

PRACTICES OF COST PLANNING AND MANAGEMENT TOOLS IN NPD PROCESS: A QUALI-COMPARATIVE APPROACH

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Abstract of the paper:

Our PhD research focuses on costs planning and management (CMP) tools implemented in the new product development (NPD) process. Our aim is to analyse this dynamics and to characterize different CMP tools configurations within French industry.

We assume that models of Costs Planning and Management Tools in NPD process differ from one organizational model to another, and we then formulate the following research questions: What is the relation between management style and Costs Planning and Management tools and the NPD process configurations ? What are the dynamics of cost planning and management tools in the NPD process ? What is the role of agents in coordination, and tools interpretation ?

The theoretical framework is based on a theory of activity developed on the 30's by psychologists Vygotsky, Luria and Leontiev. This theory puts the emphasis on the importance to take the context into account, since it is assumed that any action is necessarily situated in a social and physical context. Thus, human interactions are considered as social, hierarchically organized, based on media and oriented. The theory of activity focuses on a cornerstone of these interactions: the process of internalisation of tools. This process consists in a collective appropriation of the tools, and their effective use. That leads to Vygotski' theory of "tools" (97). He made a distinction between the object (the physical tool) and the instrument (the way the tool is used), in order to analyse the relations between subjects and tools. An instrument's perceived usefulness results from the characteristics of an artifact and from the interpretation process through which the subject uses the artifact in some pattern of action. Therefore an "instrument" is the product of a "subjective scheme of utilization", which is the actor's scheme of interpretation, implemented on an "objective artifact", resistant to interpretation.

Our research model is highly embedded in this theory's dynamics. Our aim is to put the emphasis on the interactions between CPM tools, instruments, and NPD process management style. On the one hand, the dominant interpretation model (i.e. the organizational model) plays a role of interpretative filter in partly determining the instrument, and in so doing, also determines the CMP "tool box" . On the other hand, the

CMP “tool box”, highly constrains the instrument. On this basis, we build our conceptual model of CPM Instruments dynamics within NPD process. We want to study to what extent we can observe and measure this theory.

Our methodological device is based on a questionnaire circulated within the French system-based industry. The aim of this questionnaire is, on the one hand, to identify the cost planning and management tools and techniques implemented in NPD process, and, on the other, to characterize the key elements of managerial practices of these tools. This identification and characterization is done in order to stress interactions between the tool, its use and the management style.

According to the dynamics complexity and the small number of “cases” analysed, we choosed to use a comparative methodology. This methodology is a quali-quantitative method. This method seemes to be the most relevant for taking into account the complexity of the phenomena (since our approach is context based and therefore social), and it offers a dedicated technique (based on boolean algebra), to deal with data. Developed in sciences politics, this method is based on a continous dialogue between facts and ideas. It does not establish causality between variables, but contingency and necessity. This method is based on a constructivist approach, then variables are “constructed” on the basis of facts and ideas. The boolean algebra is based on dichotomic variables,(present or not). This permits the study of regularities more than causalities. The explicative logic makes the difference between the conditions and the result. Thus, we are looking for conditions of the phenomena, in order to explain how the phenomena occurs (more than why its occurs) . Still, we want to describe the conditions present while the phenomenon is occuring, rather than explaining the phenomena itself. This allows us to handle the complexity of this social phenomenon, and still makes a balance between complexity and parcimony.

The technique is based on 3 aspects of complexity processing: (i) limited diversity, (ii) definition of contingent and constitutives conditions, (iii) typologies construction. This method is clear and flexible, thanks to its construction (by constant loops between the field, the litterature and theories). The treatment is still in progress.

I. INTRODUCTION

The New Product Development (NPD) process differs from standard firm activities. Whereas standard firm activities has been highly rationalised with various kind of management tools, NPD process still remains not completely investigated. Many rationalisation attempts of NPD have failed. This failure is due to the innovative, creative and uncertain nature of this process and thus to the inadaptation of management tools, highly oriented towards absolute rationalisation.

We also know that NPD performances vary from organization to others. These variations are partly due to socio-cultural and organizational factors (Clark & Fujimoto 1991, Womack & al.1990). In order to handle these variations, many approaches of NPD process have been developed. On the one hand managerial ones (Midler, 1998; Giard & Midler, 1996) and on the other more technical ones (Tani, Shimizu & Iwabuchi 1999, ECOSIP, 1990, Lorino, 1997; Ansari & CAMI, 1997, Nixon 1998).

Our focus is both on a technical level (ie: tools) and on managerial issues (ie: management model). Our aim is to analyze the CMP tools dynamics within NPD process. But also to characterize different CPM tools configurations within manufacturing industry, and study their relation to the management model in order to better understand variations previously noted.

Based on this idea¹, we formulate an important hypothesis for our work : models of Costs Planning and Management Tools in NPD process differ from one organizational model to another. In order to understand these CPM tools dynamics, we analyse the relation between management style, Costs Planning and Management tools and the NPD process configurations. Our theoretical framework is based on two main psychology theories, activity theory (and the theory of tools linked) and the pragmatism . We should noted that applying the activity theory in various fields has shown its potential for studying different agents interactions.

Nonetheless, this approach calls for a specific methodologic tools' box, the qualitative-quantitative method.

We should first define NPD process nature and characteristics (1), then we will analyze the CMP tools dynamics within this NPD process (2), and we finally introduce our conceptual model and methodology(3).

¹ And also based on the comparison between the German and Japan studies on CMP tools, (Arnaout, 1998).

II. NEW PRODUCT DEVELOPMENT PROCESS DYNAMICS

Different models have been developed in order to manage NPD process and control its performances². These models are linked to different representation of NPD, each of these representations put the emphasis on a different element, but all these elements may be relevant and can be important, it depends on the firm's strategy and on the adopted vision.

Our vision is centred on tools, model of management and agents' behavior. Therefore we will focus on NPD as a collective problems solving activity, and on its social interactive nature.

II.1. A COMPLEX PROCESS

A collective problem solving activity

According to the informational model developed by Clark and Fujimoto, the NPD is an integrated system of information transmission and creation, implemented in a system of interconnected problem solving cycles (Clark & Fujimoto, 1991). Its launch is the consequence of a noted gap between the market needs and the firm capacity. NPD process is implemented after a stage consisting in this gap analysis, and consist in a *gap diminution*³.

