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INNOVATIVE MANAGEMENT TO TRANSFER RADICAL INNOVATIONS TO INDUSTRIES

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ABSTRACT: This research aims to minimize the resistance for the development and transfer of radical innovations from R&D and/or universities to industries. Three categories of potential barriers have been identified that may influence, separately or combined, the development and the transfer of radical innovations. These barriers are cultural, institutional and operational. This article aims to describe the strategic management, which objective is to create an "ideal" innovative organization, for the introduction and development of a radical innovation in the industry. The originality of this management is based on the consideration given to Human Resources. Management by 5 C considers the human as a political being, in evolution, eager to develop, to control his future, concerned about the role he can play in the community and in the future of the planet. The first C is the Consideration, the 2nd Competence, 3rd to Cooperate, 4th Creativity. Everything is based on the 5th Communication: appropriate and effective in all circumstances, sharing knowledge, allowing exchanges, teamwork and support. Benefits of this management style are multiples and create a greater capacity to accept and to develop radical innovations, etc. Management by 5 C requires "open" managers oriented on research of excellence, putting in practice different types of knowledge and possessing the usual qualities that are expected for a third millennium manager.

KEYWORDS: management to transfer radical innovations

INTRODUCTION - CONTEXT

A research has found that new types of vehicles can replace the current models. The introduction of this radical innovation requires creation of an industrial project which will be integrated: R & D, manufacturing, marketing, after-sales service components necessary for new types of engines and energy storage. (Di Franco 2005).

To create this industrial project, a 3-steps strategy was conceived (Di Franco 2005):

- 1° Constitution of several research teams from universities, government agencies and associated industries.
- 2° Creation of research centre(s).
- 3° Exploitation of research through the creation of spin-off(s).

However, there are barriers to the transfer of innovations between associated enterprises and universities who may refuse or delay this cooperation which requires the creation of an innovative or "ideal" organization.

HISTORY OF STRATEGIC MANAGEMENT

Strategic management is often based on military strategies adapted to the business strategy from Sun Tzu (~ 6th century BC) through Clausewitz, Foch and today (Fievet 1992). Research and conceptualization of business strategies is only thirty years old (Lorino & Tarondeau 2006).

Ansoff has proposed a distinction between operational and strategic management that was subdivided into 3 types of decisions. **Strategic** concerns the firm within its environment, **administrative** concerns acquisition, development, organization of resources and **operational** regards internal decisions such as profit maximization, process efficiency (Ansoff 1965).

Subsequently, stemmed from Harvard, the consultants of BCG adopted a basic military strategy: to win you must be more powerful than the adversary. (Andrews 1980).

Companies are different in the architecture of organizational capabilities. They will behave differently when they enter into competition. This architecture can be an obstacle to the strategy implementation (Leonard-Barton, 1992), as well as a catalyst (Teece et coll., 1997).

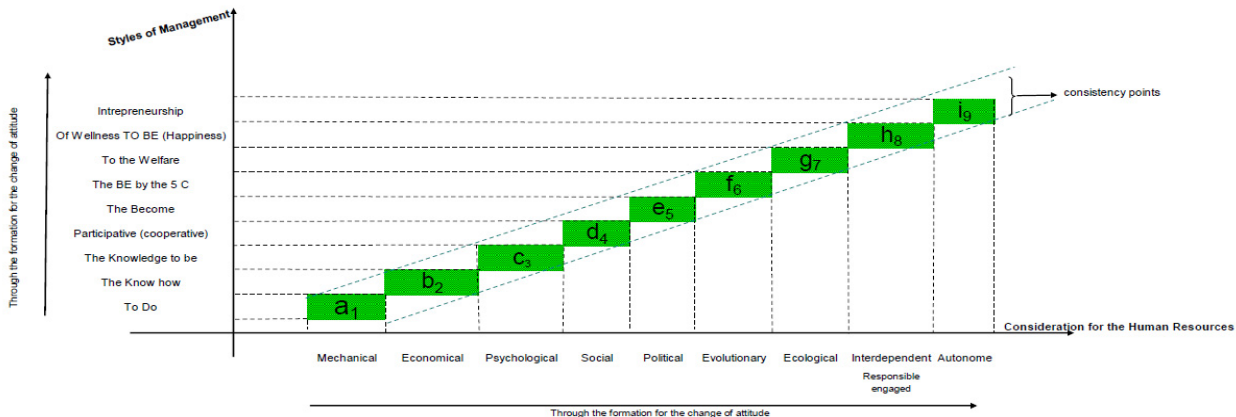
In fact, each company will develop a combination of resources, actors, activities, coordination mechanisms which reflects its "path dependence" (process technology adoption and evolution of the industry) and its strategic choices (Peteraf, 1993). Copy difficulties show their "path dependence", but also the particular characteristics of organizations that cannot easily be changed (Dosi, Teece et Winter 1990).

