

STAFFING APPROACH AND ORGANISATIONAL LEARNING IN PROJECT TEAMS - THE CASE OF NEW PRODUCT DEVELOPMENT PROJECT

Laurent Bourgeon

Strategy and Management Department,
ESSEC Business School, France
bourgeon@essec.fr

Session G-1

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 and the logic of career development of project managers have 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 and the main dimensions of the logics of project managers' career development, the empirical data analysis of this research demonstrate that job rotation in projects for functional staff, as an approach of staffing the projects' team, makes up favourable conditions for collective learning during the projects.

Keywords: HRM Practices, Organisational Learning, Project Team, Staffing.

Staffing Approach and Organisational Learning in Project Teams. The Case of New Product Development Project.

Laurent BOURGEON

Strategy and Management Department
ESSEC Business School, France
bourgeon@essec.fr

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 and the logic of career development of project managers have 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 and the main dimensions of the logics of project managers' career development, the empirical data analysis of this research demonstrate that job rotation in projects for functional staff, as an approach of staffing the projects' team, makes up favourable conditions for collective learning during the projects.

Keywords: HRM Practices; Organisational Learning; Project Team; Staffing.

Suggested track: Organisational learning (G)

Introduction

The evolution of the competitive environment has highlighted 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 and Wilemon, 1990). In this new business context, fast and cost-effective product development has become a crucial organisational capability for a company's performance and survival (Stalk and Hout,

1990). In addition, the evolution of the competitive environment explains the necessity of the firms to implement quick and efficient organisational learning and why they show greater interest in the theme of organisational learning (Easterby-Smith, 1997; Grant, 1996).

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 and Wilemon, 1989). If new product development projects have been extensively identified as learning tools for the companies, little attention has been paid to the influence of team composition on organisational learning in this particular context.

This research examines the extent to which the approach of staffing the teams of new product development projects and the career development of the project managers have an influence on the organisational learning conditions during these projects.

In a first time, it is demonstrated that, under certain conditions, new product development projects constitute a privileged organizational privileged spaces of collective learning and that the management of attention in is playing a paramount role in these learning processes. In a second time, the methodology used in this research will be outlined. Finally, the results of the data analysis are presented and discussed in the last section of this paper. They demonstrate the critical link between what is called in this research “orthogonality” (staffing approach of projects guaranting the rotation of functional actors in the projects and the alternation of the duties carried out by the project managers) and the favourable character of the conditions of organisational learning during the projects.

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

New product development projects constitute privileged organisational spaces for learning experiments and knowledge creation. By its very nature, this activity was characterised by Carlsson et al. (1976) as a learning system. Learning systems are the formal and informal mechanisms the project team use in the process of developing knowledge and “the mechanisms by which learning is perpetuated and institutionalised in organisations” (Shrivastava, 1983). These mechanisms may include the methods required for detection, storage and extraction of knowledge gained (Meyers and Wilemon, 1989). The ability to detect and correct errors in time appear to be dependent

on the efficiency of the learning system of the project team (Purser et al., 1992). But knowing the cause of the problem (error detection) is only useful when prior action is taken to prevent the problem 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 and Weiss, 1979). The project leader must therefore ensure that all members of the team are involved in the realisation of a participative learning 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 et al., 1992).

Because new product development projects are by their very nature knowledge-intensive, the competencies developed through such projects can be defined as the development of a knowledge basis (Purser et al., 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 and 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 capabilities with unexplored technological potential or technological opportunities. These new combinations are obtained through trial-and-error sequences that constitute cross-fertilization phenomenon. 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 organisational space appears to be a potential place for learning experiments on a reduced scale in terms of time, space and cost for the whole organisation. At the same time it plays the role 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. It may be seen, then, as the ideal place for experimenting as defined by putting into practice new knowledge that does not conform to the accepted rules (Midler, 1993). This demarcation of change within organisational space limits risks and allows energy to be concentrated. And the existence of an evaluation process allows validation (or refusal) and generalisation of new choices made during the project (Midler, 1993). These projects constitute the real test of the firm's capacity to succeed in cross actions and can be used as tool to reinforce

relations between functions while at the same time 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 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 and 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 organisational boundaries defining the project space (Purser et al., 1992).

The project actors seconded to a project by the different functional departments gather two types of knowledge. The 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 and Zander, 1992).

2 Organisational learning during projects: The critical role of attention's management

The organisation 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. Each project is wholly 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 realisation of the assigned objectives, depends on the ability of the project leader to manage the various forms of available expertise, to enable individuals who are not used to work together in a team, thus creating 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 functional departments of the firm's highly skilled employees.