This vision put a great attention on information management, but remains weak on the agent's dimension. A more complex approach of NPD permits to catch this dimension.

Problem solving characteristics

Davila holding the same view than Clark and Fujimoto, put the emphasize on the process complexity. This complexity is partly due to the creative dimension of the design activity. NPD as a design activity, it can be treated as a structured process, as presented by Simon in its Design Theory (1969). This process is composed by two stages: problem evaluation and problem solving. In this approach, conception is treated as a resources allocation and representation problem⁴.

NPD process consists in an activity of interconnected and ill-defined problems enunciation and solving, in a huge uncertainty context and under cost and time constraint. The simultaneous enunciation and solving activity provokes the ill-defined nature of the problems to solve. An evaluation activity play the role of support for decision taking. This decision taking will permit to defined more and more precisely problems to solve, and thus reduce the set of possible solutions. This process is defined as an incremental process which solution is the result of successive modifications, amelioration, and adaptations (Perrin, 2001). This process is also characterize by it iterative dimension, NPD process needs many returns back to precise, modify or change the retained solutions.

NPD process complexity is also due to the collective dimension of this activity.

The collective dimension

This collective process is a place of interaction between agents coming from different functions of the firm. The NPD team activity is defined by a knowledge creation task oriented

² *Succession of hierarchies* (Pahl et Beitz, 1984); *Iterative process of elementary consummation cycle* (Blessing, 1994; Rosenberg et Eekels, 1995); *Resources consumer process* (Forest, 1997); *Conception as a compromise between different functions* (Jeantet & Winck, 1996); *Conception as a learning process* (Perrin, Villeval et Lecler, 1995).

³ This concept has been developed by Galbraith (1977) defining his conception of uncertainty. He defined uncertainty as "the difference between the amount of information required to perform a task and the amount of information already possessed by organization", 1977, p. 36-37.

⁴ Going further, we will assumes that NPD is also a ressource creation problem.

toward the product creation. This team is based on an artificial social structure, imposed by the hierarchy and different from the preexisting firm cognitive structure. These agents are called heterogeneous. This heterogeneity comes from two main elements, their function and their professional group (Perrin, 2001). The professional group will determine the agents' representations. Each profession built, based on its specific knowledge, its own representation of the New Product. The function will play a role in the ranking of problems to solve and in solutions selection. Each function focuses on some product characteristics (management accounting on costs, marketing on product functions..) The NPD team is thus composed by members without any common language, common knowledge, and common practices and preoccupations. To sum up, these agents hold different social representations.

The lack of common sense provoke interpretation ambiguity, misunderstanding, conflicts and so lose of time. Team trans-functionality may provokes many problems that increase time and cost consumption, but still remains needed because of their creative dimension and the potential reduction of development delay and future product coherence problems.

B. Compromises search process

This process can be considered as a compromise and complementarities search, between several problem representations, in order to reach a technically and economically coherent solution. This cooperation mode corresponds to a reciprocal prescription process between agents, Hatchuel (1996).

Hatchuel (1999) proposed a collective action theory for design activities. This theory is based on the constitution and the revision of individual learning constraint by interdependencies and became possible thanks to them. The general principles are : **(i) *An incomplete labor division***: agents task are partially undetermined when the project starts, this creates an uncertainty zone⁵ that make the mutual adjustment possible; **(ii) *The revision is here a favorable condition for the task***: that corresponds to agents perimeter evolution all along the NPD process (*ie*: mutual adjustment); **(iii) *Knowledge revision depends on relations system***: this system is a “set of possible actions” that agents use to modify the whole set or a part of others agents knowledge and actions. This system is composed by material interactions perceptible by the actors. These interactions models (Hatchuel &Weil, 1997), corresponds to activities that do neither determine nor specify the possible actors interdependencies. The knowledge revision within the NPD process is thus based on these interactions models; **(iv) *This interactions model can be modified***: it is endogenous to collective action.

The main conclusion of this model consists in the simultaneous constitution of knowledge and interactions, within the design activities. This idea is represented by the concept of non-separability (Hatchuel, 1999). Interactions are key elements of design activities. Nonetheless this process of interactions within NPD process face to a “Babel syndrome” (Hatchuel &Weil, 1992). Here appears the common language importance. It is a support for heterogeneous actors interactions and helps the compromise search. This common language usually considered as a knowledge transfer facilitator, is here considered as an interaction facilitator. The reciprocal prescription process permits the convergence of agents' representations and the emergence of shared representations and not common⁶ (Perrin, 2001).

That leads us to the “Boundary Object”. “*Boundary objects are objects which are both plastic enough to adapt to local needs and constraints of several parties employing them, yet*

⁵ Crozier &Friedberg (1977)

⁶ We oppose here common to shared, common representations should reduce team creativity, whereas shared ones only helps to communicate and increase team consistency.

robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual site use. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation” (Leigh Star & Griesemer, 1989).

This Boundaries Objects are mediators that develops a group capacity to make visible and to put knowledge and actors constraints into common basis, to negotiate and choose common solutions and finally to create new knowledge. In order to do so, BO (prototype, draw..) have to remain opened, thus integrating knowledge in the NPD team shared representations. The role of this BO in the compromise construction in the earlier stage of NPD, seems to be important. This mediator- coordinator role can be assumed by non-material element, if we take Mead (1934) definition of Object as a thought object corresponding to a symbol by which agents enact the environment.

This object has to be recognize by all the agents, and thus has to be opened and understandable by the whole NPD team. The CPM Tools may corresponds to relevant B.O. for NPD process. Thus the NPD process dynamics has to be linked to the tools and agents dynamics

II.2. NPD AS AN ACTIVITY SYSTEM

A. theory of activity

An activity theory based framework

The activity theory is a cross scientific theory for studying man as an actor in a socio-cultural, historical context. It is based on the idea of the dual process of man and artefacts shaping and being shaped by social and physical environment (Cole, 1996). This theory is artefact-mediated and object-oriented action (Vygotski, 1997). The relation between human agent and objects of environment is mediated by cultural means, tools and signs. Activity theory can provide a broad conceptual framework that can be used to describe the structure, development and context of tasks supported by management device.