Strategic processes are actions organized by objectives or policies used to modify the conditions of insertions of the firm in its environment.

The identification of the strategy and processes employed by an enterprise helps to clarify the concept of strategic management which facilitates observation presented by historical graph to the next point which starts of the industrial era (before the 1850^s).

STATE OF ART

The goal of this graph is to describe the recent origin of strategic management until its current form, with managerial trends since three centuries.



To do management (a1), Mechanical Being: This period has been a succession of innovations and many industrial applications leading to work mechanization. The management decides, imposes, requires and considers workers as arms who don't think: it's a mechanical being. (Taylor 1911, Fayol 1916, WEBER 1922, Colliot-Thélène 2001)

The Know-how management (b2), Economical Being (~1850 - 1914): Modernization of tools leads to task standardization. After dividing labour, specialization of tasks appears. The choice for techniques is achieved by testing - errors. The salary is proportional to production quantity and performance. The objectives are neither traded nor negotiable, learning is limited and premiums are linked to production. (Taylor 1911, Ford 1922, Hatchuel 1994)

The Knowledge To Be (c3), Psychological Being (~1918 - 1940): Management is interested in work conditions that influence the work performance that individualizes itself through contests, performance encouragements and even competitions between workers via incentives and gratifications. (MAYO 1933, 1945, TRAHAIR 2005, Mousli 2007). Beginning of the planning, mechanization and tasks automation, human adaptation to the machine. The internal mutations are preferred, experience and diploma valorisation, encouraging identification with the company. (Beumier 2012).

The Participative management (d4), Social Being (~1945 - 1960): This is the time of needs and motivations hierarchy theory. (Maslow 1943). Workers are considered as shirkers, refractory to work (Mc Gregor 1960). Management developed a function classification by families. It is the discovery of the group's strength, its solidarity. To create a ripple effect, meetings are organized to make people adhere to decisions, trainings are done in groups. Human resource department are established for discipline and conflicts resolution, social partners' negotiations and centralization of the collective claims, etc. (Beumier 2012)

The Become management (e5), Political Being or neo-classical school (~1960 - 1970): Studies have determined motivations and conditions for man to flourish at work. (Herzberg, Mausner, Peterson, R.O. et Capwell 1957; Herzberg, Mausner & Snyderman 1959). This work led to an important discovery in the field of work psychology: This is not because we remove the causes of dissatisfaction that the individual will be satisfied and vice versa. (Herzberg 1971)

Factors of dissatisfaction were linked to environment and factors of satisfaction allowed personal development. The consideration of work was done by "tasks enrichment" including motivational factors, while improving the environment of the workers are the factors necessary for man to flourish at work. (Herzberg 1971)

This type of management led to ferment of ideas, creativity (Aznar 2005) and highlighted the importance of motivation. (GOGUE 2011, Beumier 2012). Management consideration is that worker is a political being whose needs are utility, esteem, status, by taking control of his destiny, etc. (Beumier 2012)

