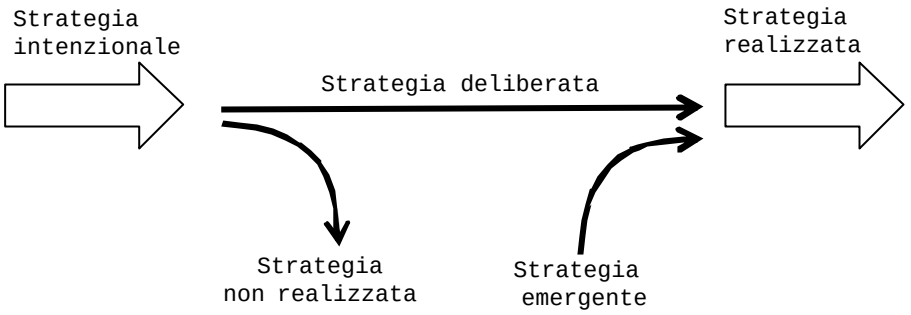
Lastly, the extreme results in this sense are those achieved by the evolutionist economists Nelson and Winter [1982], who almost totally cancel the role of company management, as the provider of global rationality, and give first place to the strategic process, intended as one which results from the evolution of organisational routine. Environmental changes impose learning processes in which inefficient routines are replaced by efficient ones.

This replacement – in view of the deeply-rooted interconnection of routines which are enchained in a hierarchical fashion, from those regarding production activities to those which crystallise managerial processes – forces the change to be transmitted within the organisation. According to this theory, company management has the task of accompanying the learning process by facilitating the elimination of inefficient routines, removing the difficulties in transmitting the change within the organisation and stimulating the change of the routines by means of innovation of imitation [Mintzberg, Ahlstrand e Lampel, 1998]. However, the real agents of the evolution of company strategy are said to be the subsystems in which the organisational routines are localised.

Because of the emphasis assigned to learning processes in forming company strategy, the contributions we have listed – from Norman to Mintzberg, Bower, Burgelman and Noda and possibly Quinn, and finishing with Nelson & Winter – can be traced back to a line of thought which Mintzberg, Ahlstrand and Lampel [1998] have called the Learning School.

FIGURE 1

[2] As Mintzberg, Ahlstrand and Lampel [1998: 180-182] point out, Quinn can be considered as an exponent of the Learning School because of the emphasis placed on the incremental component of strategy. However, the authors highlight a certain ambiguity which could position half way between the Learning School and the Design School. In fact, in certain contributions, Quinn describes the shaping of strategy as a process of which the CEO has a very clear idea, a priori, of company strategy and incrementalism is the fruit of the realisation effort which has to pass through the gradual creation of the necessary political conditions for the strategy to be accepted. Therefore, incrementalism could be said to be the fruit not so much of a learning process within the strategy definition process, as the outcome of the difficulty in controlling political coalitions within the company.



Source: Mintzberg [1978]

3. A number of open problems

As we have seen, the contributions of Norman, Mintzberg, Bower and Burgelman highlighted a number of fundamental aspects, like the decisive role of learning and the spontaneous, emergent component of the company's strategic activity. In addition, these contributions have helped us to re-interpret the role of the company leader, re-dimensioning his "heroic" content [Burgelman, 1983a] as the enlightened guide, in perfect control of the situation, and highlighting his no-less important qualities as the designer, or the architect, of complex systems. Starting from this base, let us now attempt to move forward towards, clarifying certain problems which were left open by the previous contributions.

3.1 Local vs. Global rationality and learning: A feedback approach:

Although Normann and Mintzberg and Bower-Burgelman clearly highlight the spontaneous, emergent component of strategy, based on learning-by-doing processes, the substance and protagonists of these processes need to be further clarified.
It is one matter to say that the CEO learns because he observes the result of the strategic action enacted. It is another matter to state that the CEO monitors, approves and includes a posteriori into company strategy the results of emergent strategic initiatives generated by front-line managers or other collaborators like researchers or people close to customers and the market, who are not necessarily members of the company top management.

In the first case, we shall not distance ourselves greatly from the existence of a certain unique and global rationality as the motor of strategic change; the learning process is an individual one: the leading player in the CEO who, by observing the facts and emergent information, re-

examines his strategic intents, or does not re-examine them, but learns to be more effective in the actions taken to realise them. In this case, we shall have a process in which, starting from Mintzberg's model in Figure 1, information deriving from the realised strategy reaches the CEO who processes it and promotes the generation of emergent strategies (loop 1 in Figure 2). Secondly, the new realised strategy which now also incorporates the results of the emergent strategies can help make a contribution towards changing the intentional strategy (loop 2, Figure 2. This situation, in which the top manager is personally involved in a entrepreneurial-like, strategic innovation activity, remind us of typical situations of small-medium sized companies in which the articulation of the hierarchical levels and degree of complexity to be managed are of a low level.

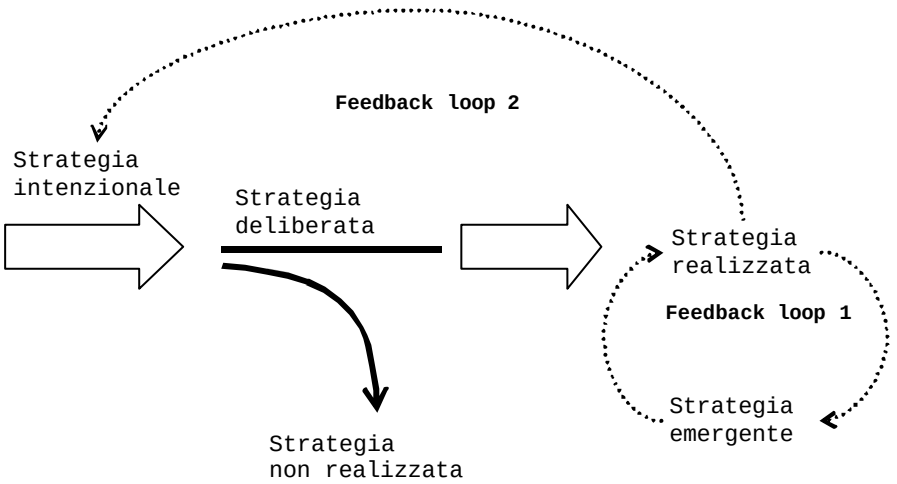
The process is substantially different if we consider large, complex companies with an articulated organisational structure. In this case, the CEO has a different role in governing retroaction loop 1 in Figure 2. In the first place, the CEO increasingly manipulates the strategic-organisational context in order to induce[3], rather than to develop personally, emergent strategic initiatives in which the contents come under an 'umbrella strategy'[4].
In the second place, the CEO decides to what extent to approve or discourage strategic behaviour or initiatives which, on their conception, do not come under the company's umbrella strategy. If he decides to allow strategic initiatives of this type to germinate, via loop 2 of Figure 2 the CEO will have to adjust the umbrella strategy a posteriori in order to incorporate the content of these emergent strategic innovations.
It is clear that in the second interpretation of the strategic learning process, the agents who contribute to learning are distributed throughout the entire company system and the functioning of loop 1 appears to be the result of a choral effort. On the one hand, we have the players who, bottom upwards, gradually enrich the operating strategy with new contents, both within the confines established by the company management and in totally new directions; on the other, we have the management which makes its contribution both by designing the company's strategic-organisational context and by adjusting, along the way, the strategic aims in the presence of emergent initiatives which, although they were not originally included under the umbrella strategy, appear to be valid and promising.

A sort of 'specialisation' is established in which the role of top management is to conceive the strategic-organisational context, designing company strategy, for example by outlining the company business portfolio strategy, with the middle and front-line managers engaged in developing specific strategic initiatives like, for example, the development of new products. In this case, learning is positioned at system level and the latter therefore evolves as a result of the aggregation of contributions received from various areas and different hierarchical levels within the organisation.
A third interpretation of the strategic learning process, which could be configured as an extreme case of 'specialisation', is the one described by Burgelman for the Intel case [1991]: having gradually shifted its production from semiconductors to microprocessors, after only ten years, the company officially states that it has left the semiconductor business[5].

