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FROM SCIENTIFIC TO INNOVATIVE MANAGEMENT - A PERMANENT DIALOGUE BETWEEN TAYLOR AND CHESBROUGH

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Abstract: Organizations face these days the challenge of permanent innovation, along with the rigidities of scientific management necessary to production and operation processes. In this paper, we present a reflection to allow for the integration of traditional processes, which are clearly necessary, in production and operation, with the changes in procedures and innovative processes in the moment projects and products are conceived, with real competitive differential and value-added to society. The urgent need for organizations to build a dialogue between science and innovation in the real perspective of a technological and social development is being discussed. The theoretical referential of Taylor and his contemporaries contrasts with the open innovation presented by Henry Chesbrough, which offers a rich source of technical proposals, partnerships and managerial strategies that have an affinity with the world generated in this century.
Key words: *Innovation, Modeling of Organizations, Scientific Administration*

1. INTRODUCTION

The theories of administration produced by Taylor and other researchers present methods and techniques developed in a social scenario and time that are very different from the current scenario. The volatility of markets and personal needs took absolutely unstable and intangible ways whose future search remains uncertain. In this context, administrative processes, adaptations, monitoring and corrective measures are demanded, in less time and with fewer opportunities. The strategy of contemporary administration needs to bind knowledge and experience of scientific administration to immediate current demands in the search and construction of collaborative work of innovation and insertion of new knowledge. The current administration understands the strategic administration of knowledge and competence, organizational learning, product innovation and processes, policy planning, programs and projects, the study of chaos and assessment methods with indicators of efficiency and effectiveness.

2. SCIENTIFIC MANAGEMENT

2.1. TAYLOR REVISITED

The first researches regarding rationalization techniques of workers labor developed by Frederick W. Taylor, proclaimed the practice of the division of labor, whose most outstanding characteristic is the search of a scientific organization, emphasizing periods movements and methods. Therefore, Taylor is seen as the precursor of the Theory of Scientific Administration. In his view, scientific methods should be applied in administration to assure its objectives of maxim production at a minimum cost.

With the principles of Taylor, we have:

1. Scientific selection of workers – Workers accomplishes the task that is most compatible with their aptitudes. It is important for workers themselves, who feel valued, and for the company, which increases its productivity and makes more profits.

2. Standard time – Workers should reach the minimum production as determined by management. Such control is important since human beings are naturally indolent.
3. Incentive pay plan – Workers are paid according to what they produce.
4. Teamwork - The interests of the company and of the employees, when they are in line, result in better productivity.
5. Manager's plan, workers execute - it is the duty of managers to plan, and of workers to act.
6. Division of labor- tasks are subdivided to the maximum, so speediness and productivity may be attained and profitability generated according to the employee's effort.
7. Supervision - it is specialized by areas. It controls employees' work, verifying the number of pieces made, assuring the minimum value for production.
8. Emphasis in efficiency - there is a single right way to do the job. To discover it,, management undertakes a study on time and methods, decomposing the movements of tasks involved.

Taylor's Scientific Management offers a mechanicist approach, where the organization is compared to a machine that follows a pre-defined project. It is criticized by management experts. Starting from this view, each employee is seen as a mechanism in the company, disrespecting his/her human condition. In the Homo Economicus issue, wage is important, but it is not fundamental for employees' satisfaction.

Acknowledgement, moral incentives and self-realization are important aspects that scientific management disregards. Its hermetic approach does not make reference to the environment of the organization. The organization is seen in a closed way, detached from the market, neglecting the influences it receives and it imposes on everything and every one bordering it. In a realm employees are more and more specialized, the division of tasks renders the employee's qualification superfluous. This way, the employee executes the same monotonous task repeatedly, generating frustration in the production process. This process therefore explores employees, and feeds its own private interests once it alienates employees, disregards their human condition and does not address prevailing social deficiencies.

Henry Ford, one of Taylor's followers, was seen as one of those who were responsible for the huge qualitative leap forward in the current organizational development. Aware of the importance of mass consumption, Henry Ford launched some of the principles backing production improvement, cost reduction time of production, introducing vertical and horizontal Integration - integrated production, from raw material to the final finished product (vertical integration) and the creation of a large distribution network (horizontal Integration); standardization, establishing the assembly line and the standardization of the equipment used in the process, attaining speediness and cost reduction. On the other hand, product flexibilization is hampered, and economy is attained through inventory reduction and production improvement.

