

EFFICIENCY AND DYNAMICS OF THE ORGANIZATIONS: INNOVATION AND DECLINE

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Abstract:

The organization can be a potential resource for encouraging innovation in a company. In its turn, innovation changes the organization. In this research paper we will endeavour to study and understand the network of mutual determination of the couple which we will call: “Organization - innovating Process”. We will therefore seek to understand and determine the organizational elements which increase creative effervescence.

System dynamics enables us to understand, over periods of time, how the process of innovation is created as well as how it can disappear. Indeed, it is in the duration and lifecycle of the organization that one can observe the collaborative forces which create the conditions for innovation.

We wish to show that the changes of an organization's state and the properties which result from this exacerbate or on the contrary inhibit innovation. Innovation is a dynamic process which begins with the identification and acquisition of knowledge and ends with transferring and implementing this knowledge into organizational initiatives. This process is influenced by the organizational characteristics, the strategic decisions and contingency factors. It may be noticed that the organization structures the forms of collaboration, the strategy of knowledge, the maturity of projects, etc....

We will highlight the principal feedback loops which determine the evolution of innovation processes and we will propose a model which presents, in a qualitative way, the behaviours and the counter-intuitive effects which result from interactions between variables. We based our research on a study carried out in a company. Our model can be used to teach the dynamics of organizational innovation.

Keywords:

Organization – innovation – process – structure - modeling – decision – simulation – experiment's sharing – property - organizational capacity – innovative capacity – forms of collaboration – competences – efficiency

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What is innovation?

‘Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. It is capable of being presented as a discipline, capable of being learned, capable of being practised’²

For the managers, innovation is initially a process mobilizing various entrepreneurial resources, before giving results (the meaning of the word innovation in the everyday language), i.e. a product or a new service offered on the market, or a way of making something new for a company. Innovation generates results for a company which are materialized by a modification of the environment (new commercial offers, evolution of the competitive position, reinforcement brand image, etc) while at the same time it modifies its internal activities, its organization to meet the environmental requirements.

Innovation is thus not a static concept but on the contrary is based on dynamic characteristics, i.e. on acting forces, sources of any change

Problems and the objective of the model

Our ambition is to decode and understand the organisational and human “levers” of the process of innovation in the company.

The company has an organisational potential created by the more or less appropriate combination of its components (the manager’s knowledge and experiment, the structuring of the activities, the intra organisational coordination, etc).

We wish to understand how the process of innovation spreads in the course of time, what are the relationships between the acting variables (endogenous) and the environment variables (exogenous) which reinforce or inhibit this process.

Our thesis is evolutionist. We attempt to show that the process of innovation can also produce its own crisis. Innovation is a factor of development but can also be a factor of change in the organization of the company which can produce counter-intuitive different results from those expected.

We will try to identify in our model, the dynamic capacity (adapted organization, dissemination of knowledge, coordination of the activities, the experiment sharing, etc) and how to pave the way to build an innovating organization (strategic alternative).

Note that the model developed here is not intended to generate theories to be confirmed, but rather to contribute to a better understanding of the possible states with the potential to evolve, instead of just analyzing the states or situations that are observed. This model is thus more generative than merely descriptive of the various possible states of a constantly evolving organization.

Our model can be used as teaching material to analyze the evolution of the organization and to observe the organisational determinants which influence the organisational capacity. The students can thus measure dynamics (forces) which act on the components of the innovation.

² Peter Drucker (1985) Innovation and Entrepreneurship, Harper & Row, New York

The model

Why do we need the System Dynamics?

Peter Senge³ shows how a system over time moves according to the threshold effects or of critical mass which may cause a lever of action to become a constraint later or vice versa.

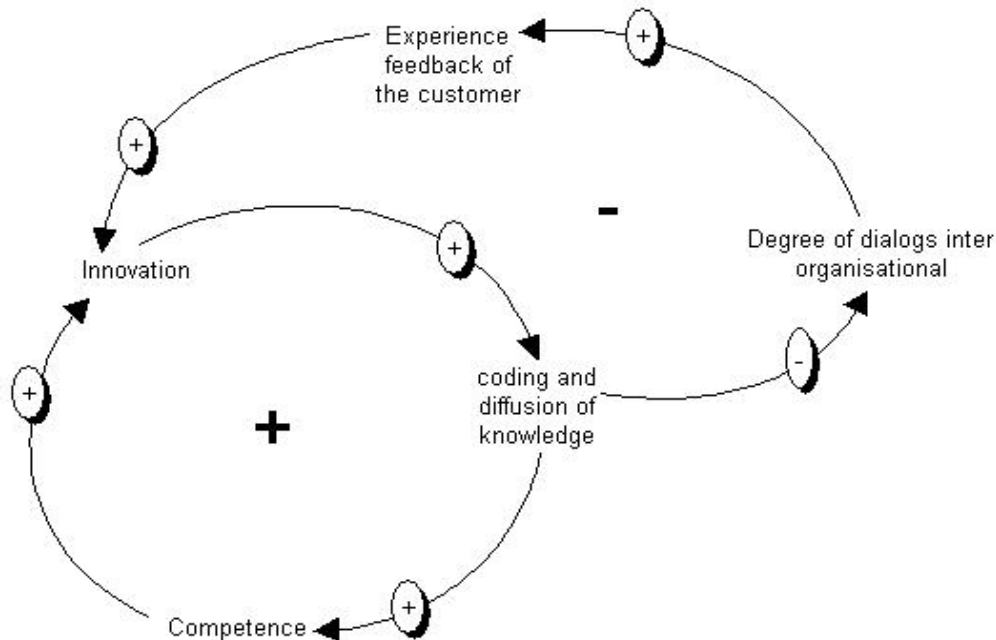


Figure 1

In diagram 1 above, innovation is triggered by already existing competences and by the experience feedback from the customers. Part of this knowledge is codified by the organization in the form, of procedures and rules, but an excess of codification (figure 1) generates an organisational rigidity and no longer facilitates the dialog with the customer who might move away from the company