[3] For this type of emergent strategic initiatives, Burgelman uses the concept of induced strategic initiatives [Burgelman, 1991].
[4] For this type of emergent strategic initiatives, Burgelman uses the term 'autonomous strategic initiatives' [Burgelman, 1991].
[5] Looking closely, this second feedback loop, which describes the mechanism which generates and adapts strategic intents, was not considered by Mintzberg who, nevertheless, albeit at an implicit level, considers loop 1

The nature of this last type of learning process could by described, in Figure 2, by saying that the company management governs loop 2 while the front-line management or other members of the organisation manage feedback loop 1. In other words, we may say that the Intel case appears as an extreme version of Burgelman's description of the strategy formation process in which the sharing of tasks in the context of the strategy formation process is taken to it extreme consequences and a company management which governs loop 2 and other figures performing a leading role are identified in loop 1.
In the company reality, it is probable that learning processes, in which the contribution and role of top management is different, co-exist and become confused. However, with a view to understanding and governing the mechanisms at the base of the evolution of company strategy, a distinction should be drawn between the characteristics of processes of a different nature. Mintzberg does not use the concept of the feedback loop and focuses his contribution on identifying a generic learning process in which it is difficult to single out the truly spontaneous and evolutionistic component of strategy formation.
On the other hand, Burgelman is interested precisely in highlighting the feedback mechanisms which lie at the base of the formation processes of strategic aims and of emergent strategies in a big company in which different levels of management and an articulated network of players must be identified. In the contribution of the Author, these are presumed to contribute in different ways and to a different extent to the formation of company strategy.

FIGURE 2



Source: adapted from Mintzberg [1985]

---

when he explains that emergent strategy takes shape from the learning triggered by the attempt to realise the strategy. Therefore, we imagine that, while the strategy is realised progressively, it produces observable results which become the starting point for learning in field.

3.2 Need for stock and flow diagramming

A second area which, in our opinion, requires probing, concerns the managerial implications of conceiving the formation of strategy as a circular process, in which thought and action 'feed' each other mutually and fuse formulation and realisation activities into a single process. In general, literature on strategy-making processes overlooks the distinction between sub-processes, which make up the strategic management process, and the products or the results of this process. In other words, in the traditional management literature, the symbolic language used to describe cause-effect relationships seldom includes the notion of stock and flow variables. Yet, to provide managers with appropriate operational and conceptual tools to govern strategy dynamics it becomes essential to distinguish between flow variables, which may be employed to represent strategic sub-processes, and stock variables, which are results of strategic sub-processes and generate inertia in a firm's strategic behaviour.

Returning to Mintzberg's diagram shown in Figure 1, we note that some of the concepts illustrated refer to processes and that others appear to be more specifically the observable results of the processes themselves, or state variables.

For example, considering intentional strategy, this would appear to be an observable result of processes which generate strategic intents and aims. Inversely, as far as intentional strategy is concerned, certain doubts arise. Should we consider it as an observable result of processes intentionally aimed at achieving the strategic intents?
Furthermore, it would appear that, concerning realised strategy, there are no doubts about considering it as an observable product, for example in a company's physical-technical, organisational and patrimonial set-up. But what should we understand by emergent strategy? Should we intend the processes which modify realised strategy from the bottom up as a result of strategic management, or as both?
Also in this case, the distinction between processes and results is a necessary starting point for an accurate description of the strategic management mechanisms in a company. If we consider emergent strategy as a product, it is interesting to understand where and how we observe this product. For example, we could identify emergent strategies with the various initiatives enacted without official support from top management, with the ongoing research and development projects or the experiments and trials that top management itself wishes to encourage in order to adjust strategy 'along the way'. If, on the contrary, we consider emergent strategies as processes, we must understand the morphology of these processes and identify the relevant sub-processes.

Describing appropriately a feedback dynamics means to to rigorously distinguish, and tease out the interplay between, processes and products of processes; the former observed over periods of time and the latter in different points in time. For example, intentional strategy, as well as being the product of certain processes (strategic planning, visioning, etc.), defines a desirable situation which orientates and directs managerial actions aimed at achieving it. Realised strategy, as well as being the product of top-down and bottom-up executive processes, defines a context from which learning processes unfurl in-field, resulting in operational innovations and strategic initiatives.

4. Governing the dynamics of strategy: a systemic model.

In this section, we propose a model of the strategy's dynamics. The description of the model is articulated into three phases. The first phase highlights the level variable which in the symbolic language used by us represents the state of a system at a certain point in time as the result of one or more processes.

The question we asked ourselves in this first phase is as follows: if we imagine a company's strategy as a dynamic system, in which various types of processes are entwined, at a certain point in time, what are the observable products of these processes? In other words, if we imagine that we can freeze the company strategy system in a certain moment, what are the stock variables which will crystallise its state?
The second phase in the construction of our model is the description of the processes, or of the flow variables, which result from the stock variables and affect the state of the same[6].
Lastly, the third phase consists of highlighting the causal chain which links stock variables and flow variables.

The model proposed is rooted both in relevant literature and in a set of longitudinal case studies. In particular, the construction of the model and the selection of the variables is based on a grounded-type approach [Glaser & Strauss, 1967], based on analyses of the cases of companies involved in important strategic-organisational change processes[7].

[6] In this paper use is made of a symbolic language based on the distinction between flow variables and stock variables in order to represent economic processes. In proposing such a logic, we expect to use System Dynamics to make explicit assumptions that permeates, inplicitly, thinking in strategic management. Not only this is true as far as anglosaxon management literature is concerned but also in European tradition. For example, the representation of the dynamism of economic processes based on the flow-stock dichotomy was implicitly inserted into the heart of Italian company tradition as early as Zappa. On the one hand, Zappa claimed that the movement is usually represented as a "sequence of states" in which the accumulation of previous variations is observed [1957: 930-931], and on the other, he suggested that in order to fully understand production phenomena, the mere association of a sequence of states is not sufficient, but that the definition of times and durations is also necessary in order to describe the processes "within the unit of time".
The portrayal of dynamic phenomena centring on the distinction between sequence of states, which vary in their accumulation, and processes, defined in the unit of time, is therefore similar to the representation based on stock levels, which at a certain moment in time represent the state of a system following successive accumulations and on flow variables which describe the rate of variation of the stock variables within a certain period of time.

[7] The central body of the empirical research consists of a clinical analysis conducted with a 'grounded-type approach [Glaser & Strauss, 1967] to the case of IBM between 1993 and 2000. The analysis of IBM's case was conducted by means of open-ended interviews (about 20 interviews with managers who in the period considered held important positions), the study of balance sheets, the examination of internal procedures and documents (memos, e-mails, manuals) and the collection of information published in newspapers, specialised magazines and previous studies.
The analysis of IBM's case also formed the starting point for the development of subsequent clinical analyses of company case histories, which are still under way, aimed at corroborating the constructs and the relations between constructs. In addition, in order to make the description of the grounded model more vivid, where this appeared to be plausible, reference was made to empirical cases, like that of General Electrics, for example, analysis of which was conducted above all on secondary sources.

4.1 Stock variables

Guided by the analysis of the literature and the information drawn from the empirical analysis, we selected four significant stock variables to describe the state of the company strategy system at a certain moment in time[8]: the basic strategic orientation and the intentional strategy of the CEO, the realised strategy and the portfolio of strategic and operational initiatives/innovations.

The basic strategic orientation (BSO) of the CEO [Coda, 1989] is the level variable which incorporates the mental patterns of top management, in other words the basic values, convictions and attitudes formed over time as a result of accumulated experience. The BSO is a variable, which although it is not tangible, forms one of the hinges on which the company strategy system is articulated; in fact, all the formulation and realisation processes of strategic intents, analyses, the interpretation and control of results, are permeated by interpretative patterns which have been consolidated over time [Argyris, 1982; Argyris & Schon, 1978].