The To Be management (f6), Evolutionary Being (~1970 - 2000): Company is seen as a "closed" structure, centered on its internal relations, with production factors used to maximize its profits. This conception of the decision corresponds with "classic" economic model based on a series of assumptions:

a) Decision maker is free and autonomous; information is perfect because possible choices and their consequences are known.

b) Decision maker is rational (profit maximization) and would be able to evaluate all alternatives before making his choice. This model describes the various steps that the decision maker must follow to achieve optimal choice. It remains very theoretical because these assumptions are rarely satisfied. This "classic" position has been corrected because rationality of decision maker is necessarily limited:

- The decision is integrated into a complex environment which restricts the perception of choices and imposes many constraints.
- The decision maker is: a) limited to the quantity of information he can integrate to find a satisfactory solution. b) is always rational, but within the limits fixed by its internal and external environment.). (Simon 1978)

Each decision includes a risk, the decision maker is submitted to an internal conflict (or stress) who can push to defer its choice or to avoid its responsibilities. (Simon 1978).

When decision makers are placed in the same situation, the solution will be different because each personality is crucial in the decision making process, the range of tools used will differ according to its perception of the problem, more so if decision unit is a group and furthermore for each service which may have interests and objectives different from those of the organization which it forms part. (Beumier 2012)

In a "centralized" company, all powers are concentrated in one or a group of people. This conception of power originates from the OST which rests on organizational cleavage between those who think and decide, and those who execute. Centralization is a powerful mechanism for coordination and consistency.

However, centralization is difficult to apply in large enterprises, it tends to deprive staff of responsibilities and restrict performance decisions because a person can't effectively control all the phases of decision process. An organization with "centralized" structure having rigid separation lines between departments and functions with many hierarchical levels, "limit opportunities that can have a leader to assume responsibilities, test his ideas or to exercise his own judgment"(LIKERT 1974).

Therefore, management adopts a "decentralized" system wherein a person or department features an independent power of decision, but the decision maker remains sole holder of decision power, it "creates an environment where the individual, assuming more responsibility, obtains rewards in the form of self-satisfaction and self-realization, that encourages him to take more responsibility, and thus to evolve" (Mc Gregor 1969).

This is the time when management adopts Participative Management by Objectives (DPPO) which considers the company as a system of objectives. All actors are involved in the negotiation and set objectives that promote integration and staff accountability to facilitate internal communication that creates a climate of "social peace".(Drucker 1959)

Regardless of procedures for exercising power, leader must exert three main activities: relational, informational and decisional. Study of the behavioural style of managers allowed to discover an evolution in their conception and utilization of power, revealed that "there are circumstances where employees and companies objectives diverge so much that it is not possible to maintain a high concern for people and preoccupation for maximum yield" and grasped the art of directing from different angles. (Blake & Mouton1969).

Before 1930's, leadership was specific to individual, few people had the traits and qualities needed to become a leader. Subsequently, the leadership is not considered any more as a property of the individual, but managers can be created through training. (Mc Gregor 1969)

The Welfare management (g7), or Global adapted. (~2000 -): This management called "flow" or "optimal experience" is based on the well-being which appears when a person engages himself into an activity with clear goals and challenges that are matched with his competences, since this person declares himself happier. (Csikszentmihalyi 1990,1993, PATTON 1997, Inghilleri 1995).

The optimal experience refers to the subjective state of feeling good and identifies conditions that could characterize the moments that people described among the best of their lives. This concept refers to personal trait, a person is happy when he acquire or to develop a system of behaviour and enabling him to focus easily on clear rules and objectives. (Csikszentmihalyi 1975, 993)

Optimal experience tends to occur under the following conditions: **Clear objectives lead to action:** like sports player clearly knows what he must do. **Immediate feedback follows the action:** thus the person knows exactly where he is. **Thus distractions are minimized:** the person can concentrate exclusively on what it does. **Action corresponds to the aptitudes of the person:** when the challenge is too great for his skills, anxiety or boredom appears. Finally, when there are few challenges or solicitation, this is inaction. Optimal experience arises when the challenges and skills are equilibrated, then any individual action becomes motivating (Csikszentmihalyi, M PATTON 1997).