Innovation is a complex process. Emergent properties appear in the course of time. We notice: the effect of amplification (amplifying insignificant causes have substantial great impact); the principle of inhibition or negative regulation (stability, resistance); the effect of critical mass or activities when certain conditions are reached; the lag-behind effect (when things happen too late after the event or the decision); the principle of diffusion or conduction (by adjacency or principle of the dominos in cascade).

During the lifespan of the company, internal pressures and forces appear and those are then used to create new states of the organization and new innovative processes. In Michel Crozier's⁴ words it is "creative effervescence".

In a previous article, we showed that the changes of state in the organization and the properties which derived from them improve the level of performance. The decisions and the actions which result from them transform the properties which structure in their turn the organization. We have a loop of determination. Consequently one can say that an innovating

³ Peter Senge (1991) *The fifth discipline*, first Publisher

⁴ Michel Crozier (1963), *the bureaucratic phenomenon*, Seuil Publisher

process determines the organization at the same time as this one exacerbates or limits the process of innovation. Thus are the dynamics of the organization and the process of innovation interdependent.

Therefore the system dynamics is an approach which is appropriate for the study of the organisational changes.

The diagram below (figure 2) analyses these dynamics and this interdependence:

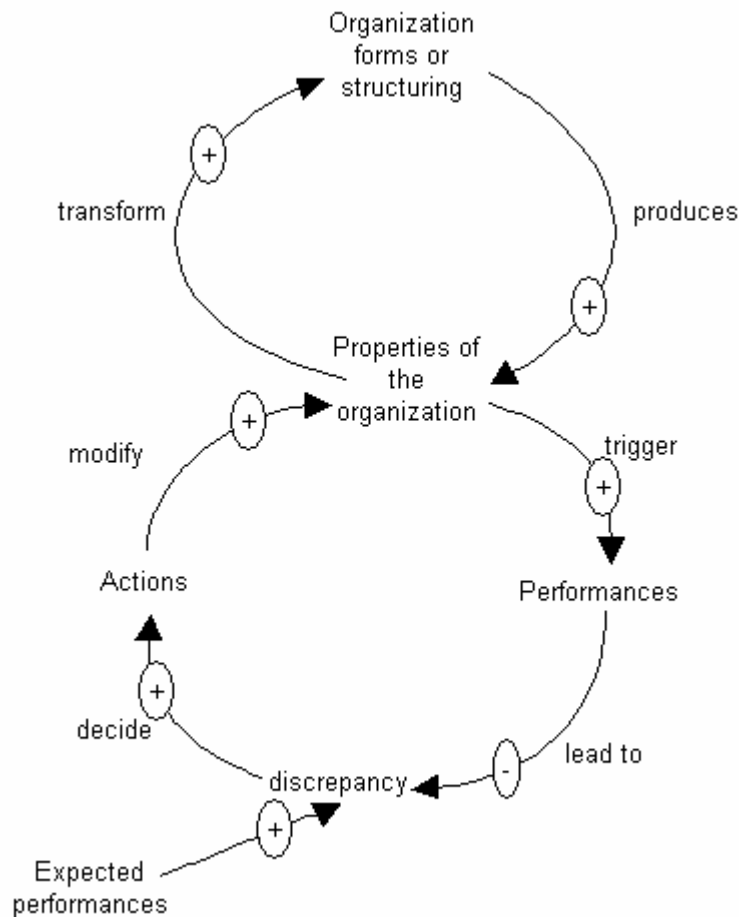


Figure 2

As Norbert Alter⁵ says “the forms of organization thus represent the result of actions carried out previously and are equivalent to crystallization”

The underlying structure of our model

Our model is built on four interacting systems (figure 3):

- 1) System of training and capitalization of knowledge
- 2) System of mobilization (People)
- 3) System of structuring of the activities
- 4) System of professionalization (experiment sharing)

⁵ Norbert Alter (2003), *The ordinary innovation*, PUF Quadrige Publisher

One can consider these systems as four forces which produce a fifth resulting force: The capacity to innovate. These four forces are interdependent. If the knowledge is actually transferred to the actors in the company, or if on the job knowledge is generalized, the actors of the organization are motivated (relation between the systems of training and mobilization). In addition to the importance of the intra dialog and inter organisational there is a factor of motivation (relation between the systems of professionalization and mobilization). It is also noted that the organisational form (structuring of the activities) has an effect on the system of professionalization (experiment sharing). Moreover the degree of dialog (experiment sharing) acts on the pace of training and the intensity of the capitalization of knowledge. Finally organisational transparency and its impact on the capacity to innovate is a stake. The transparency and organisational opacity are properties of the organization which result in having the company performance move through the process of innovation. The organization acts on the men at the same time as the latter make it move.