The second level variable which we consider to be relevant is the CEO's intentional strategy. This variable includes both the strategic goals and intents and the possible plans for achieving them. The concept may also include the strategic intent proposed by Prahalad e Hamel [1989], which evokes a desired market leader position and the criteria for monitoring the approach to this position. Strategic intents can be drawn, for example, from official documents like the report to shareholders or the statements issued by top management during interviews, press conferences, meetings with collaborators and other events in communication.

The third level we shall deal with is realised strategy. This includes both the variables and relations which define the structure of the company system operating at a certain point in time in a given environmental context – therefore, for example, strategic positioning, the organisational set-up, actual company culture and values – and the variables which, observed as they unfurl over time, indicate its economic-financial, competitive and social performance.
In the description of the state of the system, the latter may come into play as rates, or rhythms, but are observable results when accumulate into stock variables (for example, monthly profit or loss production rates, or monthly billing production rates) or of relative performance levels (for example, level of customer satisfaction or level of staff motivation). Realised strategy is therefore an extremely complex aggregate variable which, in its systemic and dynamic complexity indicates the concrete situation which the company's top management finds itself having to govern strategically at a given moment in time.

Lastly, the final level variable we highlight is the Portfolio of strategic and operating initiatives/innovations; it embraces: on the one hand, projects and business ideas in the experimentation and development phase and on the other, innovations, ideas and proposals not yet incorporated into operations, aimed at reducing costs, improving quality, speeding up processes and increasing productivity. As is evident, these are two different stock variables

[8] By analysing the literature, we identified a series of wide categories of concepts (for example the intentional profile of company strategy is linked - albeit with different facets – to both Mintzberg's concept of intentional strategy and to Prahalad's and Hamel's strategic intent). The categories formed in the analysis of literature were then compared with the constructs and relations between constructs which emerged from the empirical analysis.

which are brought together exclusively in order to avoid overcomplicating the model.

4.2 Flow variables

Having described the stock variables, we now pass to a description of the processes, represented by flow variables which, over a certain interval of time, modify the state of level variables.

We consider five groups of processes which modify the state of the four stock variables described previously: value and mental pattern learning processes; intentional strategy realisation processes, innovation generation processes and innovation selection and realisation processes.

The first group includes the learning processes of values and mental patterns, in other words the processes which affect top management's BSO, enriching, modifying and/or strengthening its content. By observing the results of its decisions incorporated into the realised strategy, the members of top management learn and evaluate the suitability of their mental patterns. For example, they adjust their ambitions according to whether they have been seen to be unachievable or not very challenging, or they adapt their basic beliefs to the attitudes of members of the organisation or other stakeholders, having observed their behaviour.

The second group considers the intentional strategy formation processes, i.e. all the processes which are responsible for the formation of the contents of a desirable strategic outlook and therefore worthy of being achieved. We may assume that the strategic intention formation process emerges as the combination of various subprocesses.

There probably exist: a (company and environmental) situation analysis subprocess; a subprocess in which the top management's ambition for challenging goals takes shape, which we define as visioning; a sub-process of benchmarking competitors to elicit strategic directions; an analytic-rational and organisational strategic planning subprocess and an a-poteriori learning subprocess.

Our empirical analyses revealed the presence of these subprocesses with differing levels of importance and in different proportions. Dissimilarities may be explained, in our study, by referring to the degree of organisational formality/informality, to the level of top management's ambition, to the more or less participatory style of leadership, to the ability to effect an in-depth analysis of the problems, to the realisation of contextual conditions for stimulating strategic creativity, to the CEO's conception of his role and his way of interpreting it.

In a third group, we include the processes for realising intentional strategy, i.e. the managerial processes which result from the strategic intentions and are aimed at ensuring that the latter are realised.

These processes can be ascribed to the following classes:

- processes of communication and sharing the intentional strategy;
- processes for structuring a company's business portfolio;

- processes that set up, or adjust, organisational structures and operating mechanisms;
- processes that encapsulate the launching of company challenges and the projects into which these latter translate;
- processes that crystallise fundamental managerial processes (decision-making, planning, budgeting, controlling, staff assessment and management).

The fourth group is that of the generation processes of innovations which include processes aimed at creating operational innovations and internal entrepreneurship processes which generate strategic innovations. The innovation generation processes are, in various ways, stimulated by the environmental opportunities and cultural and morphological characteristics of the company context. By morphology of the organisational context, we intend, for example, the characteristics of the mechanisms, formal or informal, via which internal entrepreneurship is stimulated or discouraged. As far as the informal mechanisms are concerned, the culture, history and folklore which permeate the life of a organisation form a layer of accumulated information which reveals the widespread attitudes towards innovation.
On the other hand, these attitudes are frequently formalised into programmes or routines, systems of remuneration, promotion and stimulation. Suffice it to think, for example, of the 'melting-pot of ideas' created by General Electric at the end of 1988, which involved the constitution of a periodic forum among employees in which the latter could present ideas and proposals on how to make their business more effective and have an immediate reaction to the initiatives presented. Inversely, at 3M, the stimulus to produce innovation is also created by the "15 per cent rule" which enables employees to allocate 15% of their time to work on ideas which they believe to have some development potential, and by the goal, imposed by the divisions, of having at least 30% of turnover originate from products introduced in the last four years.

The last group of processes to which we refer are the processes for realising and selecting innovations. These functions act as a filter on the various emergent initiatives. These 'filters' may be of an official type and be incorporated into formalised routines In this case, they assume the form, for example, of processes of periodic assessment of the economic-financial, commercial and strategic potential of the single emergent strategic initiatives or of feasibility studies of the latter. Or, the selection processes may concern the evaluation of costs, opportunities and the possible recovery of efficacy and efficiency made possible by innovations of an operational type.
These processes are usually linked to resource allocation mechanisms which enable the initiatives to survive, grow stronger and finally emerge. On the other hand, there are also informal mechanisms which stimulate or discourage emergent strategic and operational initiatives. For example, as Burgelman [1991] explains, it sometimes happens that strategic initiatives can survive and be finalised outside the official evaluation and selection mechanisms.

4.3 Causal chain

Following the description of the flow and stock variables, we can proceed to link the variables by drawing the retroaction loops.
We show four fundamental loops: the strategic control loop, the strategic intent formation loop, the entrepreneurship and propagated initiative loop and the learning loop of mental patterns and the BSO.

Strategic control loop (loop 1)

The first feedback is loop 1 via which the realisation of intentional strategy is controlled. Once intentional strategies have been modelled and possibly articulated into strategic plans, the resulting realisation processes are oriented towards reducing the gap between strategic intents and realised strategy (Figure 3). Each time, we note the distance between goals and results the realisation processes are gauged in order to govern the dynamics of the system, however without intervening on the intentional strategy which is 'given'.
Loop 1 is a mechanism which performs a strategic control activity[9] and therefore behaves as a thermostat: it aims to preserve the homeostasis of the company strategy system when it is felt that that entrepreneurial formula in operation does not require adjustment, or to place the system on a new trajectory of evolution if the company management intends to change the operating entrepreneurial formula. We may liken this loop to the first-order learning loop of Argyris [1982].