Because individuals take a paramount place in these projects it is crucial to take into account the contributions of the cognitive psychology. The psychological limits of the individuals restrain them to paying attention to non-routine problems and lead them to look for simple causal models (Cyert and March, 1963). Furthermore, the inertia they show in organisational life restricts their capability to get involved in learning processes (Simon, 2001; Van de Ven, 1986). Moreover, it was empirically shown that the individuals have a limited capability to deal with complexity (Johnson, 1983; Tversky and Kahneman, 1974). In complex situations, seeking what Baumard (2002) calls "ontological security", they create schemes, like defence mechanisms, in order to deal with this complexity. The denial of realities, on an individual or collective level, is also a frequent reaction in organisations (Baumard, 2002). This attitude restricts the perception that the individuals, who are involved in new product development projects, can have of the problems emerging during the projects and the detection of such problems constitutes the first stage of learning-by-doing cycles.

At the group level, the problems of inertia and conformity are added to psychological limits of the individuals. Pelz and Andrews (1966) showed that a group of scientists, from various disciplines, working together daily, develop a shared and homogenous approach of problems after a period of three years. Moreover, the groups tend to minimise the internal conflicts and to focus their attention on problems which maximise consensus. This phenomenon, known as *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 of 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 default became progressively and tacitly accepted and considered as "normal" by NASA engineers (Starbuck and 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 and Strauss, 1997). According to the “comfortable clone” syndrome, the project leader tends to recruit, for the project, individuals who did the same studies, who share the same cognitive type of cognitive scheme, 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) calls “not paradoxical organisation” in which the individuals show a congruence both cognitive and behavioral”.

Table 1. Diverse *versus* Homogeneous Teams

Diversity vs Homogeneity		
	<i>Diverse teams are characterised by...</i>	<i>Homogeneous teams are characterised by...</i>
Benefits	<ul style="list-style-type: none"> • an enhanced capacity for creative problem solving and learning capability (Pfeffer, 1983; Reagans and Zuckerman, 2001) • benefits of the conflict resolution experience for team effectiveness (Guzzo and Shea, 1992; Sessa, 1991) • the tension that arises between the team members enhances the performance of the team - <i>Equity Theory</i>- (Tziner, 1985) • creativity in decision making (Bantel and Jackson, 1989; Hoffman and Maier, 1961) 	<ul style="list-style-type: none"> • favourable interpersonal interaction, cohesiveness, attachment, member satisfaction and performance gains in certain situations (Clement and Schiereck, 1973; Fenelon and Megargee, 1971; Filley, House and Ken, 1976; Lot and Lot, 1965; Tsui et al., 1992) • higher level of performance because of the better coordination (McCain et al., 1983; O'Reilly et al., 1989; Zenger and Lawrence, 1989) • a mutual attraction shared by team members that enhances the performance of the team -<i>Similarity Theory</i>- (Tziner, 1985) • shared language and better coordination (Weirseman and Bantel, 1992)
Drawbacks	<ul style="list-style-type: none"> • a lessened capacity for coordination (Ancona and Caldwell, 1992) • a lower performance (Pfeffer, 1983) • inherent tensions between team members that limit team productivity (Tziner, 1985) 	<ul style="list-style-type: none"> • dangerous cognitive and behavioral congruence (Baumard, 2002) • groupthink, conformity or over-attention to interpersonal issues (Janis, 1988; Ziller, 1965) • a relative redundancy of members' perspectives, information, and resources that limit the performance of the teams (Ancona and Caldwell, 1992; Bantel and Jackson, 1989; Pelled et al., 1999) • a lack of openness to new sources of information (Bantel, 1994)

Many studies and research (cf. Table 1) have debated the benefits and drawbacks of diversity and homogeneity for staffing work teams (e.g. Bowers, Pharmed and Salas, 2000; Dose and Klimoski, 1999; Reagans and Zukerman, 2001).

The duration of the projects also generates a decrease in the communication between the members of the project team (Katz, 1982). The longevity of the project team also significantly affects the attention of the team to the information coming from the environment. The average duration of new product development projects that can exceed five years in certain sectors suggests the need to pay attention to this type of phenomenon. Moreover, inter-group conflicts reinforces intra-group cohesion (Coser, 1959). 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 constitutes 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. Finally, the necessary time for the company to evaluate the results of the experiments carried out during the projects, which Midler (1995) calls "the inertia of the feedback on experience", is often important. This acknowledgement reinforces the sharpness of the phenomena previously described.

Considering these statements, the difficulties that project teams encounter when integrating threatening information, which is inherent in new product development projects, appears more understandable. Leadership becomes paramount. It makes it possible to focus 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 leader 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, to be able to detect these problems early, to treat them and to carry out the learning experiments.

Human resource management practices, concerning the employees involved in new product development projects, implemented by the firm, constitute a critical illustration of its will of creating conditions favouring organisational learning during the projects and ensuring the knowledge transfer between the projects (Meyers and Wilemon, 1989; Midler, 1995). Thus, a staffing approach that establishes the rotation of the functional staff within the projects, and which constitutes the most effective vector of the transfer of the knowledge developed during the projects (Garvin, 1993), has a double objective:

- To avoid the creation of “baronnies” around charismatic project directors -logic generating a personification of project competence in the company- in generating a systematic renewal of the project teams (Midler, 1993);
- To ensure the training by practice of the functional actors and their personal experimentation of the company’s project competence.

