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***TEAM BUILDING AND ORGANIZATIONAL LEARNING
IN NEW PRODUCT DEVELOPMENT PROJECTS.***

Theme: The Social Processes of OL and KM

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Abstract

In the contemporary competitive environment, it becomes crucial for companies to master, promote and keep the organizational learning developed during new products development projects. This research discusses the extent to which the approach of staffing the new products development projects' teams has an influence on the organizational learning conditions during these projects. After having pointed out the main dimensions of organizational learning in new product development projects, it demonstrates that job rotation in projects for functional employees, as an approach of staffing the projects' team, makes up favourable conditions for collective learning during the projects

The evolution of competitive environment has pointed out the ability of companies to develop new products both quickly and under good economic conditions -products which not only seek to satisfy the needs of clients but also bring them increased value- as a key factor of competitiveness (Gupta & Wilemon, 1990). In this new business context, fast and cost-effective product development has become a crucial organizational capability for companies' performance and survival (Stalk and Hout, 1990). In a context where the changing environment results in accelerated development and where the launch of new products is an important competitive issue, it becomes crucial to master, promote and keep the knowledge learnt through R&D projects (Meyers & Wilemon, 1989).

And this evolution explains why this echoes back to the theme of organizational learning and returns to the necessity of the firm to implement quick and efficient organizational learning (Koenig, 1994).

This research examines the extent to which the approach of staffing the teams of new products development projects has an influence on the organizational learning conditions during these projects.

After having demonstrated that, under particular conditions, the new product development projects constitute privileged organizational spaces learning experiments and knowledge creation, the methodology used in this research will be presented. And the results will be presented and discussed in the third part.

New product development projects : Critical areas for learning experiments and knowledge creation

The new product development projects constitute privileged organizational spaces for learning experiments and knowledge creation. By its very nature, this activity was characterized by Carlsson et al. (1976) as a learning system. The learning systems are the formal and informal mechanisms the project team will use in the process of developing knowledge and "the mechanisms by which learning is perpetuated and institutionalised in organizations" (Shrivastava, 1983). These mechanisms may include the methods required for detection, storage and extraction of knowledge gained (Meyers & Wilemon, 1989). The ability to detect and correct errors in time would appear to be dependent on the efficiency of the learning system of the project team (Purser, Pasmore and Tenkasi, 1992). Even if knowing the cause of the problem (error detection) is only useful when preventative action is taken to prevent

the problem from reoccurring (error correction). The members of the project team also depend on learning systems for making decisions as well as for detecting and correcting errors (Duncan & Weiss, 1979). The project director must therefore ensure that all members of the team are involved in the realization of a learning “by participation” system (Shrivastava, 1983). The setting up of a learning system, or conditions favouring learning, in an R&D project would therefore appear to be a critical factor in the success of a project (Purser and *al.*, 1992).

Because new product development projects are by their very nature knowledge-intensive places, the competencies developed through such projects can be defined as the development of a knowledge basis (Purser, Pasmore & Tenkasi, 1992). But the creation of new knowledge does not come about by disregarding already acquired competencies. The learning processes, like the projects, are the products of the firm’s combined capabilities; the emergence of new combinations of the firm’s capabilities produce knowledge. By “combined capabilities”, Kogut and Zander (1992) mean the intersection of the firm’s abilities to exploit its knowledge, with unexplored technological potential. These new combinations are obtained through constituent trial-and-error sequences that constitute, what Koenig (1994) called, « relational fertilization ». The project actors get involved in transactions during which they are negotiating the choices relative to the object of the project (Van de Ven, 1986).

The project, which by definition is limited in both time and cost, and which has a defined organizational space appears to be a potential place for learning experiments on a reduced scale in terms of time, space and cost for the whole organization. At the same time it plays the part of a learning tool which enables the firm to test the validity of certain established hypotheses (Garvin, 1993).

In effect, the project is precisely what modifies the setting, regenerates the system, and transforms the definition of activities (Koenig, 1994). It may be seen, then, as the ideal place for experimenting as defined by putting into practice new knowledge which does not conform to the rules of accepted usage (Midler, 1993). This beacon of change within organizational space limits risks and allows energy to be concentrated. And the existence of an evaluation process allows validation (or refusal) and generalization of new choices made during the project (Midler, 1993). These projects constitute the real test of the firm’s capacity to succeed in crossing actions and can be used as tool to reinforce relations between functions at the same time as giving them the space necessary to improve their own expertise (Leonard-Barton *et al.*, 1995).