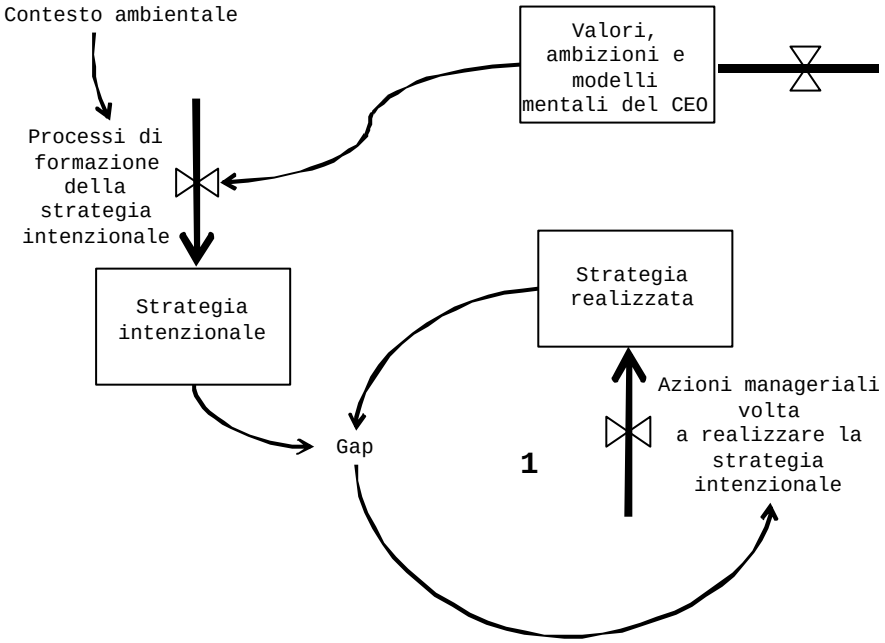
The strategic control loop describes a company's ability to execute a certain strategy promptly and efficaciously. For example, on his arrival at IBM in 1993, Gerstner complained that the company stressed the moment in time at which the strategy was defined and indicated dangerous shortcomings in the effective realisation of the strategy. According to Gerstner, the result was that the strategic plans were left on the shelf and never realised. It was not by chance that one of Gerstner's interventions was to introduce the concept of *execution*, i.e. the ability to realise or execute strategic intents rapidly and efficaciously into management performance assessment[10].
In loop 1, the gap created between the desired situation and the actual situation, between goals and results is a fundamental variable. Not only the size, but also the quality of this gap should be considered. In fact, on the one hand we expect that loop 1 is aimed at keeping the gap under control, at minimising it, so we are led to hope for a situation in which the gap is limited.
On the other hand, given the function of a stimulus performed by needing to close the difference between goals and results, it is a physiological fact that the gap is never totally eliminated and we must ask ourselves questions about the quality of the existing gap. This quality depends above all on the depth of the analysis of the situation to be strategically managed and on the values and ambitions at the basis of strategic intents: a great deal of ambition and superficial analysis or in-depth analyses not supported by an ethical conception of the company (warped by the interests of the controlling group) give a negative character to this gap, from which destructive tension is released.

[9] To increase the efficacy of the control loop management can use traditional strategic control tools or diagnostic control systems [Simons, 1995].

[10] Lucio Stanca, currently the Italian Minister for Information Technology, was until 2000 Chairman and General Manager of IBM EMEA (EMEA stands for Europe, Middle East e Africa); he reported to us the atmosphere of those years: "Gerstner told us, "You should not create strategy. I, myself, and the BRAND managers will create strategy. You carry out." Stanca adds "Previously, we all created strategy. We had bands of planners! In IBM Italy alone we had 300-400 planners. Gerstner forced us to emphase execution".

Inversely, as an example of a gap creating creative tension, we should consider the one perceived by Hayek when, in 1984, he assumed the leadership of SMH. The quality of this gap is marked, on the one hand, by an in-depth analysis of the competitive problems and the situation of Swiss watchmaking companies and on the other, by basic values and beliefs which, in the light of the facts, proved to be extremely valid.

FIGURE 3



The protraction of a gap which creates constructive tension is the starting point, or the spark, which starts off a process generating company efficiency and development. For example, in the case of General Electric, the strategic intent of being the number 1 or 2 in its business and the analysis of the actual competitive situation led to decided afterthoughts regarding the ASA portfolio (disinvestment of 200 businesses and 370 acquisitions); the goal of being a 'lean and flexible' business, compared with the high degree of bureaucracy previously existing in the company, led to reflections on organisational structure, the thinning out of jobs with the cutting of 50% of the strategic planning group's employees and the reduction of hierarchical levels from 9 to 4. The intent of becoming 'lean and flexible' then resulted in the definition of the 'improved practices' programme and the launch of the company challenge called 'surpassing ourselves'.

Inversely, at IBM, in 1994, well ahead of other companies in the sector, Gerstner's strategic intent of winning the leadership in the business of services linked to the Internet or, more generally, to connectivity technologies, resulted in the decision to shift 25% of the research

and development budget to projects related to the Internet and the creation of a study group which was to prefigure the characteristics of the new emergent sector and of the new products which had to be developed. After about a year's work, in September 1995, the study group presented its conclusions and in October the fundamental decision was taken to allocate three hundred million dollars for the creation of the Internet Division.

Strategic intent formation loop

This second loop represents the process whose protagonists are the top-managers who draw useful indications from the realised strategy in order to re-examine and adjust strategic intents (Figure 4). We note that, in our model, we keep the two processes of the formation of strategic intents and the learning of values and mental patterns distinct.

Our hypothesis is that the fact that strategic intents can change according to the observation of the results of past actions does not necessarily imply that the basic beliefs and values of top management must also change. For example, a company can re-dimension its goals in terms of market share when it has seen that it was unable to achieve these goals.

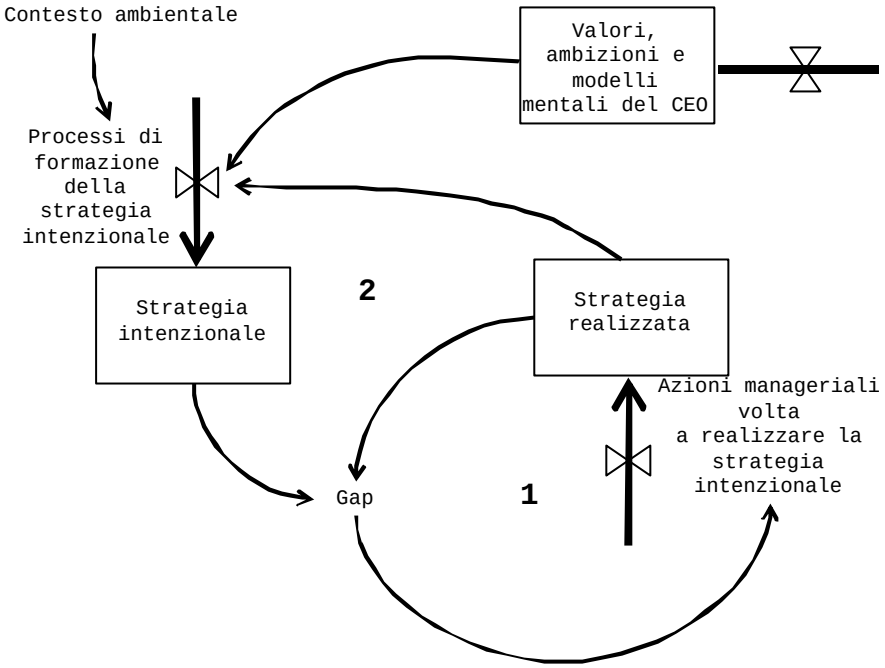
Re-examining the goals in the elucidation of the strategic intents may have the aim of not 'stressing' the organisation at a given point in time and granting it the time to reorganise its forces, to then re-attempt to achieve the most challenging goal. Nevertheless, all this takes place without losing the profound belief that the ambitious market share goal can sooner or later be achieved.

For these reasons, we use the term 'learning' where there is a real adjustment of mental patterns and inversely, we use the expression 'formation of strategic intents' when the change to the strategic intents is not a result of updating mental models but, rather, of a gradual elucidation and awareness of one's own mental patterns or of tactical needs for managing the gap.

A concrete example of how this motor works is provided by an interview which Jack Welch, General Electric's CEO, released in the late 80's when GE's restructuring process had already been under way for a number of years: "In the mid-80's, the hardware part, or the structural aspect, was more or less at a satisfactory stage. We were pleased with our businesses. The time had come to tackle the software". In this interview, it emerges how the observation of what had been achieved led to the gradual enrichment of the content of the strategic intents without, however, changing the basic goals.