The team staffing approach influences the conditions of organisational learning during the new product development projects. So, the main objective of this research consists in testing the following **hypothesis**:

A staffing approach to project-teams guaranteeing the rotation of functional actors through the projects contributes to the establishment of conditions favouring organisational learning during the projects.

Following the same logic, the career development of project managers, implemented by the firm, has an influence on the conditions of organisational learning during the projects. The **second hypothesis** tested in the framework of this research is:

A logic of project managers career development guaranteeing the alternation of their duties contributes to favourable conditions for organisational learning during the projects.

3 Methodology

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

Identification tools of the staffing approach and of the project managers’ career development adopted by the company were developed and a measurement method of organisational learning in new product development projects was derived from the works of Shrivastava (1983) and Purser, Pasmore and Tenkasi (1992).

3.1 Identification of the staffing approach and the project managers' career development adopted by the company

In a preliminary stage, interviews carried out with five R&D directors of European industrial companies made it possible to point out the three main approaches of project team staffing.

Three types of approaches seem to prevail:

1. Continuation of a team having already proved itself;
2. Staffing the project team on the basis of members of the company who have already taken part in various projects but having never had the occasion to work together on a project;
3. Staffing the project team on the basis of members of the company who have never had the occasion to work together on a project and for the majority of them having never taken part in a project.

An identification tool of the career development logic concerning the project managers and implemented by the firm was also highlighted during these interviews. So the career development approach in place in the companies is identified through the position of origin (before the project) and the next position (after the project) held by the project managers (functional position, product manager position, production manager position, project manager position). The proportion of project managers (in %) in the company according to their position of origin and destination constitutes here the indicator making it possible to grasp the project managers' career development mode implemented by the company.

3.2 Measure of organisational learning during the projects

The organisational learning, developed during new product development projects, is measured, by default, through the conditions, the implementation of which comes under the competence of the project manager and which makes the project a participative learning system (Shrivastava, 1983). The works of Shrivastava (1983) and Purser et al. (1992) propose two concepts that highlight favourable conditions for the

realisation of organisational learning during the projects. The first concept is the barriers to the development of knowledge, the second one consists of the forces that favor or impede the project teams learning.

The four types of barriers to the development of knowledge in the projects, whose existence determines 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 of actors owning knowledge useful for problem resolution, and the divergent values possessed by the project actors;
3. Procedural barriers and the withholding of knowledge that 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 new product development projects reveals a failure 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 a grasp of the occurrence of conditions unfavourable to the realisation of learning during the course of these projects. Beyond the limits inherent in a survey, in which only R&D directors were questioned, it is probably the operationalisation quality of the concept of organisational learning that constitutes the main limit of this research. The variables listed in the following table express conditions unfavourable to learning during new product development projects.

Table 2. Measure of Organisational Learning during New Product Development Projects

Variables to Measure 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

From Purser, Pasmore and Tenkasi (1992)

3.3 Data analysis method

A three-stage data analysis procedure was carried out (cf. Figure 1). In the first stage, a factor analysis was used to reduce the number of variables characterising each phenomenon (i.e. organisational learning in new product development projects and career development of project managers). Thus, were identified the main dimensions of these two phenomenon. In the second stage, a cluster analysis was carried out to identify and to assess the underlying group structure of the sample firms in relation to each "phenomenon". Then in the third stage, variance analyses (ANOVA) were carried out to explain the group membership (the projects' organisational learning conditions) of the sample firms (dependent variable) by the staffing approach implemented by the firms (independent variable), in the first ANOVA, and by the logic of project managers' career development implemented (independent variable) in the second one.