As opposed to cognitive psychology, which focuses on the study of the individual as a separate entity, the unit of analysis of activity theory is human (work) activity. This activity can be defined as an activity directed at an object that motivates the activity. The object-orientedness states that human beings live in a reality which is objective in a broad sense; the thing which constitute this reality have not only the properties which are considered as objective according to natural sciences but socially and culturally defined properties as well.

The theory of activity puts the emphasize on the importance to take the context into account, since it is assumed that any action is necessarily situated in a social and physical context. According to Nardi (1996), activity theorists don't see consciousness as a set of disembodied cognitive acts, and don't localise it in brain; rather, they see consciousness as located in everyday practice: "*you are what you do*". Thus, human interactions are considered as social, hierarchically organized, based on mediums and oriented. The theory of activity focused on a cornerstone of these interactions: the process of internalization of tools. This process consists in a collective appropriation of the tools, and their effective use. The key factors in internalization process within a team are: (i) agents' perception; (ii) social interactions; (iii) nature of activities. This process of internalisation is linked to the mediation process which is a key principle for our analysis.

The mediation process

Vygotski formulated his first ideas about mediation of consciousness by appropriating Marxist⁷ ideas about how tools or instruments mediate the labour activity, he extended those ideas to include how psychological tools mediate thought. An activity is then composed of a subject, and an object, mediated by a tool. The subject is a person or a group engaged in an activity. An object (in the sense of objective) is held by the subject and motivates activity, giving it a specific direction. The mediation can occur through the use of many different types of tools.

The activity theory emphasis on social factors and on interactions between agents and their environment explains why the principle of tool mediation plays a central role within the approach. First of all, tools shape the way human beings interact with reality. And according to the principle of internalisation/ externalisation, shaping external activities ultimately results in shaping internal ones. Second, tools usually reflect the experience of people who have tried to solve similar problems at an earlier time and invented/modified tools to make it more efficient. This experience is accumulated in the structural properties of tools (shape, material...) as well as in the knowledge of how tools should be used. Tools are created and transformed during the development of the activity itself and carry with them a particular culture and historical remnants from that development. So, the use of tools is a means for the accumulation and transmission of social knowledge. It influences the nature, not only of external behaviour, but also of the mental functioning of individuals (Bannon, 1997). Human activity is mediated by artefacts, both internal and external. These tools may be signs, languages or machines. They are created by people and exert control over behaviour. Artefacts have an associated culture and history and permanence that exists across time and space.

This analysis has developed through the notion of the activity system (Engestrom, 1987).

B. The activity system

This system is a holistic unit of analysis that explores relations between subjects, communities, and the objects they are working at by highlighting the factors through which such relations are mediated (Blackler, 1995). The notion of mediation is the cornerstone of the model. Humans are always part of varying communities, which themselves are part of a larger community or organisation. The relationship between an individual and the community is mediated by rules like norms, conventions, and social relations. Communities lead to a division of labour, which mediates the relationship between the community and the object. This involves for example the organisation of the community or the dynamic distribution of responsibilities.

⁷ According to Wertsch (1981, 134): “For Marx and Engels labour is the basic form of human activity... Their analysis stresses that in carrying out labour activity, humans do not simply transform nature: they themselves are also transformed in the process... The tools that are available at a particular stage in history reflect the level of labour activity. New types of instruments are needed to carry out the continually evolving new forms of activity. The order side of the dialectical coin is that each new level of tools or instruments gives rise to yet another round of ways of conceptualising and acting on the world”; One of the main cornerstones of Vygotski theory was, for Wertsch, the similarity between Marx’s notion of how tools or instruments mediate overt human labour activity and the semiotic notion of how sign systems mediate human social processes and thinking. In both cases the point is that instruments are not only used by humans to change the world but also transform and regulate humans in this process”.

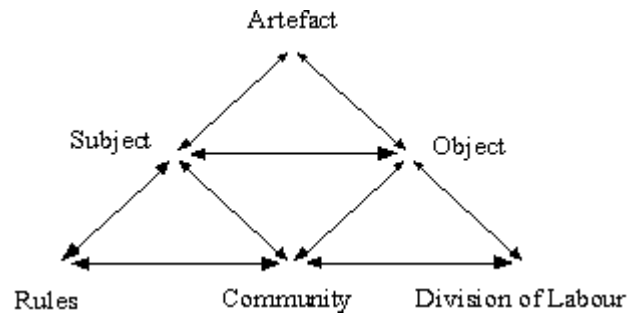


Fig. 2: The systemic view of human activity: Engeström.

The basic mediation triangle shows the relationship between the subject, an object, and the mediating auxiliary means. The extended mediation triangle accounts for the fact that humans are always part of communities. Therefore the relationship between the subject and the community which is mediated by social rules is shown, as well as the relationship between the object and the community which is mediated by the division of labour.

Like Giddens' (1984) notion of the "duality of structure", activity theory supports that individuals cannot be understood apart from the cultural means they used, as much as societies cannot be understood aside from the agency of those who use, and produce, cultural artefacts. Activity theory approach differs from Giddens' ones on the level of analysis, the collective level as a more detailed level.

NPD as an activity System

Engeström's interpretation of the dynamic relationships between individuals, their communities and the objects of their activities provides a clear alternative to approaches which attempt to study such entities, or the factors which mediate the relationships between them, in isolation one from the other. His suggestion is that the appropriate unit of analysis is neither individuals nor organizations, but socially-distributed activity systems. People act on the world, with others, utilizing (and contributing to the development of) the linguistic, material and social resources currently available.

This approach seems to be relevant for a NPD process analysis. His approach models the dynamics of problem solving: each moment is a compromise, the balance within an activity system changes constantly. Participants employ their situated representations in a situation which is itself constantly developing. In response to this changing situation participants' representations and behaviour will also inevitably develop (Blackler, 1995).

This framework, applied to NPD process, will take the following shapes. The *subject* corresponds to the NPD team composed by heterogeneous agents. The *objective* is to develop a new product and corresponds to ill-defined problems solving. *Instruments* consists in CPM tools as mediums for the activity. Every functions and departments involved in the NPD process correspond to *communities*. *Rules* are to develop a NP under constraints: huge uncertainty, high costs and time constraints, (Hatchuel' reciprocal prescription). And finally the *Division of labor* consists in tasks descriptions, power and status of each NPD team member.