In conclusion, whereas in the strategic control loop observation of realised strategy is used to monitor the degree of realisation of the strategic goals, the latter, contained in the intentional strategy, in the strategic intent formation loop, observation of the realised strategy is preparatory to the adjustment of the goals themselves. In the first case, the goals remain stationary and act as a reference point for control, in the second case, the goals evolve as the realised strategy changes.

FIGURE 4



c. Entrepreneurship and diffused initiative loop

The third loop describes the bottom-up innovation processes which are the expression of internal entrepreneurship phenomena (in the case of strategic innovations) or merely of involving projects aimed at generating operational innovations which blossom into increases in productivity.

In the diagram shown in Figure 5, loop 3 consists of a series of elements. The process pivots on a stock variable: the strategic and operational initiatives, the latter describe the results of the subprocesses which, positioned upstream and downstream of the stock, modify its level. The choice of a stock variable of strategic and operational initiatives is the response to a precise demand for research: at a certain moment in time, what describes the energies, tensions and resources which are operating in order to generate innovations in the strategy or operational reality of a company?

For example, the patents owned by a company represent the results of innovative initiatives after the latter have been selected, funded and realised and have become part of the realised strategy. On the other hand, the ideas and projects in support of which resources and energies have not yet been added indicate the richness and cultural fertility of a certain organisational context and are therefore elements of the realised strategy, although they do not yet constitute 'initiatives'. By representing the strategic and operational initiative variable, an attempt is made to 'photograph' the intermediate moment in time at which the stimuli and incentives present in the organisational context have taken shape and combined into initiatives which have nevertheless not yet changed the strategic–organisational context and are still in the development phase. This photograph makes it possible to observe the processes upstream and downstream of the stock of strategic and operational initiatives. Upstream, the initiative generation processes which take place in the strategic-organisational context, feeding the stock of strategic and operational initiatives; downstream, the selection

and realisation processes, by means of which the single initiatives are assessed and funded; these processes empty the stock of initiatives since, once selected and realised, single initiatives help to modify realised strategy and becomes and integral part of it.

In this way, the realised initiatives define the cultural environment in which the subsequent initiatives will be conceived. For example, this description is coherent with the contribution of Burgelman [1983a, b, c; 1991]. The latter highlights how the strategic initiatives generated inside a company, which are fundamental elements of both incremental and revolutionary strategic innovation, are at the same time the product of certain strategic-organisational contexts and the stimulation towards changing these contexts.

Loop 3 describes the potential of large organisations for renewal. In fact, the behaviour of companies, and in particular, the ability to generate strategic and operational initiatives from innovative contents may remain confined to trajectories defined by the company's past history, with obvious problems of self-reference, or they may emerge as self-organised phenomena, totally new and unpredicted, in the sense that they originated not in a top-down fashion, or as the product of top management's rationality alone, but as a result of the repeated interaction of a strategic-organisational context with individual and local behaviour.

An example of how the mechanism of loop 3 can function is provided by the well-known case which describes the conquest of the USA motorcycle market by Honda in the late 50's – early 60's [Pascale, 1982].

The intentional strategy in 1958, when Honda had become the domestic market leader, was to embark on a process of internationalisation, starting from the California coast of the United States. This simple strategic intent resulted in decisions and actions which led to the setting up in Los Angeles of a tiny bridgehead made up of just a few men, with very few financial resources and a modest stock of motorcycles of all capacities, headed by a director in whose ability to get by with the few resources placed at his disposal, Mr Honda and his partner, Takeo Fujisawa, placed their complete trust.

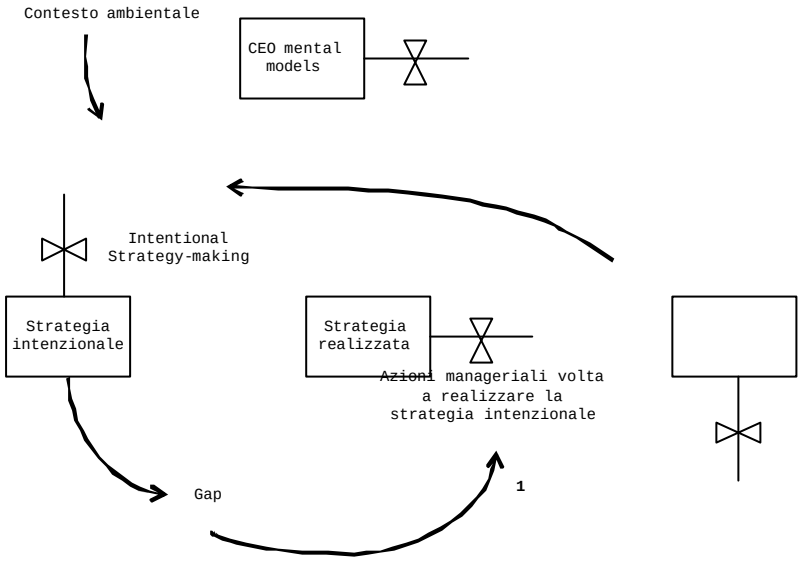
On the field, this small nucleus of men was able to develop a radically innovative learning process which soon led to the discovery of the existence of a market for low-capacity motorcycles in the USA, about which no-one had previously even thought, to the widening of the outlet for medium and large capacity motorcycles in a new segment, to the opening of new channels and to tip relations between contractual strength and the trade over in its favour. In conclusion, the bottom-up working of loop 3 provided the stimulus to explore a segment that was marked by a usage function so far neglected (the use of motorcycles as a means of healthy amusement) and rather more extensive that the one in which European manufacturers and Harley Davidson had been positioned,.

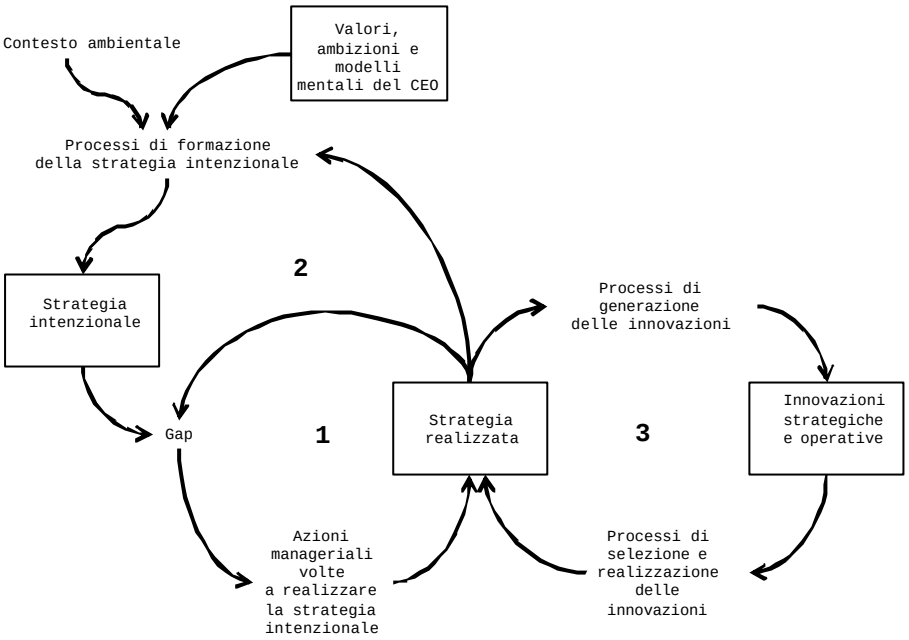
This reported case of Honda is useful for exemplifying and putting into focus loop 3, precisely: the criticality of "realised strategy" as a body of variables which configure the strategic-organisational context in which "learning by doing" takes place. Within an firm's organisational context, strategic innovations emerge which constitute the heart of a successful entrepreneurial formula. Loop 3 helps to highlight the criticality of the relationship between top management and front-line management in defining the quality of the behavioural context in which the latter operates and concretely shaping the process of selecting and retaining innovations.