Along with the studies conducted by Taylor, Henri Fayol defended similar principles in Europe, based on his experience acquired in high level management. While Taylor´s methods were studied by European executives, the followers of Scientific Management only stopped ignoring the work of Fayol when the same was published in United States of America. The delay in the widespread diffusion of the ideas of Fayol made important contributors to the science of management ignore his principles for some time.

Some of the basic principles developed by Fayol may be studied along with Taylor´s:

1. Division of Labor - the specialization of employees, from the top of the hierarchy to the plant floor, favoring production efficiency and increased productivity.
2. Authoritativeness and responsibility - authoritativeness concerns the rights of higher ranking management to give orders that theoretically will be obeyed. Responsibility is the counterpart of authoritativeness.
3. Conciseness of command - An employee should receive orders from a single manager, avoiding countermands.
4. Conciseness of direction - an only control is possible once a plan designed for specific groups of activities containing the same objectives is developed.
5. Discipline - Need to establish rules of conduct and work deemed valid for every employee. Absence of discipline generates chaos in the organization.
6. Prevalence of general interests - The general interests of the organization should prevail over individual interests.

7. Remuneration - it should be enough to guarantee both employees and the organization own satisfaction.
8. Centralization - The vital activities of the organization and its authority capacity should be centralized.
9. Hierarchy - unconditional defense of the hierarchical structure, fully complying with a fixed authority capacity.
10. Order - it should be maintained throughout the organization, keeping a place for each thing and each thing in its place.
11. Equal rights - justice should prevail throughout the organization, justifying the loyalty and the devotion of each employee to the company.
12. Employee stability - A high turnover rate has negative consequences on the organization performance and employee morale.
13. Initiative - it should be understood as the capacity to establish a plan and to accomplish it.
14. Esprit du corps - the work should be team-oriented, facilitated by a free flow of information within the team. The members of a given group need to have a common spirit of comradeship so that they may defend their purposes.

2.2 SPECIFIC ROLES OF ADMINISTRATIVE MANAGEMENT

Planning - it establishes the objectives of the company, and specifies how they will be reached. The plan is based on future prospects in order to develop an action plan to reach the goals outlined. This is the first role to be observed since it will serve as the basis for operating other roles.

Leadership – it makes subordinates do what should be done. It presupposes that hierarchical relationships are clearly defined, in other words, that the way managers and subordinates influence one another is explicit, as well as how much each one may partake and collaborate for the accomplishment of defined objectives.

Organization - it is the way the organization's resources are coordinated, be they of human, financial or material nature, allocating them according to the established planning as much as possible.

Control - It is to establish performance patterns and measures that may assure that the applied behaviors/conducts are the most compatible ones with those which the company expects. Controlling the activities developed allows for maximizing the likelihood that everything will comply with the explicitly established rules accordingly.

Coordination – implementing any plan would be unfeasible without the coordination of the conduct and efforts of the whole company, with a focus on goals.

Obsession for control- classical management theory presents some harmful factors such as: obsession for command – based on the company's view stemming from administrative management, Fayol focused his studies on the conciseness of command, authority and responsibility. Therefore, he is seen as obsessed for command.

The company as a closed system - from the moment planning is defined as being the landmark of corporate management. It is difficult to imagine that the organization may be seen as an isolated part of the work environment.

Manipulation of workers – Just like Scientific Management, it was coined as tendentious, as it developed principles that sought to explore workers.

3. PROPOSALS FOR INNOVATION

Innovation offers hope concerning the harmful points observed in Taylor concerning the detachment of human factors from work. Chesbrough introduces the collaborative component, less hierarchical levels in management, besides changes and constant updates.

3.1. INNOVATION

According to Lewis Platt, president of Hewlett-Packard in 1997, which ranked first in terms of permanent innovation, what is unique in mankind is its capacity to dream... and because it is rational, but it is also sensitive, that mankind notices, when facing its desires, the inadequacies of the world in which it lives. Its dissatisfaction is not, therefore, an addiction, but the virtue which makes it be the builder of projects.