In addition, a key element of this activity system and of activity theory, is a specific theory of tools.

III. CPM TOOLS DYNAMICS WITHIN NPD

Costs Planning Management Tools are usually seen as a set of techniques and normative propositions, deduced from an economical reasoning highly linked with the neoclassical models. Even if most of tools are based on calculation of neoclassical models, they face the complexity of the reality through they evolve. This complexity leads this tools to a relative deep adaptation, according to their nature and their field.

This is the reason why, if we want to catch a glimpse of the Costs Management Systems complexity and understand their mechanisms, we have to take into account the reality where they are integrated and their interaction with this reality, interaction that leads to a modification of the reality, and the feed back modification of CPM Tools (Berry,1983; Crozier &Friedberg, 1977).

III.1. A SPECIFIC CMP TOOL: TARGET COSTING

We study here a specific tool, the Target Costing (T.C.). T.C. is an Costs Management Tool devoted to NPD process. As we saw previously that this process is a privileged place for interactions between agents and collective dynamics. This process is a highly non-standart, due to its “one-shot” nature.

Usually Management tools consists in heavy codified and explicit rules in order to rationalise the activity where there are implemented. But NPD process is not standard and must not be rationalised because of the importance of its creative dimension. Therefore TC is a specific tool since this tool is implemented in such a “specific” process.

A. Definition

The Target Costing consists in the definition of target cost, based on the market (and not on technical or historical standard), for the new product stage and the deployment of a complex combination of costs management tools and managerial techniques. “The Target Costing process is a system of profit planning and cost management that is price led, customer focused, design centred and cross-functional. Target Costing initiates at the earliest stage of product development and applies it throughout the product life cycle by actively involving the entire value chain.” (CAM-I, 1997).

This tool is based on the following equation (Lorino, 2001):

$$TC = SP - TP$$

(where TC = target cost, SP = future selling price, TP = target profit).

The selling price and target profit are taken as constraints. This approach differs from the traditional markets one, where the producer establish his price according to the addition of his costs and profits, and sell his products. These markets have become more competitive, the market price is now establish by the market and the profit is a a firm survival element. Thus the cost is deduced from the former elements.

Based on its existing capabilities, the firm establish a realistic achievable cost. The difference from this cost to the targeted one, consists in a gap to reduce. In order to achieve this gap reduction, differents technics are deployed throughout the NPD process and the firm.

"In reality , target costing is not a cost quantification technique, but rather a complete cost reduction programme, starting even before the first drawings of the product have been prepared. It is an approach aimed at reducing the cost of new products throughout their life cycle, while meeting consumer requirements in terms of quality and reliability among others, examining all conceivable ideas relating to cost reduction at the planning, development and

prototyping stage. Target costing is not a simple cost reduction technique, but a complete, strategic profit management system". Kato (1993)

Therefore Target Costing holds a double nature, the technical dimension (reverse cost calculation), and the managerial dimension (co-ordination mode). The main tools and techniques of this device are: Value Engineering (at the design stage), Value Analysis (at the production stage), Quality Function Deployment and Cost tables. We can also mention the Design For Manufacturing Assembly, Design to Cost, Benchmarking and the 5 "W" which are relatively less important. And finally Activity Based Costing, which is a cornerstone of TC.

TC is more a device than a simple tools box.

B. Target Costing as a heuristics

Simon (1969), in his Design Theory, described a heuristic called MEA⁸, which is used to reduce the gap previously exposed. The Target Costing device seems to correspond to a specific form of this heuristic.

As previously noted T.C. process consists in, first defining target cost based on the market, achievable cost of the firm, and then establishing the resulting gap. Then, by the deployment of numerous tools and techniques, the objective is to eliminate the gap. The Target Costing is a costs centred MEA applied to NPD, where costs play the role of the cognitive artefact quoted by LORINO (1999), in his camel metaphor. As a cognitive artefact, the Target Costing support the problem solving process.

A convergent and unambiguous understanding of the object, supposes a common understanding basis supported by the universality of the object, its capacity to be understood by everyone in the NPD team. The cost can play this "universal" role. TC can be compared to a B.O. and is then an interaction facilitator.

The specific nature of NPD process may impact on TC configuration and dynamics, as much as TC may impacts on the process. In order to take the context into account we will analyze this complex tools and techniques box through a relevant theoretical Framework.

III. 2. TARGET COSTING AS AN INSTRUMENT

Target Costing device dynamics will be analysed through Rabardel's concept of *instrument* (1995). This concept has been developed on the basis of the Vygotski theory of tools.

A. Theory of Tools

The theory of "tools" developed by Vygotski (1997) makes a distinction between the object (the physical tool) and the instrument (the way the tool is used).

Vygotski analyzed the relations between subjects and tools⁹. We should note that this theory takes into account both physical and symbolic tools. Cerratto (2000) explains about Vygotski's theory that "*The instrument is an artifact, situated outside the subject, but its use requires some scheme of utilization built by the subject. The subject transforms himself by inserting the artifact into some activity making sense for him*". Nonetheless, we should note here that we differ from Vygotski, since it is not a question of psychological instrument used by the agent to management himself, but it is question of tools oriented towards an external and collective activity. At a cognitive level, the instrument will transform the agent task to make it more understandable and easier to treat.

⁸ Means-Ends Analysis

⁹ This interaction is similar to Calon & Latour's (1991) theory of "hybrid systems"

An instrument's perceived usefulness results from the characteristics of an artifact and from the interpretation process through which subjects employ the artifact in some pattern of action. Therefore an "instrument" consists in¹⁰ :

- A material or symbolic artifact produced by the user or an external conceptor
- An associated scheme of utilization, resulting from an agent construction and/or an appropriation of the preexisting social schemes.

These two elements, artefact and scheme, are associated but also hold a relation of relative independence. That is to say that a peculiar scheme of utilization can be applied to several artifacts. In addition, an artifact can be inserted in many schemes of utilization which give it different meanings and functions.