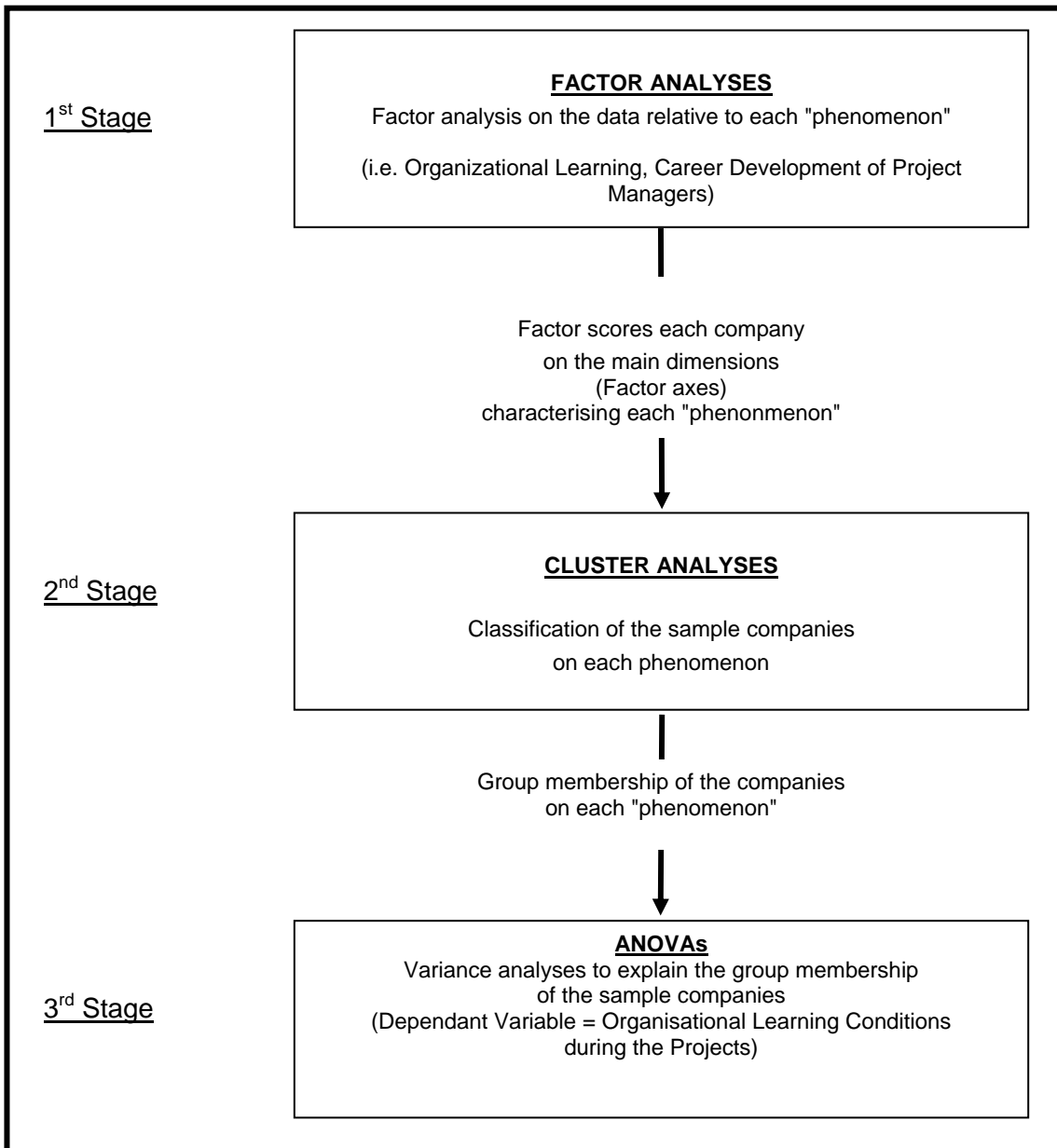


Fig. 1. Data Analysis Method

4 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.

4.1 The main dimensions of organisational 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 organisational 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 variables with these factors.

The first factor axis highlighted the companies that meet frequently, during their new product development projects, problems such as the involvement of non-relevant actors, unrealistic deadlines, a lack of economic planning and of cooperation among the project actors and divergent values possessed by the project actors and, on the other hand, the companies that rarely come up against these type of problems. The work values, that appear to make up this first dimension of collective learning during the projects, are an important factor in team relations and a condition of success (Dose and Klimoski, 1999). This first dimension of the conditions for learning in new product development projects amounts to the well-adapted organisation of the projects linked with a clear understanding of the projects and of their objectives and involving a strong commitment of the project teams leading these projects. This kind of empathy of the team for its project, or what Ayas and Zeniuk (2001) call "sense of purpose", can be defined as the bond between the members of the team and as commitment to the object of the project (Carless and De Paola, 2000).

The second factor axis compared the companies frequently confronted with problems that lead to difficulties for the project team in using available knowledge and where the project teams are confronted with political decision processes, with the companies where these kinds of problems are rare. The learning dimension, corresponding to this factor, is the involvement of the team in error detection and correction processes.

The third factor axis enabled the identification of companies engaged in projects where oversights in preliminary consultations with internal or external actors are a frequent problem bearing on decisions about the progress of the project, as well as those companies that do not experience these difficulties. This third learning dimension in new product 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 members and where there are language barriers among the project actors, from companies that 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. These informal meetings are held as necessary and where all the actors with knowledge useful for these meetings are present. The learning dimension characterising this axis is the organisation of the treatment of the inherent problems in the project.

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

1. Empathy of the team for its project;
2. Involvement in error correction processes;
3. The implementation of a participative management mode;
4. Knowledge sharing among the members of the project;
5. The organisation of the treatment of the problems emerging 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 organisational learning during the development of new products. 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.

4.2 The main dimensions of the career development mode of the project managers

The purpose of the second factor analysis is to highlight, among the eight variables (position of origin and position of destination of the project managers) describing the career development of the project managers, the main dimensions underlying these HRM practices in the companies.

The two variables mainly constituting the first factor axis are the project management duties as position of both origin and destination of the project managers.

Thus, the first axis compares two types of companies. The first type is composed of companies where the project managers have already practised this type of position and who will have to practise project management in their future career. The second one is made up of companies in which the project managers performed other types of duties (functional duties, product management, head of a manufacturing unit) before the

project and are intended, at the end of the project, to perform other types of duties than project management ones. The first dimension characterising the mode of career development of the project managers consists of the constitution, within the company, of a corps of project management specialists who will be, throughout their career in the company, put in charge of new product development projects led by the firm.