3.2. INNOVATION - CONCEPTUALIZATION AND OUTLOOK

Biddings and hiring processes use the concept of Incremental Innovation, which is the improvement of the product and/or the already existing process,, and Radical Innovation, which is when the product and/or process is completely new, having as reference the institution itself. Therefore, if it is new for the institution, it is an innovation.

Extending these concepts to the domain of technology should be understood as being the situation in which the institution introduces a technologically new product and/or process, as well as a technologically significant improvement is introduced in its own process and product. Industrial modernizations based on an only technology should not be understood as technological innovation.

Joel Barker (Barker, 1995) says that it is not enough to know the technology in use, it is necessary to know how technology will change the world. Bárbara Minto, (Minto, 1991) sought to study corporate communication and diagnosed severe communication flaws in managerial hierarchical relationship.

What Bárbara could prove was that the producer of the information believed to have reached his/her objective of communicating, and the receiver of the information considered to have received the correct information.

However, what the producer sent was not what the receiver received. In her research report, Bárbara concluded that the process in which the information on the part of the receiver is construed is different from the process characterizing the producer.

What we need to consider and study is what process or criteria conforms the information that generates results. Innovating is to control the instinct and to contemplate the existing possibilities and which ones may be considered.

The old model of innovation, still effective in some organizations, presents a closed and competitive environment, with well-equipped laboratories, a vertical integration, internal research, known objectives, and whose Organizational Mission seeks for solutions to already known problems.
The new model - "open innovation" - presented by Henry Chesbrough (Chesbrough, 2003) brings the internalization of new technologies, what means partnerships with other organizations, Academia, society or government, as well as technology licensing for and from other companies, and partnerships in R&D. Figure 1 presents Chesbroug´s process concerning open innovation