Therefore the *instrument* will be the result of the combination of subjective scheme of utilization applied to an objective material or symbolical artifact. The instrument is based on the concept of affordance: "*Affordance refers to the perceived and actual properties of a thing, primarily those functional properties that determine just how the thing could be used*" (Pea, 1993). However this artifact is willing to remain stable since there are immutable physical and then functional properties associated to it, and this stability affects the agent's interpretation, by taking shapes of resistance towards interpretation. As Lorino (2001) illustrated with his example of cost estimation, "*Cost estimation tools undertake to establish causal links between design-based cost drivers and costs; value engineering systems posit chains of causality linking local design choices and customer value. Due to their formal nature, these systems create certain forms of inertia to change (assimilation) and create standardization that constrains local modulation (coordination). Management systems therefore impose some degree of organizational uniformity and stability*". This tool's impact on agents' representation has been illustrated by Vytgoski through Francis Bacon's epigraph: "*Neither hand or mind alone suffice; the tools and devices they employ finally shape them*"¹¹.

Then, we assume that these systems can not directly determine behaviour, since they are artifacts that are subject to individual interpretation. They hold an embedded purpose, which may constrain and guide, but cannot dictate the patterns of action they will be used in. They constrain actors' behaviour schemes, but they can not determine them. The utilization of Management Systems is the result of an actor's interpretation. This interpretation depends upon actors' schemes of interpretation¹². So, in a cost planning system, there will be representations of the "induced costs/values" for a type of design envisaged and the only test of the system is validation through action (Lorino, 2001). The instrument and the NPD team behaviour result from a complex interaction between formal management systems and actors' subjective schemes of interpretation.

To sum up, the instrument can be seen as a mediator. Two main mediations are described by Rabardel, the epistemic one and the pragmatic one. The epistemic one is a mediation from the object to the subject, where the instrument is a mean for object understanding. The pragmatic one is from the object to the subject, where the instrument is a mean for transforming action towards the object. Since this occurs within an activity, the two kinds of mediation constantly interact.

However the instrument is more than a mediator, also a mean for action. It is material, cognitive, psychologic, semiotic. Then, it is a mean for the capitalisation of accumulated experience, in this sense each instrument corresponds to knowledge. Thus, artifacts are not

¹⁰ Rabardel *Idem*

¹¹ This dynamics is already developed by Marx and Engels, their analysis stresses that in carrying out labour activity, humans do not simply transform nature: they themselves are also transformed in the process, Wertsch (1981).

¹² That corresponds to the actors' theories of action concept (Argyris & Schön, 1978).

passive or “interpretatively neutral”. They hold what Rabardel calls the “preexisting social scheme”, which are parts of others agents’ interpretations implanted into them¹³. Actors must then blend their own theories of action with the elements of theories of action that the artifacts (such as management systems) embody. The purpose an artifact brings to any situation is always to some extent uncontrollable by actors and constrains their action.

B. The intrusment, artifact, agents triptych

Following Suchman (1987), we assume that people spontaneously construct interpretations of *tools* as they interact with them. Then CPM *instrument* is determined partially by actors interpretations. But these interpretations are also influenced by CPM tools, since they are constructed in interaction with the them. To sum up, we can build a three elements dynamics: artifact, agents and instruments.

Such a process of *artifact-object* interpretation has been analyzed by Pierce¹⁴ (1978). He gives an interpretation of what relations between knowledge, interpretation processes and the environment can be. In his work on signs and on how individuals make sense of their environment, Pierce built up a vision of the structure allowing people to give a sense to stimuli coming to them. This mental apparatus is built around three pillars. The first pillar is the *object* at stake, which exists in an environment. A part of this *object* (a set of specific characteristics attached to this object) is then sent to a receiver that will make sense of this message by means of interpreting schemes. These *interpreting schemes* are the second pillar of Pierce’s theory. Lastly, after having processed the message through the interpreting schemes, the individual will send toward the outside a *sign*, the third fundamental pillar that he linked to the interpretation she made of the object. These three pillars interact circularly and continuously.

Based on pragmatic (Pierce, Dewey, ...) model of knowledge and action, we analyze this process dynamic at a collective level. The pragmatic approach of collective dynamics is based upon an interpretive view of collective action and learning. Thus personal knowledge¹⁵ is based upon permanent iteration between action and interpretation of action. Interpretation is individual. Action is collective: individuals act in the frame of organized collective processes of action.

This analysis leads us to the previously exposed Hacthuel’ model of interaction. The action of each agent of the NPD team is based upon his own interpretations of the overall collective system, and agent representations will be based on his social group representations.

Nevertheless, in existing NPD team studies relation between collective representations and individuals representations are not clearly stated. Therefore these relations will be analyzed on the basis of the framework proposed by Dupouet & Laguécir (2002). In this model, groups are analyzed through the dynamic between their task, their social structure and their collective representations. Thus, NPD team task is to develop a new product, and is defined as interconnected ill-defined problem solving. The social structure is artificial and hierarchical. The collective representations are composed by heterogeneous representations composed by the each previous agent group. The final team representations are highly influenced by (i) the nature of the task, so highly oriented towards action and ill-defined

¹³ According to Wertsch (1981, 134): Tools that are available at a particular stage in history reflects the level of labour activity. New types of instruments are needed to carry out the continually evolving new forms of activity. The order side of the dialectical coin is that each new levels of tools or instruments gives rise to yet another round of ways of conceptualising and acting on the world”

¹⁴ One of the main cornerstone of Vygotski theory was, for Wertsch (1981), the similarity between Marx’s notion of how tools or instrument mediates overt human labour activity and the semiotic notion of how sign systems mediate human social processes and thinking. In both cases the point is that instruments are not only used by humans to change the world but also transform and regulate humans in this process.

¹⁵ We will define knowledge as representations (see Dupouet & Laguécir 2001).

problem solving, (ii) the dominant group representations, the dominant functional group will influence the others.

This last element of domination and influence in groups representations is a key point of our analysis. Since NPD process is situated in a context of a huge uncertainty and in a high quantity of available information context, environment and internal information interpretation is a key factor for NPD performance. This interpretation is held by individuals with a level of generalization linked to the responsibility level. Organizations and their NPD team, differ essentially by their interpretation model. According to the dominant representation, environment and internal context will be composed by measurable and objective elements, or oppositely ambiguous and subjective. They will be considered voluntarist, based on trials errors, experimentation or on contrary reactive and passive, Daft & Weick (1984).