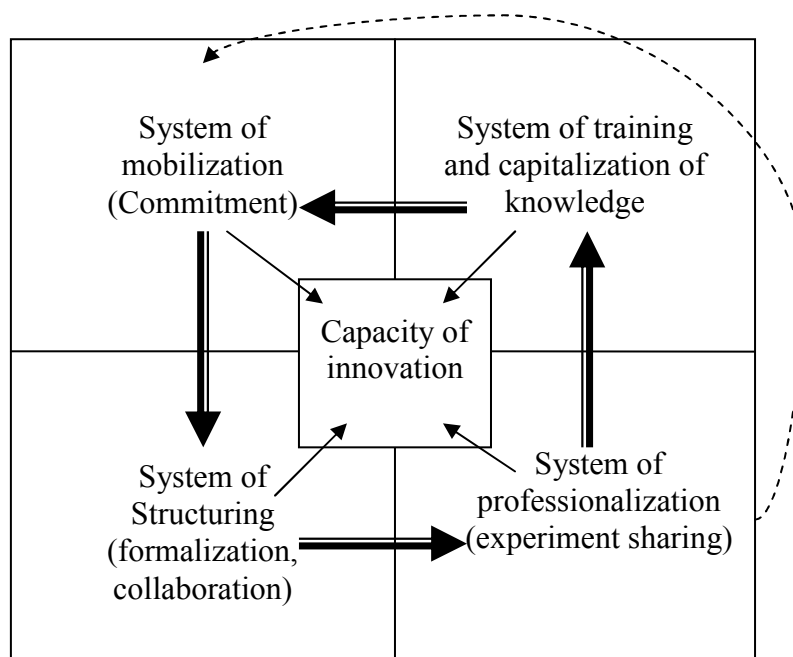


Figure 3

The system of professionalization and the experiment sharing is the organisational training process. The organisational training process is a multiplier of knowledge as it materializes it on a collective level through dialogues, discussions and experiment sharing. Thus management is learned through social exchange. It is a type of collective qualification. The management of project in the enterprises makes easy the training.

The system of training and capitalization of knowledge includes acquisition, conservation, actualization and division of knowledge. The role of the mobilization system is to allow for the implementation of knowledge into practical results.

The system of mobilization

The effectiveness of an organization lies on standards of cooperation and relations of formal and informal exchanges which allow the pooling of the knowledge. In Mr. Mauss' words :

Simultaneously an individual capacity of innovation depends on his willingness to commit himself, to take part in the creation of a new product or a service and level of capitalization of knowledge which it reached.

This willingness does not develop spontaneously.

We can postulate that the degree of implication of the staff is in relation to the degree of maturity of the organization. At the beginning without any experiment, the manager, responsible for the project, “pulls” the team then later there is a collective and progressive training on the project. Then the moment comes when the team itself “pushes” the project. Dynamics is started and the success of the projects leads to other successes. The motivation increases and the process of cross fertilization of knowledge is started.

The chaotic situation is a state where each member of the project is a “free electron”. This one is not organized. There is no method.

The structured situation corresponds to a project organized according to methods. There is learning (failures and success).

The managed situation is that where the feeling to belong to a team exists. The Organization chooses managers who are “conductors” whose the successes are recognized.

The figure 5 below shows three maturities or situations of project

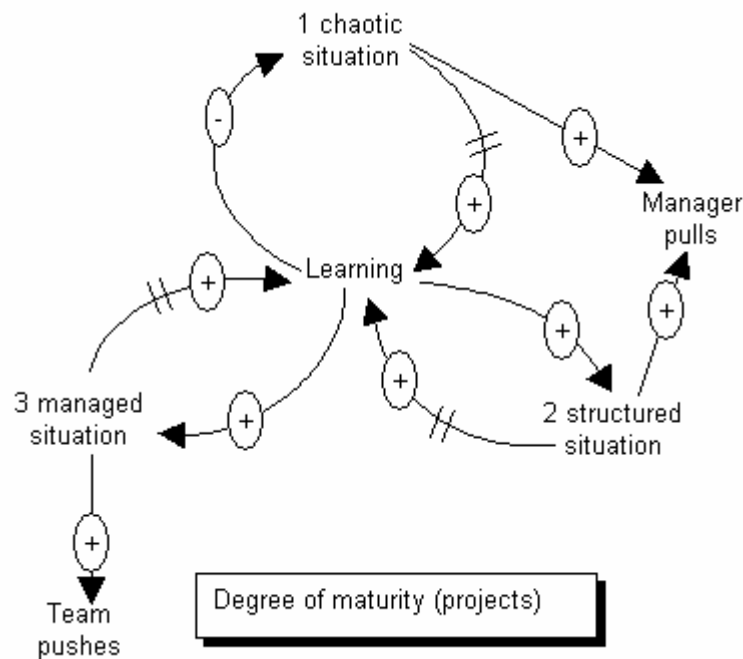


Figure 5

This commitment is encouraged by the experiment sharing which generates motivation at work, but also by received knowledge (comparable with gifts) from other actors of the company. It is necessary to privilege the transfer of knowledge a type “senior-juniors” and the networks of interaction between the managers to stimulate this capacity to be innovative.

This experiment sharing is amplified by the degree of collaboration triggered by the reputation of the company through its products, but can be constrained by the degree of rigidity of the organization. It is known that an excess of structuring of the activities limits the

flexibility and the creativity of the employees. The principal objective of the organisational training consists in limiting the defensive routines which are hurdles to changes and training.