According to Meyers and Wilemon (1989), at the beginning of a project the knowledge of the project team is said to be made up of the knowledge of its members and other available contributions. Learning by the detection and correction of errors, such errors understood as problems, challenges, crises and other events occurring during the development of the project will serve to enrich this knowledge by the end of the project. Therefore the project constitutes an area of learning by doing (Maidique & Zirger, 1985).

During a project, non-routine tasks, characterised by a high level of complexity and uncertainty, lead the teams themselves to generate processes which can deal with these problems; problems which cannot be resolved by a single player or unique function (Pava, 1983). In this case, the emerging deliberation is a way of dealing with the complexity of non-routine tasks; it will involve various and sometimes temporary members and will transcend

the organizational boundaries defining the project space (Purser *et al.*, 1992).

The project actors seconded to a project by the different functional departments gather to types of knowledge : a first type of knowledge is relative to the information gathered in their own specific functional area of expertise and know-how developed by the actors during the project resolving problems and accomplishing tasks pertinent to their specialised competences. The second type of knowledge is relative to the keeping or sharing of necessary information and know-how in order to complete the tasks required by the project (or the knowledge of “Who knows what?”) and know-how of project management (Kogut & Zander, 1992).

Organizational learning during projects: The critical role of attention’s management

The organization of new product development projects is a result of the setting up of plurifunctional teams in charge of leading projects that have been assigned certain objectives. The whole project is geared towards realizing these delegated objectives through optimal use of allocated resources, especially human resources. Individuals are transferred from their original department for a determined period of time in order to take part in and bring their expertise to the project. The project’s success, that is the realization of the assigned objectives, depends on the ability of the project director to manage the various forms of available expertise, to enable individuals who are not used to working in a team to work together, and thus to create the desired added value through the best possible integration, and, finally, to favour collective learning. But this success has a prerequisite: That the accumulated results of different forms of knowledge, sometimes stretching back to the very beginnings of the firm, are made available through the diverse functions of the firm’s highly skilled employees.

So, the individuals take a paramount place in these projects. So, it appears crucial taking into account the contributions of the cognitive psychology. The psychological limits of the individuals, which restrain them to pay attention to no-routine problems and lead them to look for simple causal models (Cyert & March, 1963). And the inertia they show in organizational life restrict their capability to get involved in learning processes (Van de Ven, 1986). Moreover, it was empirically shown that the individuals have a limited capability to deal with complexity (Tversky and Kahneman, 1974 ; Johnson, 1983). In complex situations, seeking, what Baumard (2002) calls « ontological security », they create scheme, like defense mechanisms, in order to deal with this complexity. The denial of realities, on an individual or collective level, is also a frequent reaction in organizations (Baumard, 2002). This attitude restricts the perception the individuals, who are involved in new products development projects, can have of the problems emerging during the projects and the detection of which constitutes the first stage of learning by doing cycles.

At the group level, the problems of inertia and conformism are added to psychological limits of the individuals. Pelz and Andrews (1966) showed that a group of scientists, from various disciplines, daily working together, develop a shared and homogenous approach of problems in a delay of three years. Moreover, the groups tend to minimize the internal conflicts and to focus their attention on problems which maximize consensus. This phenomenon, wellknown

under the name of *Groupthink*, had spectacular illustrations that led to the fiasco of the Bay of Pigs invasion in Cuba and to the decision to launch the ill-fated space shuttle Challenger in January 1986 (Janis, 1988). It consists in an excess of group cohesion that restricts critical sense and creates the illusion of a consensus about a decision. In the Challenger disaster, the Thiokol rubber joints defaults became progressively and tacitly accepted and considered as « normal » by NASA engineers (Starbuck & Miliken, 1988). This excess of cohesion can be generated at the very beginning of the project during the stage of the project team constitution where the « comfortable clone » syndrome occurs (Leonard & Strauss, 1997). According to the « comfortable clone » syndrome, the project manager tends to recruit, for the project, individuals who did the same studies, who share the same cognitive systems, the same sensitivity to stimuli, the same approach of problems and with whom he has already worked in the the past. So, he tends to constitute what Baumard (2002: 15) called an « not paradoxical organization » in which the individuals show « a congruence both cognitive and behavioral ».

The duration of the projects generates also a decrease of the communication between the members of the the project team (Katz, 1982). The longevity of the project team significantly affects as well the attention of the team to the information coming from the environment. The average duration of the new product development projects that can exceed in certain sectors suggests to pay attention to this type of phenomenon.