The dominant group holds the dominant representation and then influence significantly the team representations. These assumptions on dominant representations impact calls for taking into account the power structure within the team and the activity.

IV. THE CONCEPTUAL MODEL AND THE METHODOLOGY

In this part we expose our conceptual model. This model emerged from a three level analysis. It is based on a global approach of NPD process as an activity system. Within this activity system, tools are perceived as highly related to agents through the theory of tools' concept of *instrument*. Then agents, tools and instrument interactions are conceptualized through a pragmatic dynamics adapted to a collective level.

Nonetheless, as noted in the latter part this model still remains incomplete. So the first part will be dedicated to the power and tensions issues, and the introduction of these elements in our model.

IV.1. POWER , TENSIONS AND CONFLICTS ISSUES

A. Power and conflicts in activity theory

We noted that beyond a structuration role (Berry, 1983), CPM tools have a coordinator role¹⁶. The first role aims to orient the problem solving activity, in a high complexity context, linked to the NPD process nature. But still, through this role deviant behavior can emerge. In his studies on french social health administration, (1983), Berry (1983), analysed deviations as a reaction against the rigidity of the tool imposed by the hierarchy. This is completely linked to power relation. Crozier explained this kind of deviations through the concept of *incertainty zone*¹⁷. Crozier analysed the organization as a concrete system of action. In this system, agents try to create and maintain their own power to balance with organisation authority. He described the concept of authority as the capacity to create and control uncertainty, authority is organised through hierarchy, whereas power is created through uncertainty zone. This zone exists thanks to uncertainty and organisation's structural ambiguity, and is created through social interaction. Therefore authority has to be taken into account through hierarchy, and power has to be through social interaction, group relative position and domination. This is consistent with Foucault's conception of power. According to him (1980), power comes from

¹⁶ This coordination role is played since Target Costing tools correspond to Lundvall concept of *meta-code*, (Lundvall 2000)

¹⁷ "zone d'incertitude" Crozier (19)

the bottom. It is a strategy, an action upon action. Power does not exist as an external concept, it is interiorised by agents: constraints are embedded in the agents' social interaction system. So power can be observed through social interactions.

As we previously exposed Activity Theory is a powerful theory that analyzes collective activity through its context. Nonetheless, quoting Blackler (1995) "...activity theory is weak in the analysis it offers of the relationship between knowledge¹⁸ and power". Social systems are fundamentally unequal. And we should integrate the power and authority structure, in our analysis of the NPD team. To the idea that human action and thought is mediated, situated, provisional and pragmatic must therefore be added the point that it is also contested. As noted at the beginning of this part, contestations and resulting deviations are linked to the power and authority structure. Finally, as noted before, the concepts of representations and power are interrelated.

Activity theories in general state that agents' representations are constantly evolving. Analysis of the tensions that inevitably developed within socially-distributed activity systems points to the power structures that exist beyond it. Representations and power structure are analyzable in systems terms, in the relationships between, tools, roles, formal procedures, and emergent routines. John Locke's epigraph illustrates it perfectly "*The actions of men are the best interpreters of their thoughts.*". Since their "thoughts" are structured by power structures, their actions will also be.

Power and authority structure in New Product Development process

Conflicts are to be expected within and between the new generation of symbolic analysts and problem solvers, and established professionals and managers. These conflicts and their issues depend on the social structure of a NPD team, the relative power of team subgroup and project manager weight. That indicates that issues of domination and subordination are fundamental to the understanding of a NPD team practices.

On the one hand, the previously exposed Project Manager (or any project responsible) holds authority and influence the team according to his weight. On the other, the dominant profession or department created and maintains a certain power and then also influence the team. The power and authority structure constraint the NPD team representations, objectives, rules, hierarchy, that is to say the NPD team schemes of action, but also the rules, the division of labor, the objectives of the NPD activity system and even, according to the high level of interdependencies within this system, the whole activity system.

The NPD team is built throughout a previously existing organisation, the organisational power structure and culture should also be taken into account. Following Ouchi's (1980), there is a relevance of analyzing organization's impacts in this processes of interpretation. Organizational structures transform the contexts of action.

Daft and Weick's (1984) notion of organizations as systems of interpretation points out that to survive, organizations must find ways to interpret events. Indeed, the processes of 'sensemaking' that Daft and Weick highlighted are likely to be especially important for groups that concentrate on the solution of unfamiliar problems, such as NPD team. In addition, this process of 'sensemaking', when it happens within NPD team, can be driven by a key actor (for instance the project manager), or key group. As we said previously interpretation is held by individual with a level of generalisation linked to the responsibility level.

Foucault's (1980) notion of a 'discourse of perversions' put the emphasis on the self-reproducing dynamics of domination and subordination. That leads us to put the emphasis on

¹⁸ Knowledge here is taken in the sense of representations.

power and authority issues, since power and authority structures are to some extent self-reproducing, even in a one shot activity as NPD one.

Our aim is now to introduce power and authority structures roles in the interactions between CPM tools, instruments, and NPD process management style.

We will put the emphasize on the relation between instruments and tools, and between instruments and agents. On the one hand, the dominant interpretation model (i.e. the organizational model) may play a role of interpretative filter in partly determining the instrument, and doing so, also determine the CMP “tools’ box” . On the other, the CMP “tools’ box”, highly constrains the instrument. So based on this, we build our conceptual model of CPM Instruments dynamics within NPD process.

IV.2. THE MODEL

A. The conceptual model

According to the previous analysis and the methodology adopted we develop our cost planning and management tools dynamics model. The CMP tools studied here (Target Costing) correspond to the set of planning & management tools, methods and techniques, implemented within NPD process.