Optimal experience is complemented by self esteem based on: **self confidence** (to act without exaggerated fears of failure and judgments of others), **self positive vision** (to believe in his capacity,

to project himself in the future), **self love** (self-respect, listen to his needs and desires). In this way, when a person has a self positive vision, he will trust in himself and, if a difficult event arises, his self-esteem will support him. (ANDRE & LELOR 1999).

This management pays attention to stress in the workplace and personal life in its entirety (professional and private). (Beumier 2012).

The Wellness management (h8), or Happiness (~2000 -): History is marked by people who engaged in altruist behaviours to quench their thirst for happiness and / or inner serenity. Research have demonstrated a very weak relationship between material well-being and happiness. (Myers 1993, Myers et Diener 1995, Diener et Diener 1996). Therefore material well-being is negligible in personal considerations of happiness (Brickman, Coates et Janoff-Bulman 1978, Diener et al. 1993, Inglehart 1990, Kammann 1983).

Altruism provides two kinds of "rewards": a) an altruistic attitude is likely to attract reciprocal behaviour rather than indifference, b) to be appreciated and valued generates more sense and joy to his life (Seligman 1991). Strong relationship between altruism and happiness can be explained by the theory of optimal experience, because a person mobilized into the well-being of others is often found in situations where the goals are clear, precise and achievable. Furthermore, altruism allows to reach the state of "flow" because the person omits to pay too much attention to his ego and his own needs (Colby et Damon, 1992).

Instead of concentrating on his own observation and monitoring himself, psychic energy is released and becomes available for further goals he has fixed himself. It is one of the paradoxes of optimal experience: it is only by forgetting oneself that one grows. People rewarded by material resources are trapped in a zero sum game because financial resources and social recognition are limited and subject to contestations. Positive feedback obtained from these sources can only be rare and uncertain. In opposite, person whose aim is to help others, can rely on a reserve of almost unlimited feedback and is self-motivated in an intrinsic or autotelic manner (actions that make sense in themselves) (Logan, 1988).

Wellness is magnified by projects with senses, pleasure supplier, assets and challenge through autotelic actions. Action creates pleasure of the objective itself, but also the way to achieve objective gives pleasure during action. Work becomes a pleasure because this style of management allows to play and even to joke at work, generating creativity. Thanks to this work environment one "creates" or "enters" in a spiral of happiness. Personal development is searched as well as self-fulfilment. Worker is considered to be responsible and interdependent (everybody takes into account the needs of the other, there is no submission or domination) (Beumier 2012).

Intreprenurship management (i9), 4th type organisation (~2000 -): Man is at the centre of his projects, he is the motor of his work and the master of his destiny. He is an entrepreneur within the company, conducts himself as if he worked on his own behalf while he works for the company. He is free to act within limits established by mutual agreement with his employer. He may even disobey with reason because authority allows it: obedience is not submission. Obedience means acceptance of decisions when submission means obligation to accept a decision. (Beumier 2012).

Intraprenurship is a "Creation - Communication" culture based on interaction in synergy. What is valued is that everyone may define his personal project in harmony with the company development. It is a culture of respect for others in their differences, heir desires for autonomy and creativity, turned towards inner creativity development and adaptation to external developments. In this approach, individual skills are pooled in, but contrary the previous culture, to serve common vision and values (Saloff-Coste 1990).

Organization of "4th Type" is a management based on listening, valuing personal characteristics, or individual self-fulfilment, game, humour and distraction at the disposal of the creative process.

(Saloff-Coste 1990).