There are situations in which, within the frame of a realised strategy, both because the strategic intents are only generally outlined – for example in situations of environmental uncertainty - and because in the realisation of the strategy new opportunities emerge which enrich or change the contents of the strategic intents, the role of the patrimony of internal entrepreneurship diffuse inside a company becomes fundamental.

In the case of Honda, the managers who were sent to the USA were able to exploit the resources placed at their disposal within the sphere of the realised strategy, by means of a learning process, by trial and error, behaving as entrepreneurs in the true sense of the word.

FIGURE 5





d. The loop of learning/revision of mental patterns and the OSF

The process represented in loop 4 of Figure 6 highlights the impact which observation of the results of strategic action has on the learning of the mental patterns of top management. Compared with the mechanism described in loop 2, the learning process shown in loop 4 goes to greater depth because, stimulated by the impact on realised strategy of processes upstream and downstream of the latter, it changes management's mental patterns, i.e. it goes to the roots of strategic intents. Therefore, loop 4 describes a mechanism which is very similar to the second-order learning of Argyris [1982].

For example, in IBM's restructuring process started by Gerstner at the end of 1993, the motor which was loop 4 made it possible to constantly refine the basic beliefs concerning IBM's field of activities, it role in the competitive arena(s) in which it operates, its way of being and operating and the meaning assumed by profit as a measure of success.

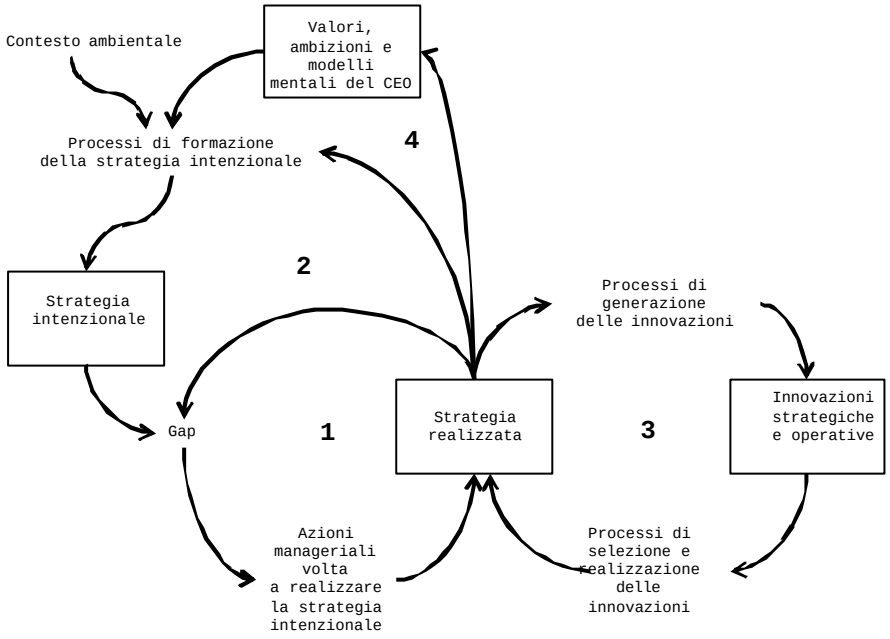
Concerning the field of activity in particular, Gerstner, following an in-depth, evolving analysis of IBM's distinctive competencies and of competitive arenas in which the company was present, realised that the information technology sector was evolving profoundly and that value for the customer was created not so much in production as in assembling services.

Gerstner's strategic goal was therefore to make IBM a company providing integrated Edp services and able to create value by producing new solutions to old problems and creating new competencies.

Subsequently, Gerstner further refined the definition of the field of activity and in around 1995, the idea that IBM was essentially a service company became even clearer and developed into the strategy for making IBM not only an important company in the Information Technology Sector but also, and above all, the biggest service company linked to what Gerstner defined in 1995 as network-centric computing (NCC), i.e. the possibility of communicating and exchanging various types of digitalised information like video, high resolution images, voice and music by means of interconnected networks of computers. Gerstner realised that NCC

and the tool which is its prime motor, Internet, would lead to a profound revolution in world's culture and way of life and therefore, in the business strategies of client companies. So IBM's mission would become to accompany companies in this technological and cultural transition.

FIGURE 6



In conclusion, the model presented suggests that in order to manage the strategy, both as a continuous process and as a 'one-off' profound transformation process, we must acknowledge the existence of the four motors described.

The first motor highlights top management's ability to create, more or less efficaciously, managerial actions aimed at achieving the contents the intentional strategy. The second motor refers to top management's ability to update, if required, the strategic intents, taking account of the structural changes within the environmental context and company situation. Also by this means, the gap is controlled, aiming to keep the level of motivation of collaborators high without causing stress.

The third motor makes it possible to achieve the potential for innovation built into the company's articulated human and organisational chain, to the extent that energy, know-how and creativity are released in the direction marked by a productivity and development growth strategy into new spaces for entrepreneurial initiative and responsibility. The possibility that this strategy can be shaped "bottom-up" increases the company system's adaptability, making it quicker in perceiving the changes under way in the environment and in framing suitable responses. Lastly, the fourth motor describes top management's ability to open itself to questions and to learn, challenging its own mental patterns.

4.4. Co-ordination of the motors of strategic dynamics

In order to successfully manage a company's strategy, it is necessary to learn how to orchestrate the simultaneous operation of the four motors, controlling two delicate areas.

The first area concerns the co-ordination of the strategic control motor (loop 1) on the one hand, and on the other, of the motors for forming strategic intents and learning of mental and BSO patterns (loops 2 and 4).

Making the first motor work means being able to reduce the gap between realised strategy and intentional strategy. Jack Welch of General Electric and Lou Gerstner of IBM are examples of leaders able to achieve strategic intentions effectively, shifting resources within the organisation, redesigning operational mechanisms and creating the necessary motivation for pursuing the new goals with determination.
On the other hand, high profile strategic management also requires the company's top management to be able to govern loops 2 and 4 in order to re-open the gap between realised strategy and intentional strategy, creating constructive tension which pushes towards challenging goals.
Therefore, the first area for attention in governing the dynamics of strategy can be defined as 'management of the gap'. The company management must be able to govern the gap: a persistent and significant gap between strategic intentions and their achievement can be the result of shallow analysis and excessively high ambitions which lead to the definition of unachievable goals or to inconsistent plans and executive actions and in all cases, results in the generation of non-productive stress and negative tension within the organisation.
On the other hand, the existence of a comfortable situation of well-being with no gap can be the indication of a dangerous state of equilibrium, featuring no positive tension, and the company is drawn towards a state of inertia which is detrimental to its very survival.
The second area to which attention must be paid concerns loops 1, 2 and 4 on the one hand and loop 3 on the other. In fact the first group of motors is indirectly driven by the CEO who assumes a fundamental role in directing the movement. By means of loop 1, the CEO governs the achievement of strategic intents; via loop 2 he adjusts strategic intents and finally, by means of loop 4, he reviews and updates his mental patterns and, as a consequence the intentional strategy. Inversely, loop 3 is only indirectly governed by the company's top management.
The potential protagonists of motor 3 are distributed more or less throughout the organisation and are all those who are able to develop new ideas and initiatives, stimulated by the learning that develops in-field and by a strategic and organisational context which rewards co-operation and widespread initiative. The company's top management influences this loop only indirectly as an architect or design engineer who designs and shapes the strategic and organisational context, making it a 'behavioural environment' [Batlett & Goshal, 1995] which is more or less favourable for the generation of operational and strategic innovations.
As far as operational initiatives are concerned, we should think, for example, of the impact of a leadership style consisting of 'wandering around' in production departments and offices, asking questions and looking into the innovations achieved and problems of improvement. We should also remember the impact in terms of involvement and mobilisation on the behavioural environment – if they are properly managed - of challenging projects aimed at increasing productivity, like, for example 'action work-out', 'quality loop' and 're-engineering'