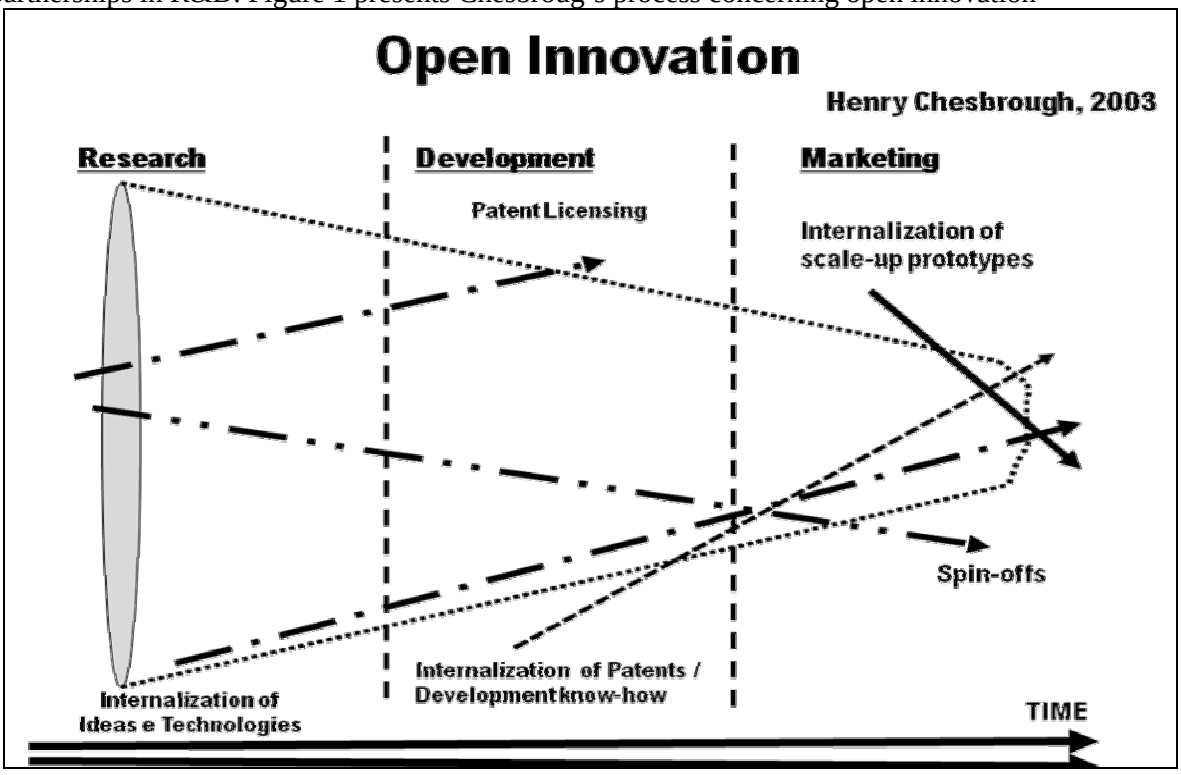

Figure 1 – The innovation process by **Henry Chesbrough**

3.3. WHAT IS THE PROBLEM?

Several innovation initiatives begin with faulty premises. They implicitly hide appreciations on the current business model. Those appreciations restrict the possibilities for new business models or for enabling them to migrate away from their current models. Such is specially the case with successful companies, since their successesfulness means that their own appreciations on their current business models are very powerful.

Thus, overcoming existents premises requires systematic creation of options using different premises. It also demands the ability to learn, to test and to reduce the risk of resorting to those options in frequent, but short time cycles, with limited resources. There is insufficient experience produced on generating and managing proprietary methodologies for assessing and managing technologies in a close relationship with universities and research centers, for access to funding and service rendering. Innovative organizations are meant to have a Mission, such as the support towards generating innovation, working to transform scientific knowledge into real benefits for society, with an emphasis on ethics and social responsibility.

3.4. MODELS

Some differences emerge between Taylor´s and Chesbrough´s model. Figure 2 presents some of them.

Model Comparison	
Traditional Model	**Chesbrough´s Model**
1. Hire talented people	1. Hire people from within and outside the company
2. Profit stemming only from own development, Patents and marketing	2. Values-added from Networking and partnerships
3. Profit from commercial breakthrough	3. Profit from any value-added activity
4. Every innovation wins	4. The best product is not the best business opportunity
5. Best idea wins	5. Best use succeeds over best ideas
6. Patent control for self use	6. Licensing as core business

Figure 2 Traditional and Chesbrough models characteristics

4. DIALOGUE BETWEEN TAYLOR AND CHESBRUGUER

The complexity entailing organizations in the current days does not allow for choosing between the two models, Taylor´s or Chesbruguer´s. Actually, what is mandatory for the manager is to know where to adopt the rigidity of Taylor, the innovative openness of Chesbruguer, and, all the time,,know how to make the different principles guiding each one manifest themselves. It is within this context that a modeling of innovative organizations emerges as the appropriate synergy governing their aspects of normative closeness and their aspects of cognitive openness.

4.1 NORMATIVE CLOSENESS

Knowledge conforming organizations is formalized in the instruments that establish work processes, and which determine the integration of operational tasks and include production processes as much as those processes linking the relationship between the agents that are part of the value-added network within the organization business environment, whose activities and action-taking happen within the environment of normative closeness, as shown in Figure 3. Normative closeness involves both operations management and strategic management, which is responsible for the network rallying in supplies agents within the businesses environment, which ultimately promotes the necessary and due adaptations in daily life.

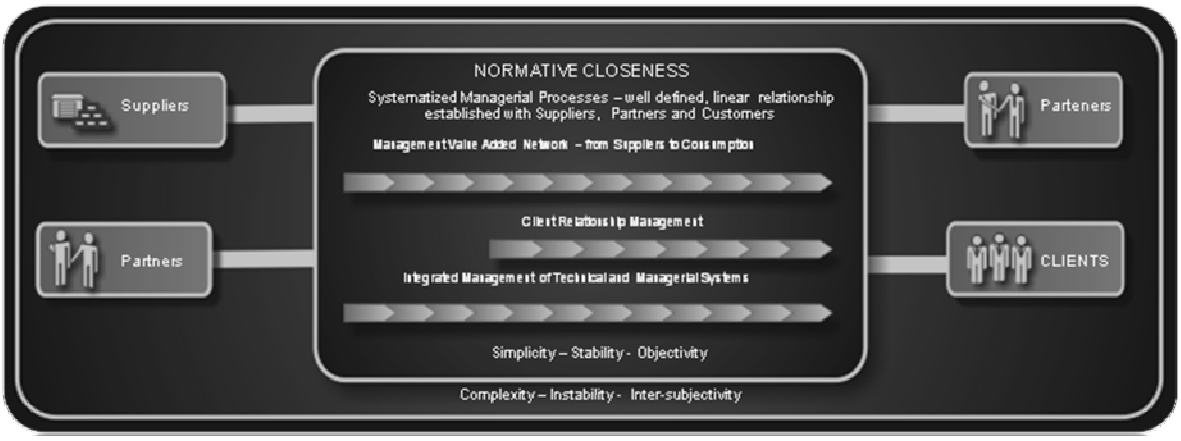

Figure 3 – Normative Closeness (Ritto, 2005)