Target costing holds a double nature, therefore we have to deal with the accounting dimension (reverse cost calculation), and the managerial dimension (co-ordination mode). The accounting dimension brings us to take into account techniques and tools linked to the cost manipulation. The principals tools and techniques are the Value Engineering (at the design stage), Value Analysis (at the production stage), Quality Function Deployment and Cost tables. We can also mention the Design For Manufacturing Assembly, design to cost, benchmarking and the 5 “W” with are relatively less important. The Activity Based Costing, is a cornerstone of TC, so we must focus on it. The Target Costing managerial practices that we have to identify are the following:

- Functions decompartmentalization
- Project management
- Simultaneous development
- Supplier partnership (integration in TC)
- Participative management
- New competencies, capabilities and knowledge creation

We must keep in mind the TC stakes. These stakes consist in Consumer orientation, NPD process focus, considering the product life cycle as a whole, taking into account all the value chain and to promote transversality by composing trans-functional teams. But the real TC specificity is on the basis of this process. This complex cost based process is Market driven. That is to say that all the process stages are realised on the basis of the market. The target cost is the “market cost¹⁹”.

In order to focus our research we choose the most relevant tools and techniques. Directly linked to the Target Costing process: Value analysis, Target cost management; and a support tool: Activity Based Costing.

We noted that NPD management styles highly influence the NPD team representations and behavior. Therefore the NPD team representations will be identify by the NPD management styles and by the dominant group identification. These two elements will be analyzed through their influence on the managerial practices of cost planning and management tools, since we assume that these practices are linked to the style of NPD management.

NPD management styles is highly influenced by the whole organization management. Even though NPD process is not a standard activity of the firm, it is obvious that the general management style will have an impact and will influence NPD management.

Based on that we will define different models of NPD management. These models of NPD process management have been identified along four key elements: (1) the coordination and labor division; (2) the risk management, (dealing with responsabilizing, target finalization and schedule management); (3) the knowledge and innovation process management ; (4) the supply chain management

These elements can take different shapes according to the NPD process management style. As previously noted, instruments are the results of a combination between tools, and the

¹⁹ The market cost does not exist, but it is a marketing construction that help to co-ordinate NPD. It is a marketing cost in opposition to technical or engineer cost.

way these objects are used. Thus the instrument is the result of agents interpretations. Then, according to different NPD management styles, different instruments will be deduced. These instruments are constrained by the object CPM tools, and are the result of agents interpretations. The NPD management style is the basis of this interpretation.

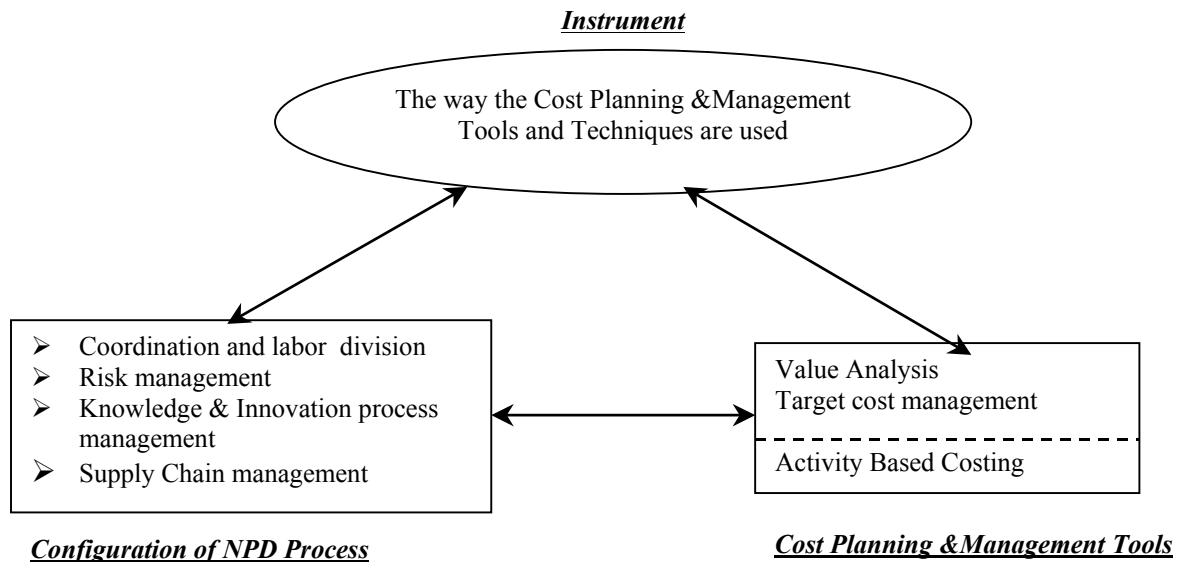


Figure 2: The theoretical model.

The shapes previously exposed are highly linked to the way these tools are used. We note that these modalities are logically linked to instruments. The distinction between modalities and instruments is not clear, but we will try to do it, to some extent on the tools studied. The way the team uses different tools converge, since these tools are part of the same management device, implemented in the same firm, so they have interdependencies and are under the same constraints. We should note that these elements correspond to highly stylised facts, but that will help us to structure and organise our analysis.

B. From the concept to data

The Target Costing and cost management tools, are really complex and highly related to their environment within the firm, so we have to take care of a lot of elements, to be able to identify CMPT practices. The structure of the questionnaire will take those elements into account. We now present the principal parts of the questionnaire.

- General one : will be devoted to the person that answers, his (her) function, formation, information about the firm, subcontractor or client.
- Costs management tools design: techniques and tools implemented in the firm within the NPD process and elsewhere. identification and determination of the CMS.
- Targets : Targets used during the NPD process, the nature of the targets and the use of it, targets basis, responsibility of the targets, construction of them, evolution of them and iterative process involve. Slack for risk management, and DPO.
- Introduction and deployment of CMPT
- Results : success, failure, improvement
- Managerial techniques linked : co-ordination, trans-functionality, function and role definition.
- Supplier relation or industrial customer relation

Agents representations are highly influenced by the NPD process management style. This NPD management style is itself determined by the model of the whole organization management. As noted previously, CMP tools are a problem solving heuristics for NPD process. These tools can also be influenced by the NPD management style. NPD management style is a pillar of agents representations. These representations correspond to symbols by which agents enact the environment. So CMP tools can be seen as either the result of this enactment or the enactment filter.

Orr (1990), Brown and Duguid (1998) demonstrate how essential language is to this process. Talk enables collective interpretations, negotiates behavioural priorities, signals group membership, and helps to create a community. Language is an archetypal communal activity, integral to the enactment of practical actions. This element is taken into account through the geographic situation of the different departements involved in the NPD, and through the policy of exchange between these departements.