The structuring of the activities of a company depends on the form of organization and the degree of standardization of work (significance of the rule). There are companies close to the customer with an organization built around the project or in a network mode. Others are characterized by a strong internal cohesion with a regrouping of specialized and rationalized activities.

The evolution of the forms of organization is characterized by several factors: the size of the company, the life span of the company, the intensity of the exchanges with the customers, the discontinuous process of production which becomes continuous under the influence of the new characteristics of the products and new information technologies like Internet. We privileged, in this model, the importance of flows between the customers and the company (degree of proximity with the customer). Indeed the intensity of these exchanges leads the company to be either very close to its customers, or to be distant from them.

The capacity of innovation makes it possible to develop new characteristics of the products and services. If those correspond to expectations from the consumers and even go somewhat beyond the functional requirements, the level of the performance increases and the reputation of the company grows as well as the number of its customers. But there are limits beyond, the customer is no longer interested in buying these products. The product/service meets his needs, goes beyond but there is no need for the extra.

In a process of management of innovation, it is fundamental to have a permanent dialog with the customers. This inter-organisational dialog results from the importance of the network of the customers but also the degree of coding of the knowledge which allows fluidizing the exchanges and the transfer from the knowledge. However it may lead to a counter effect if this coding is too rigorous. Indeed the excess of formalization may push customers away rather than bring them closer to the company.

The process of knowledge management begins with the acquisition of the knowledge starting from the experience sharing and it continues with its capitalization on it. It ends in their transfer.

However, preserved knowledge loses its interest or value in a gradually way. If they are not updated by the regular experience feedbacks, they rather quickly become obsolete.

This process of knowledge management is related to the process of innovation to finally create new knowledge.

Results of the model

Our model has two possible modes: the automatic mode where the computer only decides and the manual mode where it is the user who decides according to definite strategies (figure 6).

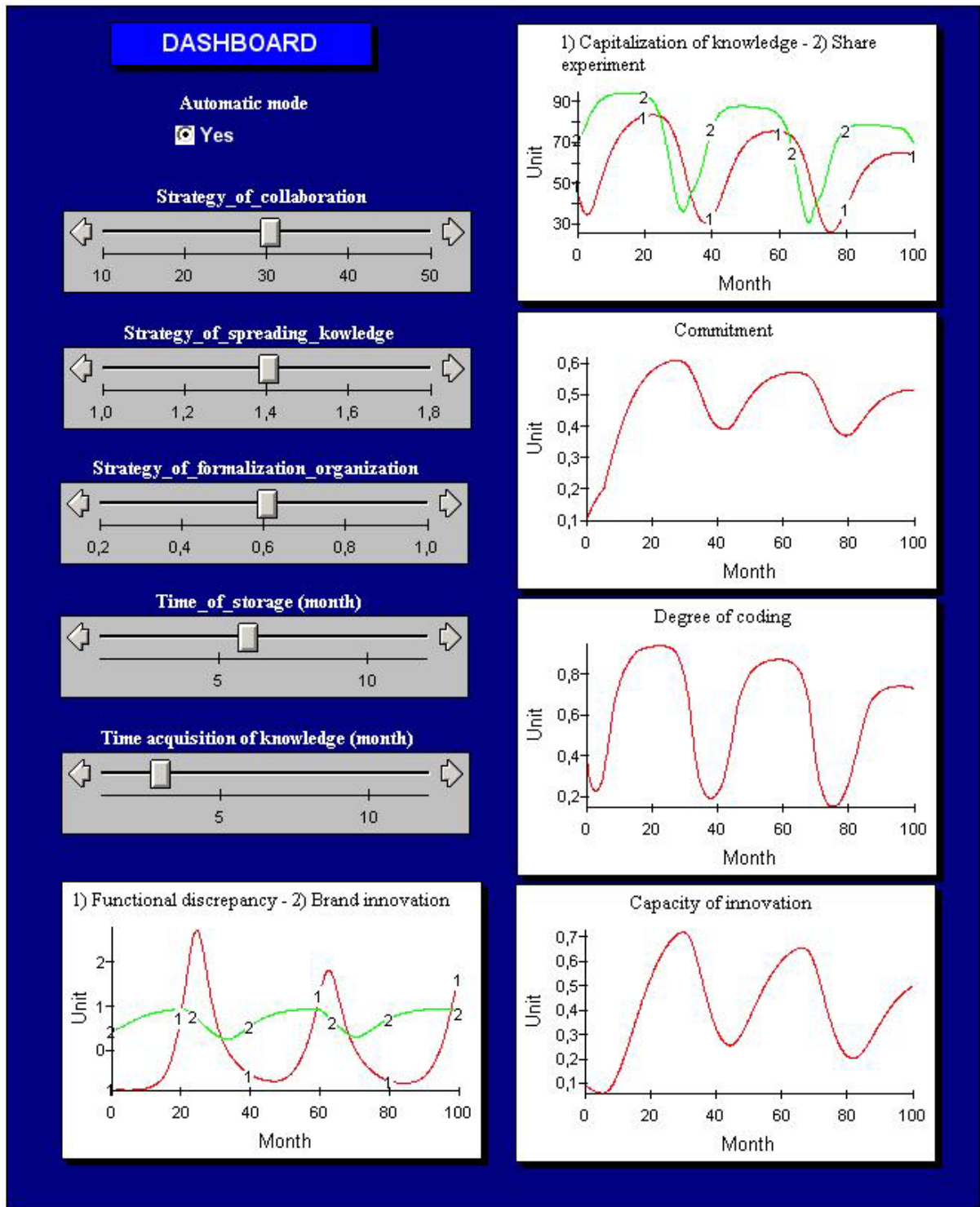


Figure 6

The 1st scenario (the computer only decides) revealed several oscillations over a period of a hundred month. These natural fluctuations (there is neither function “wave” nor “pulse”) show that there is a desynchronization between the processes or the four subsystems of our model:

- 1) System of training and capitalization of knowledge
- 2) System of mobilization (Commitment)
- 3) System of Structuring (formalization, collaboration)
- 4) System of professionalization (experiment sharing).

These oscillations come from the alternation between the rational and formalized organization which reduces a creative environment and the professionalization (experiment sharing) which draws advantage from uncertain, exploiting the internal and external networks. In the course of time, there are two opposed forces which dominate in turn.

The absence of piloting reduces the capacity of innovation and thus in the emergence of new functionalities of products and services.

The process of acquisition and capitalization of knowledge (figure 7) is a slow process. Indeed the diffusion of knowledge is not immediate since it is necessary to get over the phases of the processing of knowledge (filtering, combination, coding, etc). Moreover knowledge becomes obsolete after a few years. It is thus advisable to regularly enrich this process in order to develop knowledge. The strategy of transfer of knowledge is based on the following tasks: integration (integrating technology with production and marketing), the training, external networks, procedures, etc. The spreading of knowledge is also accelerated by the tasks of coding which makes fluid information. The dynamic diagram below makes it possible to represent the process.

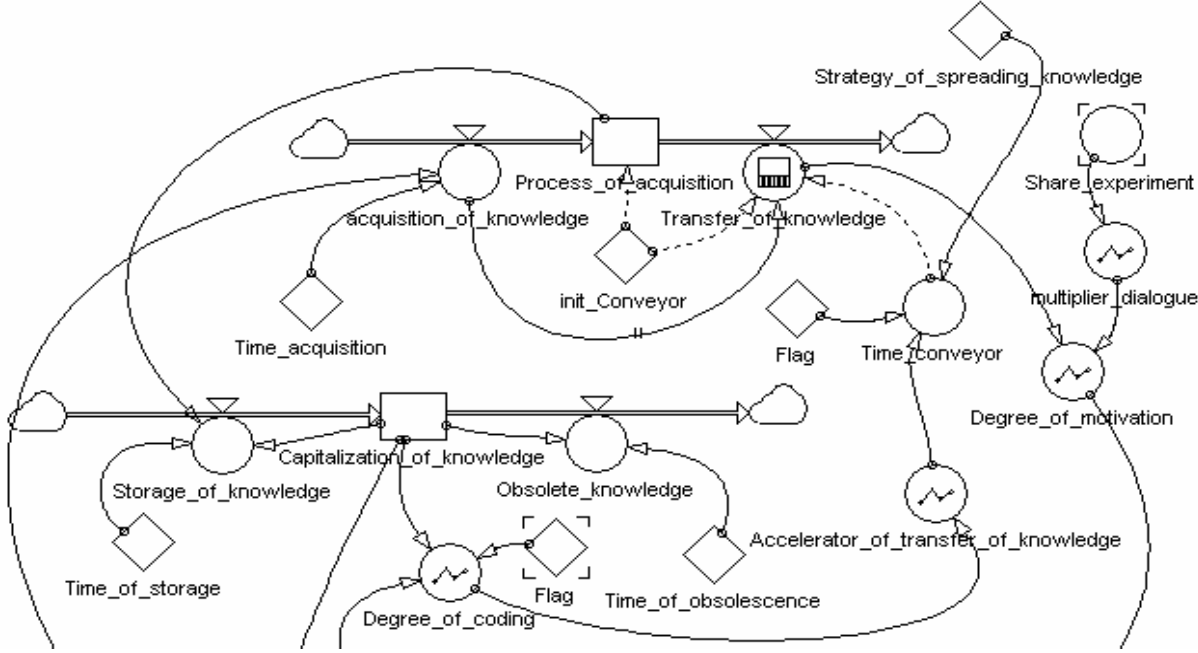


Figure 7

The process hereafter (figure 8) highlights the system of professionalization (experiment sharing) connected to the system explained above. Experiment sharing is essential to feed the process of acquisition and capitalization of knowledge. This variable “experiment sharing” depends on the degree of proximity to the customers (a number of contact points). The more customers, the more opportunities of meeting them; in addition the degree of collaboration (contract, alliance, license, consortium, joint venture, external network) acts on experiment sharing. This degree of collaboration is linked to the brand image of the company (produces, services).