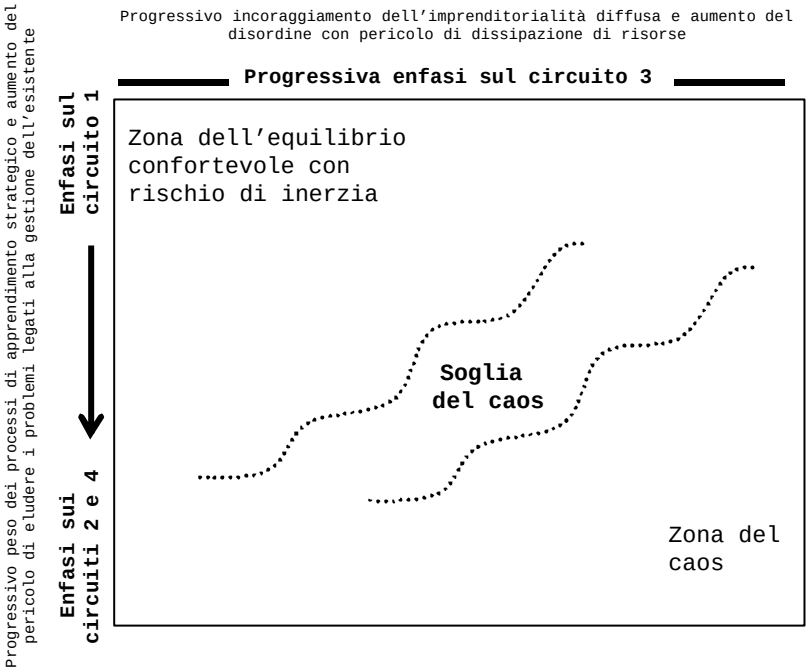
projects, etc.
Concerning strategic innovations, we should bear in mind the distinction between innovations introduced into top management's strategy – the so-called 'induced' innovations [Burgelman, 1991] which contribute to the realisation of intentional strategy, and innovations which, if allowed to proceed, are likely to changed the company strategy being pursued (the latter are the so-called 'autonomous' strategies [Burgelman, 1991]). Now, the organisational context can be shaped in order to leave more or less liberty in exploring new business areas outside the dominant strategy and the 'core' competencies of the company and in using resources for experiments and research even if the latter do not promise tangible results in the short term.
The greater the freedom of action assigned to loop 3, the greater stimulus will be given to liberalising creative energies and entrepreneurial behaviour but, on the other hand, the greater the disorder and dissipation of resources and energies might be in non-correlated directions and with no exploitation of synergies.
The systemic model drawn up, with identification of the motors at the base of the company system's strategic dynamics, highlights a fundamental problem which characterises the study of the strategic behaviour of companies: the role and space for manoeuvre of top management in shaping company strategy in the face of the emergence of bottom-up self-organisation processes, of the inertia which characterises the variation of stocks of resources, be they tangible or intangible, or of consolidated mental patterns and the difficulty in anticipating the consequences of the decisions taken within the context of dynamic, complex company systems.
On the basis of the model developed, the two areas of attention considered now cross in a matrix (Figure 7).
The first dimension, on the vertical axis, concerns the use of motors 1, 2 and 4. The more intense the function of the learning loops of mental patterns and the formation of strategic intents is, the greater the tendency will be to abandon situations of equilibrium and to move towards the exploration of new territories, new business areas, new products, new technologies and new management systems, taking up new opportunities but also running the risk of neglecting or underestimating the existing situation and of conceiving strategic intents which cannot be achieved or are too distant from the company's basic competencies or of creating too much stress within the organisation.
On the other hand, a management which focuses exclusively on loop 1 risks paralysing the company in a situation which is comfortably balanced but potentially dangerous because it is prone to change into inertia and the inability to face the challenges laid down by the discontinuities in the environmental context (competitive, social, juridical-institutional, etc.) in which the company operates. The second dimension, on the horizontal axis, concerns entrepreneurship and diffused initiative.
The looser and freer of constraints the use made of the motor in loop 3 is, by moving – in the diagram – from left to right towards areas of creativity, freedom of experimentation and disorder, the more the company' strategic behaviour will be left to be the result not only of the unique rationality of the company's top management but also of the local rationality of the other members of the organisation.
So it will be necessary to decide to what extent to liberate or bridle loop 3. In this case the aim will be to enable the company to avoid renouncing the achievement of the innovation and creativity potential present in the organisation if loop 3 is excessively restrained, or leaving too much freedom of initiative inside the organisation, generating chaos, disorder and the dissipation of resources if loop 3 is allowed to unfold without instilling it with the discipline necessary also for innovations to be produced.

So the model contributes to explain how, by steering the four strategy motors , to approach a zone which we call the threshold of chaos [Pascale, 1999; Pascale, Milleman and Gioja; 2000], which represents a condition, an intermediate, permeable stage between order and disorder and which is the place in which innovation is produced. As figure 7 illustrates, in the search for the threshold of chaos, there are two areas to avoid: the top-left area of pathological equilibrium in which the danger a form of inertia which immobilises company strategy, and the lower right-hand one where the level of chaos and disorder is unsustainable. In short, innovation can be produced neither in a well-balanced and comfortable situation void of stimuli and tension which prompt the creation of innovations not oriented towards maintaining the status quo, nor in chaotic environments in which there is strong tension pushing towards change and innovation but failing to channel itself in a constructive manner. If this is true, the task of the top management governing a company with a successful, consolidated entrepreneurial formula is to introduce, into the well-balanced comfortable situation in which it finds itself, elements of disequilibrium which push it towards the area called the threshold of chaos, taking care not to cross and surpass it.

If, on the contrary, the management finds itself managing a company in a situation of serious crisis or strategic disorientation, the top management's task is to introduce elements of equilibrium which push towards the threshold of chaos, in other words into an area in which energies and stress can be channelled in order to achieve the inescapable goals of increasing productivity and renewing the entrepreneurial formula.

In order to avoid falling prey to the opposing dangers of deadly equilibrium and pathological chaos, management should be clearly aware (i) of where the obstacles lie which prevent it from governing the company along the paths of innovation; (ii) of what the inescapable elements of discipline of the behavioural context are, which are not only compatible with the need to innovate, but are also functional in terms of innovative processes.

FIGURE 7



5. Conclusions

From a theoretical point of view, the contribution which the article aims to offer is twofold.

First, the article provides a platform for organising and interpreting literature on the strategic process of companies, by using the symbolic language of feedback loops and the logic of analysis crystallised in them. In this sense, the work presented proposes an example of how feedback loops can be used to represent and communicate theories of the strategic behaviour of companies. In fact, although literature on strategic management dedicates increasingly more space to approaches to research which are influenced by studies on dynamic systems and complexity and are therefore characterised by non-mechanistic, interpretative logics in which increasing attention is paid to relations between circular-type variables rather than one-way ones, the circular nature of the causal model used frequently remains implicit, concealed in the web of narrative theories and not represented and communicated in an explicit and rigorous way [Farjoun, 2002]. In this respect, we suggest that futher studies may go in the direction of formalising and further articulate the theory through computer simulation, thereby testing its internal coherency and honing hypotheses for empirical testing. Along these lines, we hope the article will provide a theoretical reference to guide longitudinal clinical studies finalised to interpret emerging strategic behaviour of large

organisations.