Dominants values are that man is at the centre of work and his project, by seeking difference. All actors of the company (customers, employees, shareholders, etc.) are partners in performing products, promoting change, innovation, authors and staff autonomy, all this with the objective to create Happiness (Beumier 2012).

INNOVATIVE MANAGEMENT TO TRANSFER RADICAL INNOVATIONS TO INDUSTRIES BASED ON 5 C

Objectives of this research focus on the creation of research tools, for modelling, for simulation, for experimental validation of fuel cell system for transportation applications and for prototyping and manufacturing.

The above graph creates a vision of strategic management, which will be the basis of spin-offs creation strategy, based on the consistency and balance between management style and how to consider staff or relative to vision that staff concerns itself. This innovative management is based at minimum on the To Be management, (f6).

This strategic management is based on management style that a company should adopt in order to correspond to manner of staff be considered, therefore there will be equilibrium on the consistency point corresponding, which should lead to efficiency and wellness.

If staff is considered or considers himself in g7 while management is situated in c5, management is "too short" and staff will be frustrated (boredom, behaviour trouble, collective hostility, temporary or permanent mental disorder, under-utilization of staff competencies, etc.). But, if staff is considered or considers himself in d4, while management is situated in c5, management will be "too evolved", which will create anxiety (incomprehension, staff opposition, etc.). Equilibrium points are along points of coherence, which will be reached only through management and staff training. Training will aim a change of attitude.

Evolution of management styles showed in the graph above implies to focus on acquisition of new skills to meet new relevant requirements. Example, adoption of management style "participative" involves more skill than the management of "know-how". The participative style implies that staff adheres to this system, which he will be able to participate in decisions, he will give his opinion, his ideas, he will influence change and should be creative. While adoption of "Know how" management style involves submission, no initiative, no freedom, no reflection by the staff.

Management of spin-off cannot be subordinated to decisions taken by public or private enterprises and associated universities. Such dependence would jeopardize the advantage of a spin-off, characterized by flexibility and enthusiasm, which animates the research team, a crucial component important to preserve.

It's this spirit, the challenge they are facing, the intellectual interest of the work, that will motivate people more than the material satisfaction. It is necessary that industrial partners accept that their representatives will integrate well the research team. Mutual agreement and esteem are obviously fundamental conditions for the success of such collaboration.

Management by 5 C postulates:

1° A better Consideration: objectives are negotiated and not imposed, constitution of genuine teams that share same values, same mission, with complementary functions, etc.

2° Incentives to increase the Competences: promote staff and managers training because it engenders personal development, progression and promotion. Creation of quality circles, because the search for total quality is a way to be. Learning how to favour self-knowledge, self-acceptance, dare to be himself and fight against stress.

3° Participation (Cooperation): task delegation is used as a way of development.

4° Encouragement of Creativity (to be learned) and Innovation (to be applied), adaptation to change is encouraged.

5° Communication is adapted to appropriate functioning of all the interlocutors: development of the means of expression, using motivating communication.

The 5 C will be executed in support of the 4 competencies of management:

- 1st **Integrate** (be part of a whole): All human and material resources will be integrated.
- The strategy will be integrated and not just a set of separate strategies which cover recruitment procedures, changes, research, etc. This integration will be daily as soon as reception and integration because recruitment will be conducted at the local level but also at international level and adapted to different working cultures and workplaces. Staff training will be permanent in order to avoid resistance to innovation and foster the sharing of knowledge, experience, to avoid individualism and foster solidarity and altruism. Group and individual coaching will be provided regularly to follow up and perfect integration within research groups, etc.
- 2nd **To manage**: to decide, to organize, to carry out.
- 3rd **Evaluate**: continually and very periodically to better react and faster redress and evaluate, to decide and act, what to do to create the shared values in function of the objective and culture to develop.
- 4th **Explore**: develop and encouraging research, stimulate creativity and innovation, establishment of technological monitoring by creating favourable environment with the acceptance of change and develop a forecasting system for the development of strategy.