The variables playing a decisive role in the constitution of the second factor axis are the functional duties as position of origin and destination for the project managers, as well as the product management duties as position of origin and destination. So, this second axis compares the companies in which the project managers alternate project duties and product management position with the companies where the project managers alternate project duties and functional position. This axis embodies alternation in the logic of career development of the project managers: project-product or project-function alternation logics.

Finally, the two variables mainly constituting the third factor axis are the head of a manufacturing unit as both position of origin and position of destination for the project managers. This third factor axis compares the companies in which the project managers alternate project duties and the head of a manufacturing unit to the companies where the approach of the career development of project managers corresponds to another logic. So, the third dimension characterising the mode of career development of the project managers is a technical logic consisting of alternating new product development project duties and production duties.

So, the implementation of this factor analysis made it possible to highlight the main dimensions characterising the career development approach of project managers, which are:

1. The constitution of a corps of project specialists,
2. The alternation of project duties with functional or product management position
3. And a technical logic consisting of alternating project and production management duties.

The logic of the project managers' career development characterising in place in the sample companies was highlighted on the basis of its respective position on these three dimensions.

4.3 Cluster analysis on the main dimensions of organisational learning during the new product development projects.

During the second stage of data analysis (cluster analysis), the sample firms was

classified and regrouped into homogenous groups according to their respective position on the principal dimensions of organisational learning during new product development projects. These groups refer to the relative character of the organisational learning conditions during new product development projects.

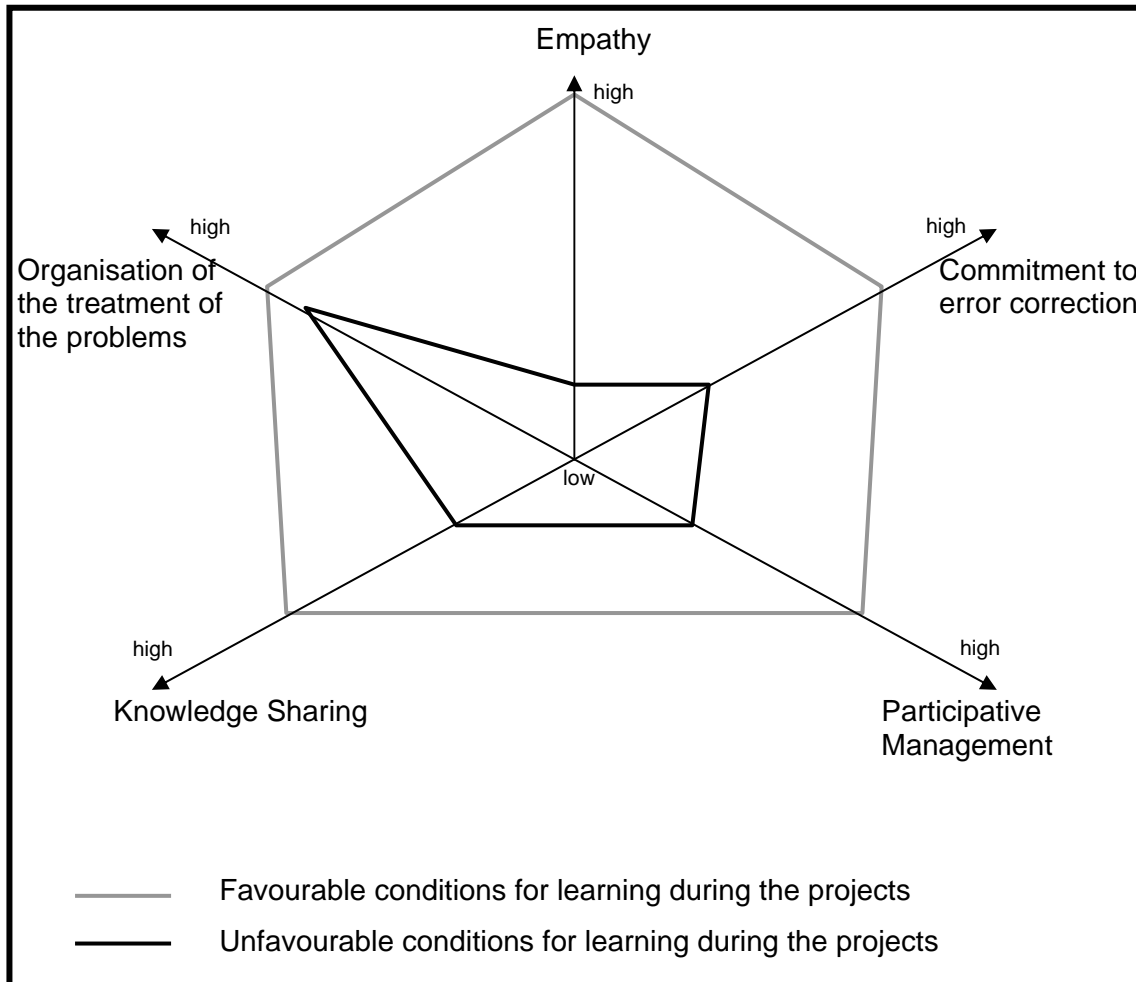


Figure 2. Organisational Learning Condions in New Product Development Projects (main dimensions and mean positions of the groups)

The first group of companies was characterised by negative average positions on each of the dimensions characterising organisational learning. In other words, the companies hold the conditions identified as being unfavourable to organisational learning during the new product development projects.