The activities developed in everyday tasks within the context of normative closeness determined by operating processes are also influenced by agents of the work environment, and the changing needs and opportunities should contaminate the dimension of cognitive openness, searching for improvements through the development of new configurations with the work environment. Under the standpoint of the intensity these changes bring, the basis on which the dimension of normative closeness lies shares itself with simplicity, stability and objectivity, operating on the level of continuous improvement, seeking to do more of the same, with increasing quality and at smaller costs, though. It is dynamic, and changes mainly due to the fact that it lies on value-added network where production is not necessarily a linear chain. However adaptable and customer driven, though, production conforms to previously determined and systematized patterns, so that it may even make possible the complementarities of the actors action-taking within the process. In this segment of activities within an organization (normative closeness), Taylor´s principles and proposals may well be applied, and, very often, they must be.

4.2 COGNITIVE OPENNESS

The perception of a permanently changing and globalize world and the recognition that knowledge is a production means constitute the main motivations of the ever increasing importance attributed to knowledge management, which fosters cognitive openness within the organization towards the several aspects of the work environment and the manifestation of its several agents.

Due to the needs imposed by those forces, organizations are seeking, in an integrated and systematic way, to register what they know, to discover what they need to know, and to implement processes to handle knowledge as an asset and an effective production instrument, both at the present time as much as in future times. Knowledge, in this context, it is understood as everything that provides a reference to the assessment and incorporation of new experiences, new information and new insertion forms in political, economic and social realms. Within organizations, knowledge is clustered in repositories, norms, procedures, processes, systems, technologies and organizational practices in the realm of normative closeness of their operations environments.

More and more organizations shall set a difference by their ability to anticipate situations and by doing well and fast what is necessary for a good performance. And more than that, the most successful organizations foster situations and anticipate the future through innovation. This becomes critical in the case activities are strongly based on knowledge and when the development of new products and services is considered. Already tested practices embodied by competent professionals are priceless resources for the solution of similarly new problems; however, its most powerful stance concerns its capacity to deal with unheard of situations, and more than that, to create them. Knowledge, therefore, may provide speed and agility in handling complex or urgent situations organizations may experience, providing they conform the knowledge created by people or groups to their formal work processes. Knowledge existing only in a fragmented way in the several different units of the organization means in most cases a loss when compared with an integrated stand that, respecting and strengthening knowledge producing areas, promotes integration, establishing complementarities and synergy, while opening room for innovation. Knowledge enhances its own worthiness as an asset when it joins the corporate realm and is accessible to all; corporate here means

networking, availability, and transparence, as well as the involvement of many individuals. In this case, shared knowledge becomes a potentiate of innovation and productivity within the activities of the organization, above all because it favors organizational learning. In the long run, breakthrough performance depends on breakthrough learning.

It is a challenge to understand how organizations learn and accelerate such learning. In the context of organizations, knowledge management is an array of processes that governs not only the best existing knowledge management, but also and mainly the creation, spread and use of knowledge to reach the objectives of the organization completely. It is worth mentioning that within cognitive openness, Figure 4, immersed in the established complexity by the conduct of several agents, and the dynamics produced within the several issues that become cognitive attractors, the objectives of the organization also deserve permanent revision.