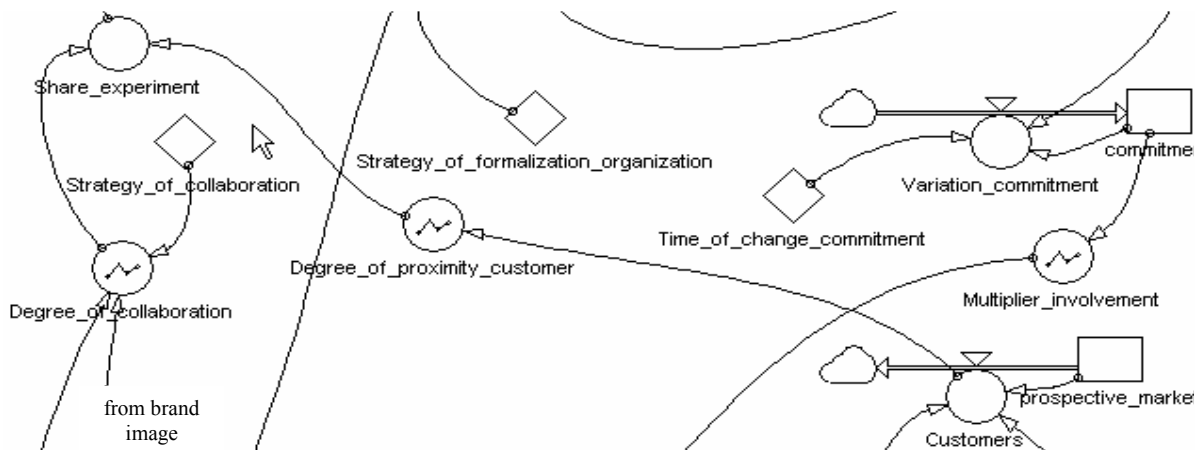


Figure 8

The capacity of innovation makes it possible to develop new functionalities of a product or a service (figure 9). Those are compared with the functionalities expected by the customers. The observed discrepancy increases the performance or on the contrary decreases it, if this one is unfavourable.

The lasting performance has an effect on the brand image of the company. At the end the new functionalities are added gradually and become everyday needs for the consumers who evolved with the new products.

The strategy of formalization of the organization rationalizes knowledge by the procedures and the rules of management.

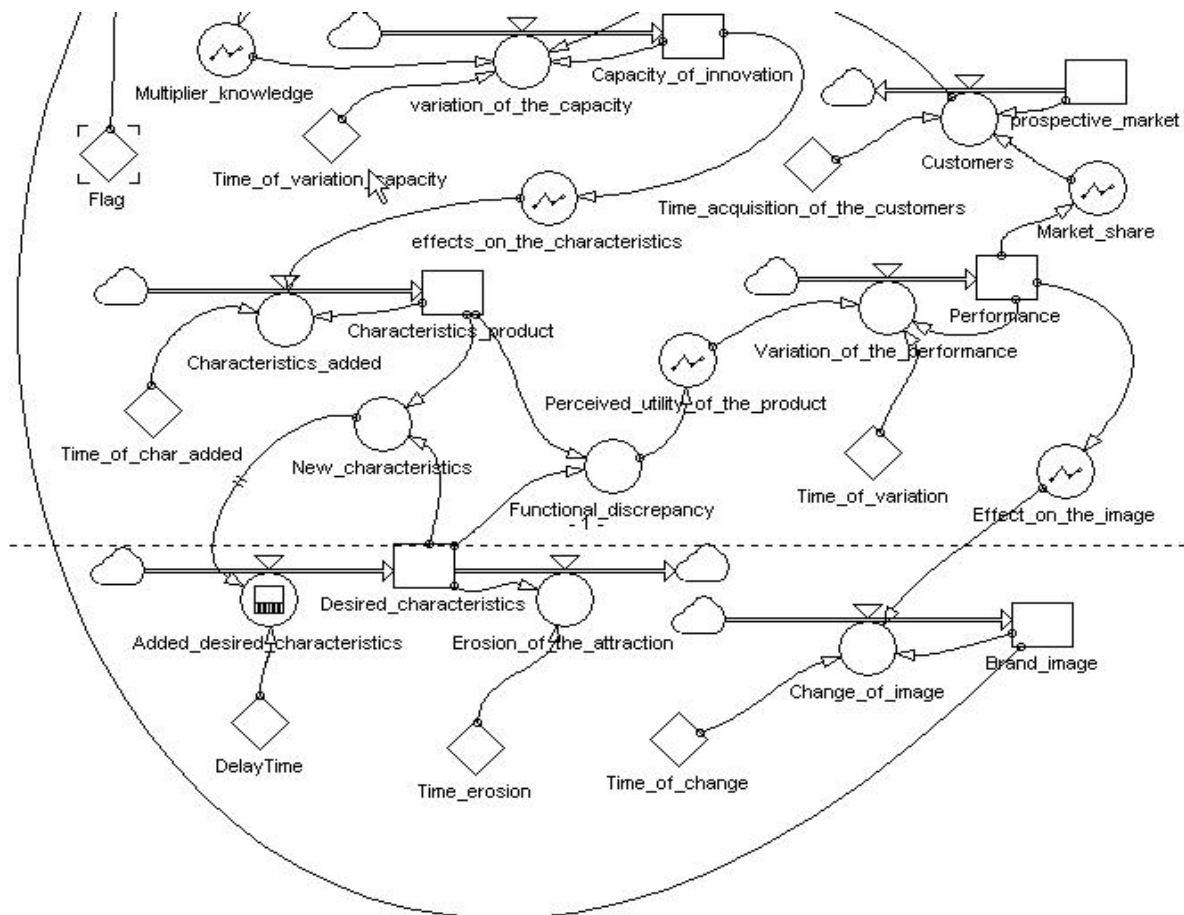


Figure 9

The 2nd scenario (figure 10)

Thanks to new technologies (Intranet, groupware), managers reduce in a drastic way time to acquire and capitalize knowledge (one month only). It is noted that the capacity of innovation after having progressed substantially decreases as of month 82. The capitalization of knowledge follows the same curb. This scenario shows what is already known in the company: in spite of the tools, intelligence is required !