Moreover, the inter-group conflicts are reinforcing intra-group cohesion (Coser, 1959). And every project team has to make strong choices that can be perceived by one or another functional department as a clear questioning of its power and competencies' territory and constitute a source of conflict. So, the frequent conflicts emerging during new product development projects, between the project-teams and the functional departments, increase the probability of occurrence of this type of phenomena. And, the teams encounter difficulty to integrate threatening information –type of information inherent in new product development processes-.

Finally, the necessary time for the company to evaluate the results of the experiments carried out during the projects, what Midler (1995) called « the inertia of the return on experience » is often important. This acknowledgement reinforces the sharpness of the phenomena previously described.

Considering these statements, the difficulty that encounter project teams integrating threatening information, which is inherent in the new product development projects, appears more understandable. And the leadership becomes paramount. It makes it possible to focalise the attention of the team's member on innovative activities instead of routines (Van de Ven, 1986). In this perspective, the choice of the project's director and the staffing approach of the team play a crucial role in the capability of the project team to pay necessary attention to the problems emerging during the project life, to be able to detect these problems early, to treat them and to carry out the learning experiments called by those.

The human resources management practices, concerning the employees involved in the R&D projects, implemented by the firm constitutes a critical illustration of its will of creating conditions favouring organizational learning during the projects and ensuring the transfer of knowledge between the projects (Meyers & Wilemon, 1989; Midler, 1995). Thus, a staffing approach consisting in establishing the rotation of the functional personnel within the

projects, which constitutes the most effective vector of the transfer of the knowledge developed during the projects (Garvin, 1993), has a double objective:

- Avoiding the creation of "baronnies" around heads of projects charismatic project directors -logic generating a personification of project competence in the company- in generating a systematic renewal of the project teams (Midler, 1993);
- Ensuring, for the functional actors, the training by practice and the personal experimentation of the company's project competence.

The team staffing approaches influence the conditions of organizational learning during the new product development projects. So, the main objective of this research consists in testing the following **proposition: team building approaches of project-teams guaranteeing the rotation of functional actors through the projects contribute to the establishment of conditions favouring organizational learning during the projects.**

Methodology

To test this research proposition, a survey with the heads of Research and Development of 264 French industrial companies was carried out.

An identification tool of the staffing approach adopted by the company was also developed. And a measurement method of organizational learning in new product development projects was derived from the works of Shrivastava (1983) and Purser, Pasmore and Tenkasi (1992).

Identification of the staffing approach adopted by the company

Interviews carried out with five directors R&D of French industrial companies made it possible to point out the three main approaches of project team staffing:

Three types of approaches seem to prevail:

- First approach, continuation of a team having already proved itself;
- Second approach : Staffing the project team on the basis of members of the company who have never taken part in various projects but having never had the occasion to work together within a project
- Third approach: Staffing the project team on the basis of members of the company who have never had the occasion to work together within a project and for the majority of them having never taken part in a project.

Measure of organizational learning during the projects

The organizational learning, developed during the new product development projects, is measured, by default, through the conditions, the implementation of which come under the competence of the project manager and which make the project a participative learning system (Shrivastava, 1983). The works of Shrivastava (1983) and Purser *et al.* (1992) propose two concepts that point out favourable conditions for the realization of organizational learning during the projects: The barriers to the development of knowledge and the forces which favor or impede the learning of the project teams. The four types of barriers to the

development of knowledge in new product development projects, the existence of which determine how well companies learn during this type of project, are:

1. The absence of knowledge sharing among the project team, the lack of cooperation between the project-actors, the lack of planning and unrealistic deadlines for the project;
2. Schemes of references such as language barriers, the involuntary setting aside of project actors, the disposal of knowledge useful for problem resolution, and the divergent values possessed by the project actors;
3. Procedural barriers and the withholding of knowledge which are the result of unclear procedures, a lack of documentation, an external lack of consultation (opinion of outside experts), responsibilities within the project defined in an imprecise way and insufficiently prepared meetings;
4. And a barrier to knowledge acquisition amounting to the lack of knowledge at the disposal of the project team.

The confirmed existence of these barriers to knowledge development in R&D projects reveals a check in the implementation of the conditions guaranteeing a good participative learning system within the project.

The synthesis of this operational work begun by Purser *et al.* (1992) led to the construction of a measuring tool, by default, of achieved learning during new product development projects, through an understanding of the occurrence of conditions unfavorable to the realization of learning during the course of these projects. The variables listed in the following table express conditions unfavorable to learning during new product development projects.