As for the second group of companies, they presented positive average positions on each of the organisational learning dimensions. This group of companies hold the favourable learning conditions during their new product development projects.

4.4 Cluster analysis of the companies on the main dimensions of the career development of the project managers' career development

The second cluster analysis carried out aimed to classify the companies of the sample according to the logic of career development of project managers from their respective positions on each dimension characterising these HRM practices. The hierarchical classification carried out on the three dimensions of the career development of the project managers generated four homogeneous groups of companies (cf. Figure 3).

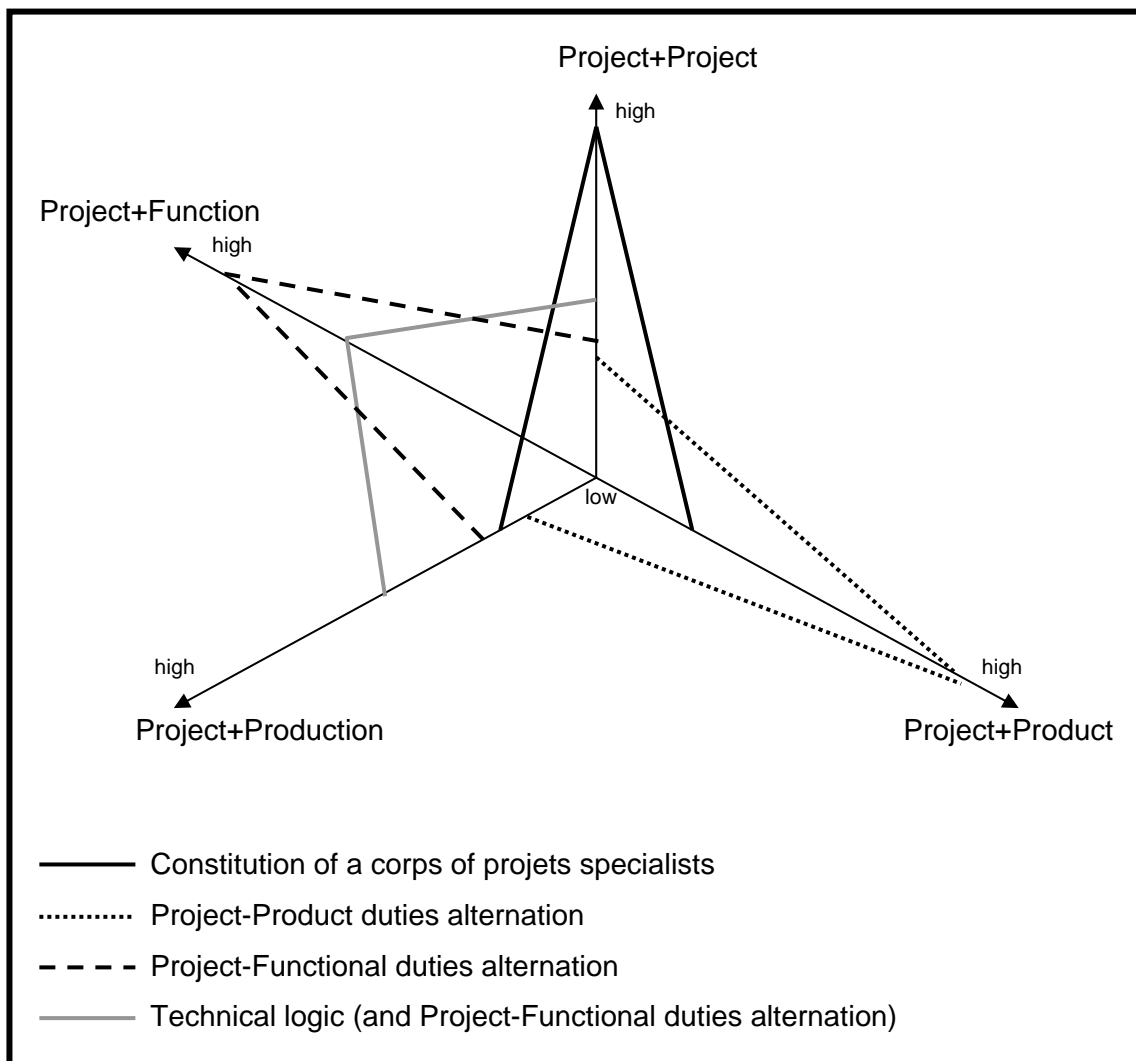


Fig. 3. Project Managers' Career Development
(main dimensions and mean positions of the groups)

The first group resulting from the cluster analysis gathers the companies privileging a logic of constitution of a corps of project specialists in the company. The second group of companies corresponds to the alternation of the duties carried out by the project

managers in the company, a project-product management duties alternation. Also characterised by the alternation of the duties carried out by the project managers in the company, the third group of companies corresponds to a functional-project duties alternation. Finally, the fourth group of companies gathers the companies combining technical logic of the career development of the project managers and alternation functional-project duties.