Second, although the work presented does not contain specific operational indications on, for example, what the optimal equilibrium between the various loops is and how this equilibrium can be achieved, from a more applicative point of view it provides a tool for diagnosing the strategic behaviour of companies. Given that the representation logic used pivots on the concept of a complex dynamic system, typically characterised by its capacity for self-organisation in constantly new and unexpected states, we felt that it was interesting to investigate the dimensions for creating a conceptual space in which to analyse the dynamics of strategy, showing the tension, pressures, forces and processes in play.
The positioning of the matrix in Figure 7 forms the basis for effecting a dynamic analysis of pathological aspects or the traps which characterise the trajectory of a company's strategic behaviour, receiving indications as to which loop has to be stimulated or slowed down. In addition, the article facilitates the metaphorical use of a number of concepts which management studies have borrowed from contributions on the theory of complexity.
For example, considering the pathological state of equilibrium described by positioning the matrix of Figure 7 in the top left-hand corner, we can hypothesise that the more companies emphasise the processes for achieving strategy to the detriment of learning and entrepreneurship strategies and the more they adopt top-down control logics, the more they run the risk of entering states of entropy intended as states of equilibrium void of usable energy[11]. In this light, the challenge of steering the company towards the threshold of chaos becomes the compulsory path for importing energy into the company, stimulating organisational learning[12] and the entrepreneurship processes and, as a result, avoiding the entropic decay which is typical of closed systems.

[11] Through the lenses of the theory of complexity, the notion of equilibrium takes on shades of negative connotations because it is a thermodynamic equilibrium, i.e. a state of stagnation reached in a closed system when entropy is at its highest and the ability to produce energy has fallen to its lowest level [Prigogine and Stenger, 1993: 124-130]; in this state, the system is inert and we are approaching an inescapable state of degradation [Monod, 1970:187].

[12] The contributions produced in the chain of literature on organisational learning are a useful support for understanding the problems relating to the control and design of organisational learning processes. More precisely, certain contributions have created particularly important areas of research regarding the strategic-organisational change of a company.
For example, as early as 1988, Nonaka dealt with the subject of the management of orders and chaos in organisational learning processes (Nonaka, 1988). Inversely, March tackled the problem of how to balance the exploitation of existing knowledge with the exploration of new terrain (1991). Nonaka and Takeushi (1995) analysed the link between the production of knowledge inside an organisation and the generation of innovation by the organisations itself, whereas Spender (1996) laid the foundations for a dynamic company theory based on knowledge.

6. Bibliographical references

ANDREWS, K. R., 1971, The Concept of Corporate Strategy; Irwin, Homewood, IL.

ANSOFF, H. I., 1965, Corporate Strategy; McGraw-Hill, New York.

ANSOFF, H. I., 1979, Strategic Management; MacMillan Press, Ltd., London and Basingstoke.

ANSOFF, H. I., 1984, Implanting Strategic Management; Prentice-Hall International, Englewood Cliffs, NJ.

ANSOFF, H. I., 1991, Critique of Henry Mintzberg's 'The Design School: reconsidering the basic premises of strategic management'; Strategic Management Journal, 12:449-461.

ARGYRIS, C., 1982, Reasoning, Learning, and Action: Individual and Organizational; San Francisco: Jossey-Bass Inc..

ARGYRIS, C. e SCHON, D. A., 1978, Organizational Learning: A Theory of Action Perspective; Reading, MA: Addison-Wesley Publishing Co..

BARTLETT, C. A. e S. GOSHAL, 1995, Rebuilding behavioral context: turn process reengineering into people rejuvenation; Sloan Management Review, Fall.

BOWER, J.L., 1970, Managing the Resource Allocation Process: A Study of Corporate Planning and Investment; Harvard University Press, Boston, Mass..

BURGELMAN, R.A., 1983a, A process model of internal corporate venturing in the diversified major firms; Administrative Science Quarterly, 28, pp. 223-244.

BURGELMAN, R.A., 1983b, Corporate entrepreneurship and strategic management: insights from a process study; Management Science, Vol. 29, pp. 1349-1364.

BURGELMAN, R.A., 1983c, A model of interaction of strategic behavior, corporate context, and the concept of strategy; Academy of Management Review, Vol. 8, No. 1, 61-70.

BURGELMAN, R.A., 1991, Intraorganizational ecology of strategy making and organizational adaptation: theory and field research; Organization Science, 2, pp. 239-262.

BURGELMAN, R. A., 1994, Fading memories: A process theory of strategic business exit in dynamic environments; Administrative Science Quarterly, Vol. 39: 24-56.

CODA, V., 1989, L'Orientamento Strategico di Fondo delle Imprese; UTET.

FARJOUN, M. , 2002, Towards an organic perspective on strategy; Strategic Management Journal, Vol. 23, No. 7.

FORRESTER, J. W., 1961, Industrial Dynamics; Productivity Press, Cambridge, Mass.

FORRESTER, J. W., 1968a, Principles of Systems; Productivity Press, Cambridge, Mass.

FORRESTER, J. W., 1968b, Market growth as influenced by capital investment; The Industrial Management Review, Vol. 9, No. 2, pp. 83-105, Winter.

FORRESTER, J. W., 1969, Urban Dynamics; Productivity Press, Cambridge, Mass..

FORRESTER, J. W., 1971, Counterintuitive behaviour of social systems; Technology Review, Vol. 73, No. 3, January.

FORRESTER, J. W., 1973, World Dynamics; Productivity Press, Cambridge, Mass..

FORRESTER, J. W., 1992, Policies, decisions and information sources for modeling; European Journal of European Research, Vol. 59, pages 42-63.

GLASER, B. G. e A. L. STRAUSS, 1967, The Discovery of Grounded Theory: Strategies for Qualitative Research; Aldine de Gruyter, New York.

HAMEL, G. e C. K. PRAHALAD, 1989, Strategic Intent; Harvard Business Review, July-August.

MARCH, J. C., 1991, Exploration and exploitation in organizational learning; Organization Science, Vol. 2, No. 1.

MINTZBERG, H., 1978, Patterns in strategy formation; Management Science, 24:934-948.

MINTZBERG, H., 1979, The Structuring of Organizations; Prentice-Hall, Englewoods Cliffs, NJ.
MINTZBERG, H.,1985, Of Strategies, Deliberate and Emergent; Strategic Management Journal, n°35
MINTZBERG, H., 1967, Crafting Strategy; Harvard Business Review, July-August: 66-75.
MINTZBERG, H., 1990, Strategy Formation: Ten schools of thought; in J. Fredrickson (ed.), Perspectives on Strategic Management, Ballinger, New York.
MINTZBERG, H., 1991, Learning 1, planning 0 reply to Igor Ansoff; Strategic Management Journal, 12:463-466.
MINTZBERG, H., AHLSTRAND, B. e J. LAMPEL, 1998, Strategy Safari; Prentice Hall Europe.
MONOD, J., Il Caso e la Necessità; Mondatori: Milan, 1970.
MORECROFT, J. D. W., 1984, Strategy support models; Strategic Management Journal, 5(3):215-229.
NONAKA, I., 1988, Creating organizational order out of chaos: Self-renewal in Japanese firms; California Management Review, Vol. 30.
NONAKA, I. e H. TAKEUCHI, 1995, The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation; Oxford University Press: New York.
NORMANN, R., 1977, Management for Growth; Wiley, New York.
PASCALE, T. R., 1982, relazione presentata alla Strategic Management Society, October.
PASCALE, T. R., 1999, Surfing the edge of chaos; Sloan Management Review, Spring.
PASCALE, T. R., MILLEMANN, M. e L. GIOJA, 2000, Surfing the Edge of Chaos; Crown Business, New York.
PRIGOGINE, I. e I. STENGERS, La Nuova Alleanza. Metamorfosi della Scienza; Piccola Biblioteca Einaudi: Turin, 1993.
QUINN, J. B., 1980, Strategic change: Logical incrementalism; Prentice-Hall, Englewood Cliffs, NJ.
QUINN, J. B., 1981, Formulating strategy one step at time; Journal of Business Strategy, 1(3): 42-63.
SPENDER, J. C., 1996, Making knowledge the basis of a dynamic theory of the firm; Strategic Management Journal, Vol. 17, Winter Special Issue.
ZAPPA. G., 1957, Le Produzioni; 2nd volume, UTET.

Back to the Top