Knowledge and innovation management, thus, need to become a discipline that promotes, in an integrated approach, managing and sharing all information assets owned by the organization, in systems, processes, documents, people etc and it should adhere to the era of knowledge, which

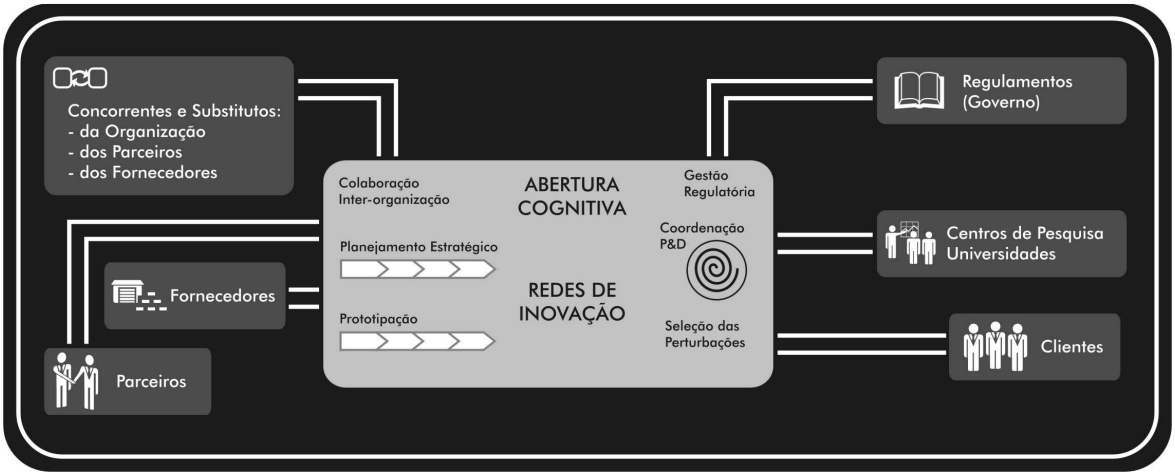

Figure 4 – The cognitive opening the organization (Ritto, 2005)

promotes the substitution of individualistic culture for collaborative culture.

Knowledge management developed in an integrated way stimulates technological surveillance with a view to planning in a permanent fashion, seeking for committed learning, also stimulating:

- R&D strategies to be in line with the objectives of the organization – which are under permanent review;
- Creation, formalization, dissemination and application of knowledge;
- Development and preservation of competences;
- Incentive towards creativity and innovation;
- Optimization of resource usage;
- Interface with science and technology centers to exchange knowledge and experiences;
- Protection and commercialization of copyrights and intellectual property rights;
- Preservation of Knowledge - digitization, storage, availability and dissemination.

For the organization to face the need for new knowledge and new practices, investments in projects of innovation through several programs are necessary, besides those concerning R&D, such as those:

- Committed with the promotion of the improvement of work methods;
- Coordinated by network management with an integrating approach ;
- With structured development that may guarantee freedom and order;
- With a transparent work methodology;
- With measurable development and progress;
- That promotes synergy among all areas involved in the search for effectiveness in what concerns resource allocation as much as in the application of their results in the practices of the organization.

It is in cognitive openness that organizational learning will occur more deeply, in this case as a permanent creation and dissemination process of organizational knowledge, seeking the continuous adaptation of the organization to the changes within its external environment, backed by methodologies that facilitate tacit knowledge to be converted into explicit knowledge as it is operated within the organization and shared by all. It is in this process that an organization exercises its competence and collective intelligence to provide answers to its internal and external environments, in the continuous development of corporate intelligence, developed through a permanent monitoring process of the relationships of an organization with its environment, seeking to identify the signs that stem from that same relationship and how they are transformed into appropriate information for the decision-making process, with the objective of subsidizing its strategic actions. Every type of relationship that may add knowledge in any instance of the value-added chain, from the inputs to the final consumer of products and services is sought within cognitive openness. This is the realm of R&D, of innovation networks that encourage contacts with agents in lying in the outskirts of the work environment, and which shall always address learning. It is in this environment that the perception and the call for any sign that indicates change is exacerbated, be it in the sense of recognizing a change that is built within the work environment, and that needs to be handled within the organization, be it in the identification of opportunities to build and implement improvements and innovations. It is important to emphasize the role of corporate education, practiced in a comprehensive way through the dissemination of organizational knowledge throughout the value chain of the organization (customers, suppliers, collaborators, shareholders and community), seeking to align individual competences with institutional competences, transforming knowledge in value added to products and services, always seeking the insertion of the organization into work environments and in building the future.

4.3 INNOVATIVE ORGANIZATIONS MODELS

Modeling organizations mobilizes those initiatives that are inherent to the realms of normative closeness and cognitive openness, working in complementarily and in permanent synergy, Figure 5.