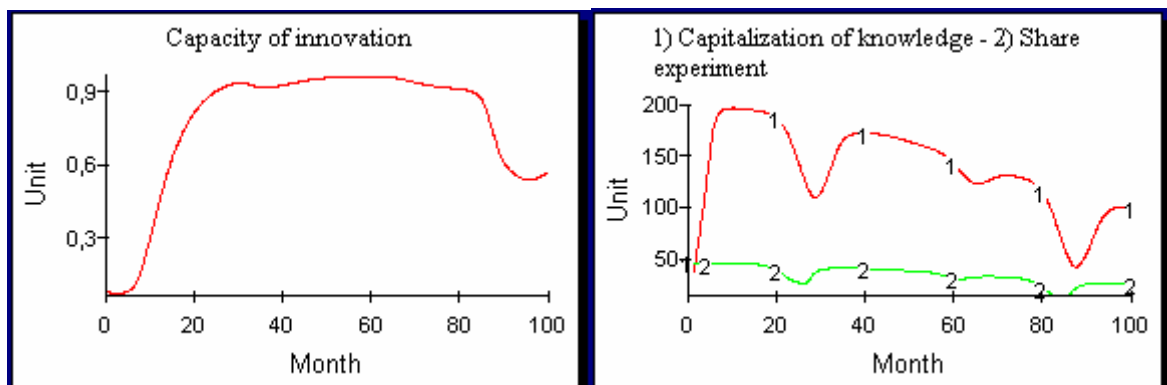


Figure 10

The 3rd scenario (figure 11)

We can imagine a much less procedural and more flexible organization by decreasing drastically the degree of formalization. The capitalization of knowledge is much less important because of the reduced exchanges of experiment. In addition, it acts on the innovative capacity which declines. To a certain extent, the organization thus should be rationalized. If the organization is too loose, it loses its capacity of being innovative in the long run. As we know, this is the major problem faced by start-ups when their sizes increase over a few years' time.

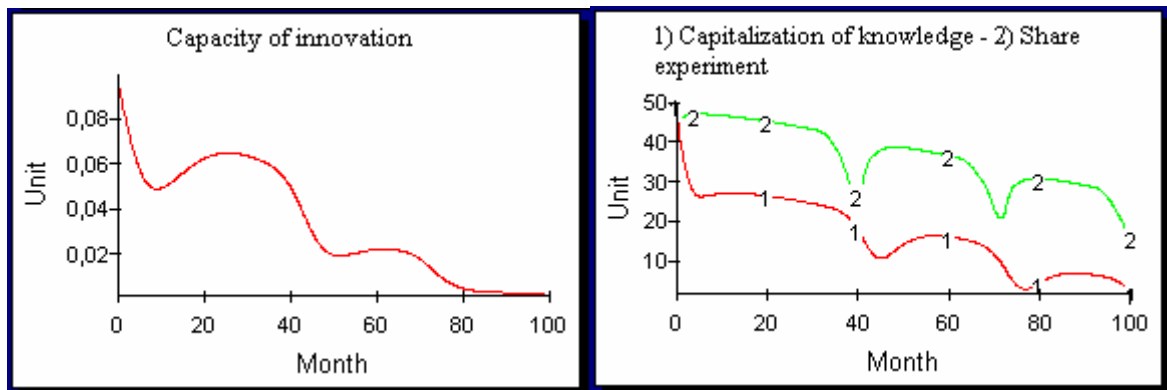


Figure 11

The 4th scenario (figure 12)

Compared to the assumption of scenario 2, here we keep a high degree of formalization of the organization and we launch, at the same time, a much more sustained strategy of collaboration and a strategy of transfer of competences. The capacity of innovation is optimum and in parallel the levels of capitalization of knowledge and the experiment sharing are maintained on a high level over several months. The four processes seem synchronized.

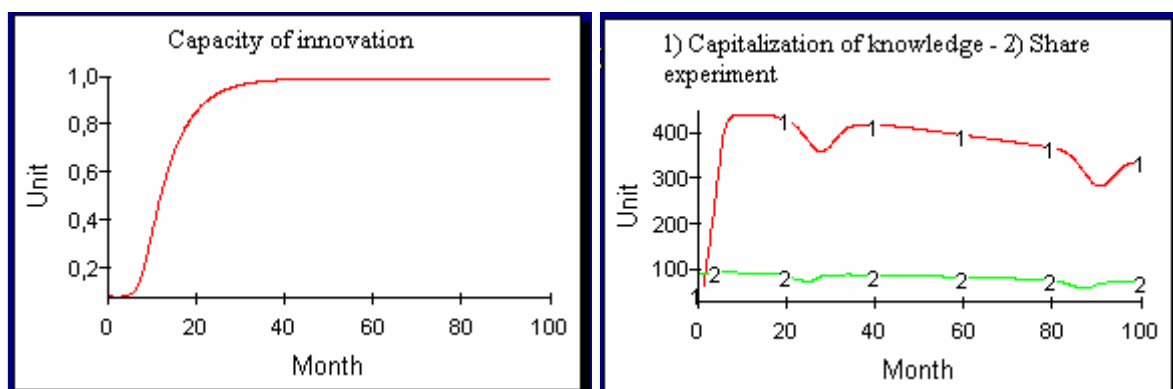


Figure 12

We observe that the difference is reduced between the real functions of the product or service and those expected by the customer (figure 13, functional discrepancy). The functionalities which go beyond the requirements of the customers are useless and have a cost.