Table 1

Variables for Measuring Achieved Learning during New Product Development Projects
1. Absence of knowledge at the disposal of the project team
2. Poor use of available knowledge by the project team
3. Absence of knowledge-sharing within the project
4. Lack of cooperation
5. Neglecting internal consultation
6. Neglecting external consultation
7. Language barriers between the project actors
8. Divergent work values possessed by the project actors
9. Lack of planning
10. Missing involvement of actors
11. Non-relevant involvement of actors
12. Unrealistic deadlines
13. Absence of informal non-programmed meetings to address problems encountered during the project
14. Formal and scheduled meetings
15. Political type of process decision
16. Interdisciplinary competition
17. The absence of overall and shared understanding of the project objectives

Data analysis method

A three-stage data analysis procedure was carried out. In the first stage, a factor analysis was used to reduce the number of variables characterising organizational learning in new product development projects. Thus, were identified the main dimensions of this phenomenon. In the second stage, a variance analysis was carried out to identify and to assess the underlying group structure of the sample firms in relation this “phenomenon”. Then in the third stage, a variance analysis (ANOVA) was carried out to explain the group on projects’ organizational learning conditions of the sample firms (dependant variable) by the staffing approach implemented by the firms (independant variable).

Results and discussion

The results of the data processing are presented and analyzed according to the three successive phases used in the data analysis method.

The main dimensions of organizational learning during new product development projects

The factor analysis carried out on the data relative to the measure of learning highlighted the main dimensions of organizational learning in new product development projects. The application of Kaiser’s criterion (eigenvalue >1) led to the retention of the five first factors arising from the factor analysis done on the data from the measuring tool for learning achieved during new product development projects. To facilitate the interpretation of the five retained factors, a Varimax-type orthogonal rotation was carried out, aimed at maximizing the correlation coefficients of the most correlated variable with these factors.

The first factor highlighted opposed the companies that meet frequently, during new product development projects that they led, problems such as the involvement of non-relevant actors that they led, unrealistic deadlines, a lack of economic planning and of cooperation among the project actors and divergent values possessed by the project actors to the companies that rarely come up against these type of problems. The work values are an important factor in team relation relations and success (Dose and Klimoski, 1999). This first dimension of learning in new product development projects comes back to the cohesion of the project team. This team’s cohesion can be defined as the attraction to the team and as commitment to the object of the project (Carless and De Paola, 2000).

The second factor opposed companies frequently confronted with problems that lead to difficulties for the project team using available knowledge and where the project teams are confronted to political type decision processes, to companies where this is rarely these kinds of problems. The learning dimension, corresponding to this factor, is the pertinence of the answers to the problems met during the project.

The third factor enables the identification of companies engaged in projects where the oversights in preliminary consultations with internal or external actors were a frequent problem bearing on decisions about the progress of the project, as well as those companies that do not (or have not) experienced these difficulties. This third learning dimension in

development projects corresponds to the setting up of a participative management mode within the project.

The fourth factor distinguished companies in the projects in which there is an absence of knowledge sharing among the project team and where there are language barriers among the project actors, from companies which are rarely confronted with these type of problems in their new product development projects. This factor constitutes the dimension of knowledge sharing in the new product development projects.

Finally, the fifth and last factor sets companies in which the problems met throughout the project are addressed during scheduled meetings that punctuate the progress of the project, against companies in which this type of problem is addressed during non-programmed, informal meetings which are held as necessary where all the actors with knowledge useful for these meetings are be present . The learning dimension characterizing this axis is the organization of the treatment of the inherent problems in the project.

So, the five main learning dimensions in new product development projects highlighted by this factor analysis are :

1. Cohesion of the project team;
2. Pertinence of the solutions to the problems encountered during the project;
3. The implementation of a participative management mode;
4. Knowledge sharing among the members of the project;
5. The organization of the treatment of the inherent problems during the project.

Arising from this factor analysis, the sample companies can be understood according to their respective positions (factor scores) on the main dimensions (factors) of organizational learning during the development of new products. and it is on the basis of these factor coordinates that these companies are classified into homogeneous groups according to their relative learning during their new product development projects.

Cluster analysis of companies in the main dimensions of organizational learning during new product development projects.

During the second stage of data analysis (cluster analysis), the results of which are not presented here, the sample firms was classed and regrouped into homogenous groups according to their respective position on the principal dimensions of organizational learning during new product development projects. These groups refer to the relative levels of organizational learning through new product development projects.