It should be highlighted that there are no well defined limits and the exchange between both fundamental realms – normative closeness and cognitive openness - is the essence of daily life. The activities of normative closeness are learning sources themselves, and the adoption of innovations deriving from it needs to pass through an integration process in the production chain, seeking to make such innovations well balanced and tuned with all agents within the value-added chain, internal agents as much as external ones.

The realm of cognitive openness is a resonance and integration chamber of the innovations that are aggregated in the coordination of innovation networks that consider all learning attractors, operational as much as cognitive, to learn and to teach, to formalize the new and to renew the organization, be it through educational processes of concepts and practices that may conform the whole body of collaborators to a higher ranking, be it in the courses that prepare people in new and formalized current techniques stemming from the innovations adopted and active in procedures, norms, systems, and production processes, relationships and businesses in general.

The selection of disturbances happens in all senses and starts with all agents who operate in the value-added chain within the borders of the organization. Exchanges are constant and the flows are permanent among internal and external actors in the everyday practice of their activities. Learning is inherent provided it is sought by the awareness of onlookers, who are eventually made learning and teaching agents. All activities are seen as production activities and they all intermediate innovation from a critical relationship with activities that are permanently inquired as to their needs and execution forms.

5. FINAL WORDS

We have observed that changes are instilled in social, cultural and economic realms. Social here meaning interaction patterns, and cultural meaning the appropriateness of discourses; it is therefore urgent not to lose the perspective that cultural phenomena are accomplished through social relationships.

The economic realm is the chaotic result of a group of activities that cannot be the object of an exact, managed, governed or guided calculation; it is an emergency.

Seen as it is, the economic realm is an imaginary narrative based on a group of more or less coherent activities. As an imaginary narrative, it is always selective due to cognitive limitations, prejudices, specific episteme and the economic paradigms under consideration. People have difficulties to insert themselves in these realms, which is natural, above all, due to the frequency that crisis happen, be it globally, be it locally, in industry sectors, in groups, in people. Crisis disorient