4.5 Analysis of variance: Explaining the learning conditions during the projects through the staffing approach of project teams and the project managers' career development

Once these groups were formed (on the basis of the main dimensions of organizational learning conditions in the projects), an analysis of variance was carried out in order to explain the membership of the sample companies in these groups (That is, the more or less favourable character of the learning conditions during the projects) by the staffing approach of the projects (cf Table 3) and by the logic of the career development of the project managers (cf. Table 4).

Concerning the projects' staffing (cf. Table 3), the first approach corresponds to the systematic continuation of the teams. The second approach corresponds 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. The third approach 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 3. Staffing Approach and Organisational Learning

Mean <i>Standard Deviation</i>	Organisational Learning Conditions			
	Unfavourable	Favourable	F	Significance Level
Project Teams	1,825	2,220	3,419	0,068
Staffing Approach	<i>0,958</i>	<i>0,962</i>		

Examining the results of this analysis of the variance (in Table 3), the staffing approach of project teams seems to be a discriminating variable of the conditions of organisational learning during new product development projects. As such, the companies, whose new product development projects are characterised by favourable conditions of learning, mainly privilege (58.54%) the staffing approach on the basis of

members of the company who have taken part in various projects led by the firm but have never had the occasion to work together within a project.

Thus, validating the first research hypothesis, the logic underlying the constitution of project teams in the company seems to play a determining role in the more or less favourable character of the conditions of organisational learning during the projects carried out by a company. A staffing approach of project teams on the basis of functional actors having never participated in a project, or having already taken part in a project but having never had the occasion to work together within a project, seems to take part in the realisation of favourable conditions for collective learning during the projects. Conversely, a logic of constitution of the team-project consisting of taking back teams that have already proved themselves in the management of former projects appears to accompany poor collective learning during projects carried out by the company. These results are consistent with the explanation of job rotation developed by *Campion et al.* (1994). These authors assess that job rotation fosters learning and increases human capital accumulation.

Concerning the career development of the project managers (cf. Table 4), the first logic aims to constitute a corps of project specialists in the company and also includes the technical logic prioritising a production-project rotation logic. The second logic consists of a “pure” alternation: functional duty / project management rotation or product-project management rotation.

Table 4
Career Development and Organisational Learning

Mean <i>Standard Deviation</i>	Organisational Learning Conditions			
	Unfavourable	Favourable	F	Significance Level
Career Development of Project Managers	1,477 <i>0,508</i>	1,663 <i>0,484</i>	2,84	0,095

This second analysis of variance (cf. Table 4) shows that the project managers' career development determinates the more or less favourable character of the conditions of organisational learning during the project. The companies privileging alternation of duties as the logic of career development for their project managers appear to be – significantly more – characterised by favourable conditions for collective learning during the projects. These results validate the second research proposition.

Finally, the third stage of data analysis pointed out the link that exists between on the

one hand, the staffing approach adopted by the firm to constitute its new product development project teams and the project managers' career development implemented and, on the other hand, the more or less favourable character of the collective learning conditions characterising the projects led by the firm.

The companies that decided to create a corps of project management specialists in privileging what Midler (1993) calls a methodological approach of project management, centred on tools and techniques, encountered weak conditions for organisational learning during the new product development projects they lead.

On the other hand, some other companies emphasise a widely diffused project management competence. This competence is diffused within the firm through the rotation of the personnel involved in the successive projects and the alternation of duties carried out by the project managers. The personnel rotation in the various projects led by the firm also appears to be a paramount way to favour organisational learning during the project and inter-project capitalisation on this learning (Garvin, 1993).

The renewed diversity, implying the rotation of functional actors in the various projects led by the company, can be viewed as the "orthogonality" of the logic of job rotation, orthogonality between the projects – the horizontal dimension of the organisation – 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 size and the relative degree of specialisation of actors with regard to the needs of the various projects, are sufficient. Moreover, the company must provide a clear valuation of project experience in the management of personnel careers. If renewed diversity is the condition of the diffusion of project culture within the organisation, 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 team staffing approach and the alternation of duties held by the project managers are better able to develop collective learning during these projects than the others. The empirical study necessitated the development of both an identification tool of the staffing approach and the career development logic

implemented by the companies and a measurement instrument of the organisational learning during new product development projects.

Moreover, this research embracing organisational learning issues, project management aspects and HRM perspectives raises certain questions such 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 in the various projects led by the firm, the more general question of career development of the 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 territories of the functional departments through strong choices carried out during the project.