The first group of companies was characterized by negative average positions on each of these dimensions. In other words, the companies accumulated the identified conditions as being unfavorable to organizational learning during the new product development projects.

As for the second group of companies, they presented positive average positions on each of the organizational learning dimensions. This group of companies had gathered together the favorable learning conditions during their new product development projects.

Analysis of variance: Explaining the learning conditions during the projects through the staffing approach

Once these groups made up, an analysis of variance was carried in order to explain the membership of the sample companies to these groups (level of collective learning during the project) by the approach of staffing the projects (cf Table 2). The approach number one corresponds to the systematic reconduction of the teams, the approach number 2 to the constitution of the project teams on the basis of individuals having already taken part in various projects but having never had the occasion to work together in a project, and the approach number three is relative to the constitution of the project teams on the basis of functional actors having never had the occasion to work together within a project and for the majority of them having never taken part in a project.

Table 2

Mean <i>Standard Deviation</i>	Organizational Learning Conditions			Significance Level
	Défavorables	Favorables	F	
Approach of Staffing Project Teams	1,825 <i>0,958</i>	2,220 <i>0,962</i>	3,419	0,068

Finally, the third stage of data analysis pointed out the link existing between the team building approach adopted by the firm to constitute new product development projects' teams and the more or less favourable character of the collective learning conditions characterising the projects led by the firm.

Examining the results of this analysis of the variance, the staffing approach of project teams seems being a discriminating variable of the conditions of organizational learning during new product development projects. So, the companies, whose the new product development projects are characterized by favorable conditions of learning, mainly privilege (58,54%) staffing approach on the basis of members of the company who have taken part in a way in various projects led by the firm but have never had the occasion to work together within a project.

Thus, validating the research proposition, the logic underlying the constitution of project teams in the company seems to play a determining role in the more or less favorable character of the conditions of organizational learning during the projects carried out by this company. A staffing approach of project teams on the basis of functional actors members having already taken part in an project but having never had the occasion to work together within a project seems to take part in the realization of favourable conditions for collective learning during the projects. Conversely, a logic of constitution of the team-project consisting in taking back teams having already proved itself in the management of a former project appears accompanying poor collective learning during projects carried out by the company. On the contrary, the companies whose projects know unfavourable conditions of training implement, for the majority of them, of logics of constitution of the team-project resting on the renewal of teams having already proven reliable in the project management.

The renewed diversity, implying the rotation of functional actors in the various projects led by the company, can viewed as an « orthogonality » of the logic of job rotation, orthogonality

between the projects -the horizontal dimension- and the functional department -the vertical one-. This approach is possible only if the available human resources, taking into account both the relative size of the projects led by the company compared with the company's one and the relative degree of specialization of actors with regard to those of the various projects, are sufficient. Moreover the company must provide a clear valuation of project experience in the management of personnel careers. If the renewed diversity is the condition of the diffusion of project culture within the organization, the career management of the projects' actors is the vector of its diffusion.

Conclusion

This research demonstrates that the companies privileging the rotation of the functional personnel as project teams staffing approach are better able to develop collective learning during these projects than the others. The empirical study made necessary the development of both an identification tool of the staffing logic implemented by the companies and an measurement instrument of the organizational learning during new product development projects. Beyond the limits inherent in a survey, within which only directors R&D were questioned, it is undoubtedly the operationalisation quality of the concept of organizational learning which constitutes the main limit of this research.

Moreover, this research raises certain questions as the issue of the transfer and memorization of learning carried out during the projects. Beyond the question of the valuation of the functional actors participation to the various projects led by the firm, the more general question career management of this personnel arises. This question arises with all the more acuity for the actors having held significant responsibilities during the project, sometimes leading them to call into question the power's territories of the functional departments through strong choices carried out during the project.

These actors are also effective vectors of the transfer of the knowledge developed during the projects. And the company must make sure that this transfer is effective if it wants that the learning does not remain a simple local knowledge embodied by some individuals and thus it profits from their contributions. Indeed, the ideas are carrying a significant impact on the organization only when they are largely diffused rather than held by a number limited of individuals (Garvin, 1993).

Finally, this approach of staffing new product development projects teams implying the rotation of functional actors in the various projects led by the firm can be seen also as a way for the company to learn about its employees and activities (Ortega, 2001). This relation between job rotation and staffing projects approach would constitute an avenue for future research.

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