WHO COORDINATES THE STRATEGIC MANAGEMENT OF STRUCTURES?

As researchers tend to delay the finalization of product to make improvements, it must be ensured to avoid an imbalance in management, which could negatively influence the management of spin-off. Dominance of researchers in these positions may create hypertrophy of the technological dimension then it's better to have a balanced team including at least one scientist, one economist, a human resources manager and a General Manager who must be generalist and federative.

COMMON GUIDELINES

Staff will have a great motivation for research, high level of skills with high expertise because this will increase potential for success and adaptability. Staff will demonstrate maturity, because knowledge sharing meetings will be held and participation in teamwork is essential.

Personalities will be diversified, possessing strong adaptation capacity to adaptation, formed to creativity, apt to autonomy because a certain freedom will be granted for their choice of projects treated and they will take care of.

Since hiring, staff resilience will be sought. Resilience is based on failure to evolve, risk taking and critique should be accepted because error and failure will be treated positively.

ESTABLISHMENT OF THE DEVELOPMENT OF SKILLS

Management will secure harmony in private and professional life, work by objectives and projects, foster internal transfers by training, creation of permanent training workshops having also objectives to share knowledge, experiences and innovations.

Foster managerial system by 5 C to transit through managerial Welfare to reach rapidly managerial Wellness. Complete the concept of optimal experience with self-esteem based on three variables:

Self-confidence through a process of positive verbal feedback, because words make conscious the personal value, reassure person and give him hope; **vision of himself, love for himself.**

Through management of competencies there will be awareness of the company objectives. Solidarity between functions will be increased by search for pleasure at work, search for sense in actions, striving for excellence and altruism.

Projects must have sense for researchers who will provide pleasure, advantage and challenge through autotelic actions (research of clean motors and fuels) because action engenders pleasure by objective but also in the way to achieve the objective, it means having pleasure in action. Work becomes pleasure because it will be permitted to play at work and even to joke because it will lead to creativity, thanks to the work atmosphere we "create" a spiral of happiness

Foster self-esteem by taking into account four components: the sense of security and confidence, knowledge of himself, sense of belonging to a group and a sense of competence. The sentiment of security and confidence is a prerequisite for self-esteem, because we must first feel it and live it to be available and learn what is needed to feed self-esteem. It is necessary to stimulate self-awareness, sense of belonging and a feeling of competence, at each stage of development in each period of life, with adequate educational attitudes, and practical ways to provide access to the culture.

Management will be at a very high level because self-esteem depends on positive feedback from persons that are important in the eyes of individual, highlighting his successes will confirm his self-esteem.

Establishment of a permanent evaluation by the choice of relevant indicators:

- Periodic evaluations of all departments and setting up of a feedback system for improvements and adjustments.
- Setting up reporting with high frequencies because revisions engender developments and ell-conducted evaluations allow evolutions.
- Evaluations will be between sites, avoiding competition through the organization of regular meetings.
- Allow staff self-assessment of his performances.
- Create "expressions" places to share methodologies, gained knowledge, experiences evolution but also undergoes failures. Then there will be creation of synergies, better coordination and a sense of belonging to a group but also of project ownership.

Setting up of work through participative management by objectives:

- Establish a complete coordination of projects, processes and decisions; leading to workforce development.
- Leave a certain freedom of action,
- Build an internal mobility program to avoid boredom and routine,
- Create project management with flat structure.
- No unnecessary procedure should be followed.

This should rise quality of work, rigor but also flexibility.

CONCLUSIONS

Management by 5 C aims to create a general spirit of innovation that should dominate the spin-off with a spirit of consistency to foster innovation rather than to impose it, to help individual to develop his potential, to harmonize his life; through implementation of dialogue, solidarity and creation of colleagues interdependence.

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