These actors are also effective vectors for the transfer of the knowledge developed during the projects. And the company must make sure that this transfer is effective if it wants to ensure that the learning does not remain a simple local knowledge embodied by some individuals and so to profit from their contributions. Indeed, these ideas can carry a significant impact on the organisation only when they are largely diffused rather than held by a limited number 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 also be seen as a way for the company to learn about its employees and its activities (Ortega, 2001). This relation between the factors leading to the implementation of job rotation in the company and the projects staffing approach adopted would constitute an avenue for future research.

References

- Ayas, K.; Zeniuk, N. (2001): Project-based Learning: Building Communities of Reflective Practitioners, *Management Learning*, 32, 1, 61-76.
- Baumard, P. (2002): Les paradoxes de la connaissance organisationnelle, in E. Josserand, E. and Perret, V. (Eds): *Les paradoxes de la connaissance*, Paris: Ellipses
- Bowers, C.A.; Pharmed, J.A.; Sals, E. (2000): When Homogeneity is Needed in Work Teams, *Small Group Research*, 31, 3, 305-327.
- Carless, S.; De Paola, C. (2000): The Measurement of Cohesion in Work Teams, *Small Group Research*, 31, 1, 71-88.
- Carlsson, B.; Kean, P.; Martin, J. (1988): Learning and Problem Solving : R&D Organisations as Learning Systems, in Katz, R. (Ed.): *Managing Professionals in Innovative Organisations*. HarperBusiness.
- Coser, L. (1959): *The Functions of Social Conflicts*. New-York: Routledge and Kegan Paul.
- Dose, J.; Klimoski, R. (1999): The Diversity of Diversity: Work Values Effects on Formative Team Processes. *Human Resource Management Review*, 9, 1, 83-108.
- Duncan, R.; Weiss, A. (1979): *Organisational Learning : Implications for Organisational Design*, in *Research in organisational behavior*, Greenwich (CT): JAI Press.
- Easterby-Smith, M., (1997): Disciplines of organisational learning: contributions and critiques, *Human Relations*, vol 50, 9, 1085-1113.
- Garvin, D.A. (1993): Building a Learning Organisation. *Harvard Business Review*, August, 78-91.
- Grant, R.M. (1996): Prospering in Dynamically-competitive Environments: Organizational Capability as Knowledge Integration, *Organization Science*, 7, 4, 375-387
- Gupta, A.K.; Wilemon, D. (1996): Changing Patterns in Industrial R&D Management. *Journal of Product Innovation Management*, 13, 497-511.
- Janis, I. (1988): Groupthink, in R. Katz (Ed.): *Managing Professionals in Innovative Organisations*. HarperBusiness.
- Johnson, P.E. (1983): The Expert Mind: A New Challenge for the Information Scientist systems, in Bemmelmans (Ed.): *Beyond Productivity : Information Systems Development for Organisational Effectiveness*, Netherlands: North Holland Publishing.
- Katz, R. (1982): The Effects of Group Longevity on Project Communication and Performance. *Administrative Science Quarterly*, 27, 81-104.
- Kogut, B.; Zander, U. (1992): Knowledge of the Firm : Combinative Capabilities and the Replication of Technology, *Organization Science*. 3, 383-397.

Leonard, D.; Strauss, S. (1997) Putting your company's whole brain to work. *Harvard Business Review*. 75, 4, 110-120.

Maidique, M.O.; Zirger, B.J. (1985): The new product learning cycle, *Research Policy*. 14, 299-313.

Meyers P.W.; Wilemon, D. (1989): Learning in New Technology Development Team, *Journal of Product Innovation Management*, 6, 79-88.

Midler, C. (1993): L'auto qui n'existait pas. *Management des projets et transformation de l'entreprise*, Paris: InterEditions.

Midler, C. (1995): Une affaire d'apprentissage collectif, *L'Expansion Management Review*, 71-79

Ortega, J. (2001): Job rotation as a learning mechanism, *Management Science*. 47, 10, 1361-1370.

Pava, C. (1983): *Managing New Office Technology*, New-York: New York.

Pelz, D.; Andrews, F. (1966): *Scientists in Organisations*, New-York: Wiley.

Purser, R.E.; Pasmore, W.A.; Tenkasi, R.V. (1992): The influence of deliberations on learning in new product development teams, *Journal of Engineering and Technology Management*, 9, 1-28.

Reagans, R.; Zuckerman, E.W. (2001): Networks, Diversity, and Productivity: The Social Capital of Corporate R&D Teams, *Organization Science*, 12, 4, 502-517.

Shrivastava, P. (1983): A typology of organisational learning systems, *Journal of Management Studies*. 20, 1, 7-28.

Simon, H.A. (1991): Bounded rationality and organizational learning, *Organization Science*, 2, 1, 125-134.

Tversky A, Kanheman (1974): Judgement under Uncertainty: Heuristics and Biases, *Management Science*, 185, 1124-1131.

Van de Ven, A.H. (1986): Central Problems in Management of Innovation, *Management Science*, 12, 5, 590-607.