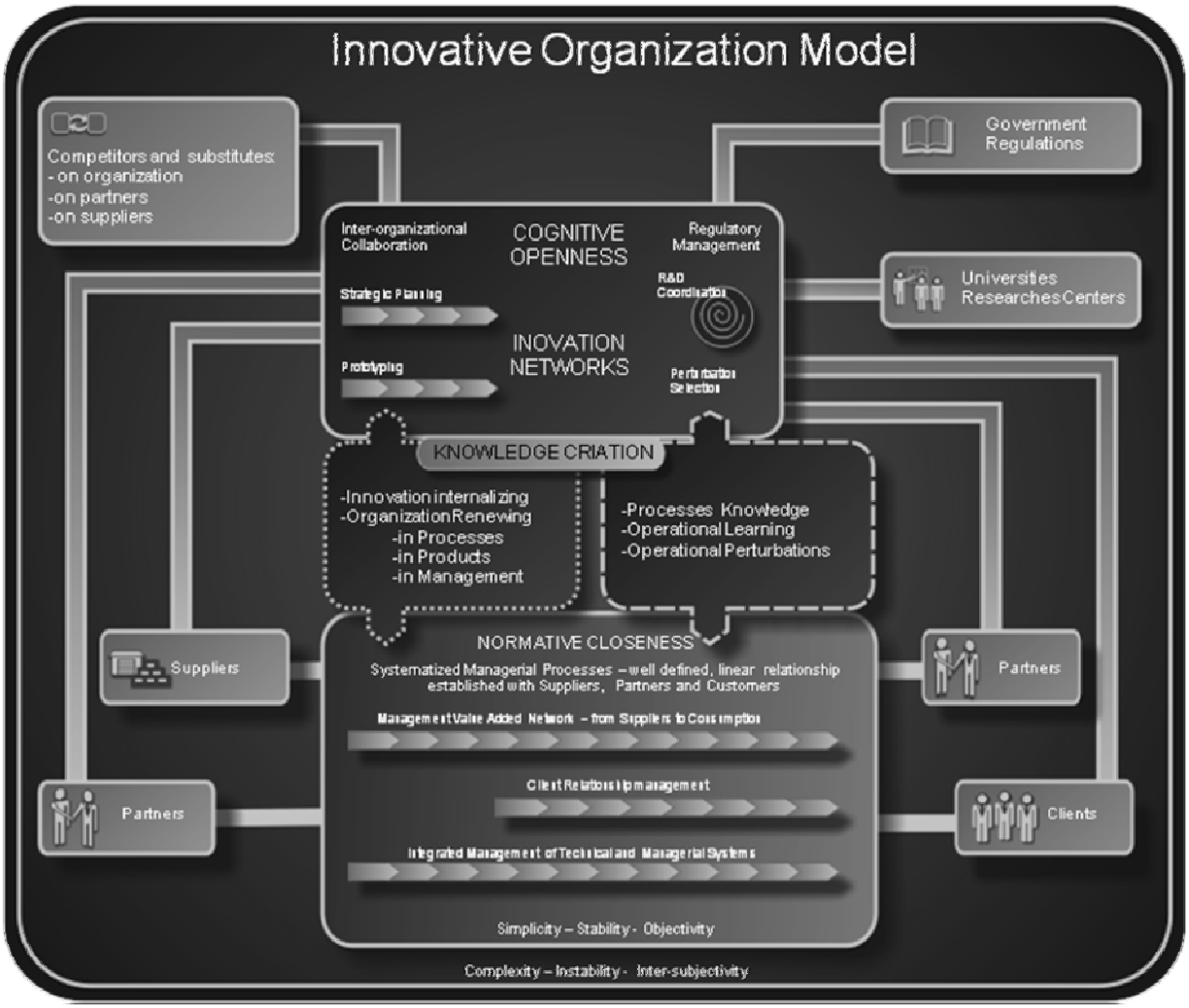

Figure 5 – Innovative Organization Model (Ritto, 2005)

actors, produce innovative variations and new approaches in the economy, generating new strategies conceived in economic, social, local and global realms. In this context, the relationships construed by new market forces and even by those outside the market provoke alterations in the uncertainties themselves. Network thinking, trans-disciplinary by itself, considers the diversity and autonomy of each actor, and searches a new logic for the coexistence of differences and the common welfare.

References

BARKER, J., (1995), Seminários de Nivelamento, São Paulo

CARVALHO, M. B., (1990), O Pensamento Tecnológico - Seminário da FGV de Educação à Distância. Fundação Getúlio Vargas, Setembro

CASTELLS, M., (2000), *Sociedade em Rede*, Editora Paz e Terra, São Paulo

COOPER, Robert K., (1997), *Inteligência Emocional na Empresa*, Editora Campus, Rio de Janeiro

DALFOVO, O; AMORIM, N. S., (2000), *Quem tem Informação É mais Competitivo*, Editora Acadêmica, Santa Catarina

DRUKER, P, F., (1992), *Administrando para o Futuro: Os Anos 90 e a Virada do Século*, Livraria Pioneira, 2ª Edição, São Paulo
GOMES DE MATOS, Francisco, (1998), Revista Decidir – Ano IV, Nº38, Rio de Janeiro
CHESBROUGH, Henry, (2003), MIT Sloan Management Review
MARCOVITCH, J., (1996), *Tecnologia da Informação e Estratégia Empresarial*, Editora, FEA/USP, São Paulo
MARTIN, James, (2000), *Engenharia da Informação*, Editora Campus, Rio de Janeiro
MINTO, Bárbara, (1991), *O Princípio da Pirâmide*, Editora Makron Books, São Paulo
MONTENEGRO, F. F.; BARROS, J. P. D., (1996), *Gestão Estratégia*, Editora Makron Books, São Paulo, 1996
PORTER, M. E, Vantagem Competitiva, Editora Campus, Rio de Janeiro
REZENDE, Denis Alcides, (1999), *Engenharia de Software e Sistemas de Informação*, Editora Brsport, Rio de Janeiro
RITTO, Antonio Carlos de Azevedo, (2005), *Organizações Caórdicas – Modelagem de organizações inovadoras*, Editora ciência Moderna, Rio de Janeiro
SENGE, P. M., (1990), *A Quinta Disciplina*, Editora Best Seller, São Paulo
STAIR, Ralph M., (1998), Princípios de Sistemas de Informação - Uma Abordagem Gerencial, Editora LTC, Rio de Janeiro