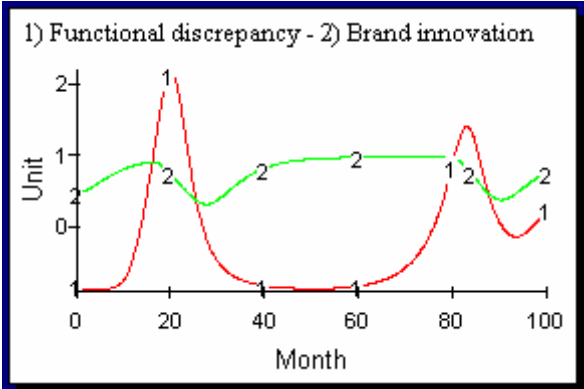


Figure 13

Discussions and conclusions

We used our model to study innovation in the company “GEM” (manpower: 70.000 people). This group is formed by a multitude of companies covering several different lines of activities (construction building, roads, electricity, oil exploration and engineering).

The common point to all the “GEM” activities is to build with durability, safety. The right impact on the natural environment is important.

These various lines of activities have a common policy: sustainable, safe, human and natural environment friendly constructions. Innovations at “GEM” are naturally conceived to be applied to the building projects so they take into account the local environment and the alternatives it offers. The local character is very important. The capitalization of the know-how faces obvious difficulties.

Good decisions in the short run (leaving initiative close to the building site) prove to be bad in long-term : not enough capitalization and therefore no drastic innovation for the company.

“GEM” works along projects. However these technological projects are specific and the cognitive system is not developed enough due to a lack of interaction between organizational structures.

Transversality of the projects is not yet very frequent and consequently the exchanges are also very insignificant.

The Management wants to develop more and generalize innovation on the products or services, but actually innovation reflects the way work is being carried out.

Our model highlighted that these difficulties are related to a purely organisational contradiction between:

- 1) The essential mobilization to innovate with greatest possible freedom and a decentralized responsibility
- 2) The concern to transfer knowledge by experiment sharing and to codify, to capitalize on it

Our model gives the possibility of clarifying this contradiction. We can summarize this dialectical process in the next diagram (figure 14):

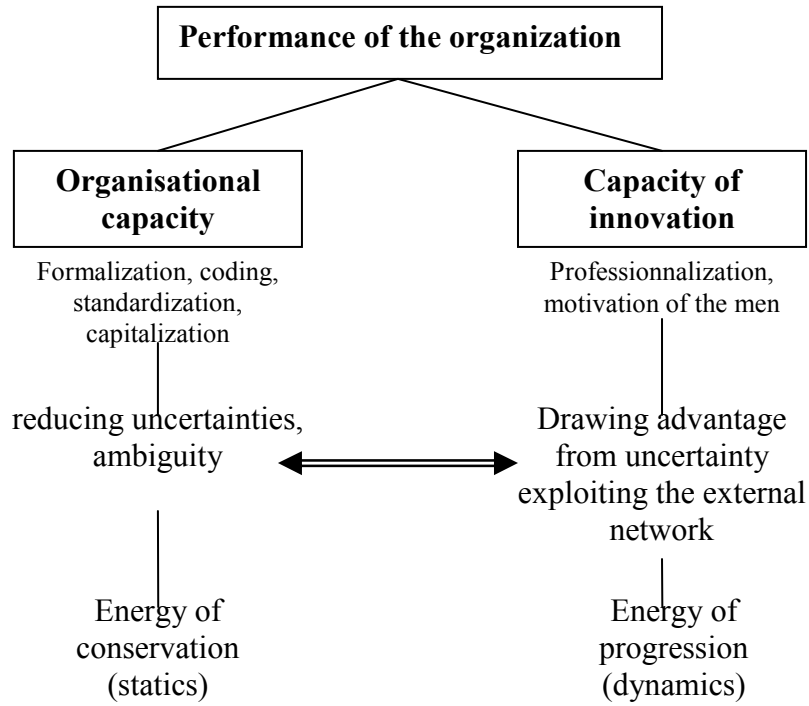


Figure 14

Many companies accept the fact that their organizations are built for the perpetuation of their product/service rather than innovation. There's nothing wrong with the perpetuation control, hierarchy, diligence, efficiency, replication, rule and quality. We inherited those virtues from the know-how and “good practices”. But in a world in perpetual change, we need to leave continuity to go to innovate and accept discontinuity.

Of course, we need alignment: We need to know what our strategy is and how we're measuring it and how we deliver value. But perfect alignment is death.

Variety is the key to evolution. The combination of knowledge, the organizational mutation makes it possible the companies to thrive in an unpredictable world. So it goes with innovation, which requires experimentation, trial and error, doing new things, and breaking old rules. An unhealthy adherence to conformity and alignment will drive out innovation – and innovative people.

Noise is a creator of order and order generates normality, alignment. It is advisable to find a good compromise between these two forces⁷.

⁷ Alter Norbert gives a report on an irreducible antagonism between the organization and the innovation (the management of the disorder in the company).

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