Similarly, different concepts of our model have been developped into data through *Annex 1*, for the elements linked to the management model; and *Annex 2*, for the elements linked to the instruments.

IV.3. THE QUALI-COMPARATIVE METHOD

Our aim is now to illustrate this model through data collected via a questionnaire. This questionnaire circulated within the French system-based industry. The aim of this questionnaire is on the one hand to identify the cost planning and management tools and techniques implemented in NPD process, and on the other to characterize the key elements of managerial practices of these tools. This identification and characterization will be done in order to put the emphasis on interactions between the tool, its use and the management style.

The analysis of these interactions will be done through a the former conceptual model based on the concepts of “tool”, management “style” and the “utilization sheme” of the tool. Once the management model is characterized and the “tool” (in fact the set of tools and techniques) is identified, the “way of use” of the tool has to be determined. This “way of use” will be the result of an interpretation of the tool by the agents, this interpretation is highly influenced by the NPD management style, which is itself highly influenced by the management style implemented within the organization.

The questionnaire is thus a methodological device of identification and characterization of these three elements. The interpretation scheme will be based on the articulation of these three elements, and the relation of constraints and influences between them. Thus data have been collected by mail.

According to the dynamics complexity and the small number of “cases” analysed, the quali-comparative methodology seemed to be the most relevant. This method takes into account the complexity of this social phenomena and it offers a dedicated technique: QCA.

Qualitative Comparative Analysis (QCA) is a new analytic technique that uses Boolean algebra to implement principles of comparison developped and used by scholars engaged in the qualitative study of macro social phenomena. Typically, qualitatively oriented scholars examine only a few cases at a time, but their analyses are both intensive (addressing many aspects of cases), and integrative (examining how the different parts of a case fit together, both contextually and historically). By formalizing the logic of qualitative analysis, QCA makes it possible to bring the logic and empirical intensity of qualitative approaches to studies that embrace more than a handful of cases, research situations that normally call for the use of variable-oriented, quantitative methods). Boolean methods of

logical comparison represent each case as a combination of causal and outcome conditions. These combinations can be compared with each other and then logically simplified through a bottom-up process of paired comparison.

The method is based on John Stuart Mill's (1843) inductive techniques to establish and discover causal connections. It can develop or test models of the association of factors with an outcome by considering the unique combination of factors in each case using the algebra of logic and set theory (Boolean algebra). The technique supports or refutes the inclusion of each variable into a Boolean expression (equation) that represents the association of the independent variables with the outcome variable. The unique aspects of each case are maintained, yet hundreds of cases can be analyzed easily with the help of the available computer program (mentioned later).

Computer algorithms developed by electrical engineers in the 1950s provide techniques for simplifying this type of data. The data matrix is reformulated as a "truth table" and reduced in a way that parallels the minimization of switching circuits (Ragin, 1987). These minimization procedures mimic case-oriented comparative methods but accomplish the most cognitively demanding task, making multiple comparisons of configurations, through computer algorithms. The goal of the logical minimization is to represent, in a shorthand manner, the information in the truth table regarding the different combinations of conditions that produce a specific outcome.

This Boolean minimization process is followed until all logically inconsistent variables have been omitted. The remaining set of variables represents a parsimonious and logically consistent model of the combination of variables associated with the outcome under study. A conventional set is dichotomous: A case is either "in" or "out" of a set, for example, the management style. Thus, a conventional set is comparable to a binary variable²⁰ with two values, 1 ("in," i.e., Formal) and 0 ("out," i.e., Informal).

Following a constructivist approach, we developed a contingency and necessity relation between variables (we did not establish causality between variables). The variables have been "constructed" on the basis of facts and ideas. Based on boolean algebra, we constructed a matrix based on the dichotomic variables (absence/presence). Then we want to characterise the management style, the tool' box and the instrument.

The basic relation is the following:

$$I = f(M ; T) \quad (1)$$

Where:

I is the Instrument:

- Management dimension (I_m)
- Supply chain dimension (I_s)
- Orientation of the tools (I_o)

T the tools'box, composed at least by three basic tools:

- Cost estimation (T_c),
- Value analysis, (T_v)
- Activity Based Costing (T_a),

M is the Management style, characterised around two dimensions:

²⁰ A Fs QCA, fuzzy set, by contrast, permits membership in the interval between 0 and 1 while retaining the two qualitative states of full membership and full non-membership

- Centralisation (M_c),
- Formal (M_f)

We want to characterise this three elements, we have then:

$$I(I_m, I_s, I_o) = f(M(M_c, M_f); T(T_c, T_v, T_a)) \quad (2)$$

I	I	I	T	T	T	M	M
I_m	I_s	I_o	T_c	T_v	T_a	M_f	M_c
(0,1)	(0,1)	(0,1)	(0,1)	(0,1)	(0,1)	(0,1)	(0,1)

VI. CONCLUSION

This QCA method allows to handle the complexity and the social dimension of the phenomena studied, nonetheless it leads to faulty empirical generalizations. Simply stated, this method permits the study of regularities more than causalities.

The QCA method is rigorous and has several additional features that are beyond this paper (e.g., de Morgan's Law, identifying necessary and sufficient factors, dealing with inconsistencies, taking the number of cases supporting an expression into account).

The treatment needs the utilization of a dedicated software, and this treatment is not complete yet, it is still in progress.

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ANNEX 1: THE KEY ELEMENTS OF NPD MANAGEMENT STYLE

	Management elements	Modalities
I.	1.1. Organizations of the NPD process	Project, line, within division... If there is a responsible, his background and profile: From Heavy-weight to Light-weight product development manager <i>Background and previous position</i>
	1.2. NPD team management	<i>Transversal : Coordination by incentives</i> <i>Vertical : Strict hierarchical coordination</i> <i>Geographic separation</i>
	1.3. Interactions management	Regular meeting and evaluations, management by the tools... Heavy or light weight project manager
	1.4. Team' composition	<i>Functions definition and of the tasks</i>
	1.5. Responsibilities	Members under the advisorship of the project manager, division manager, or department.
	1.6. Team orientation	Specialization Transversal et trans- functionality
	1.7. Engineering	<i>Sequential</i> <i>Simultaneous</i>
II.	Responsabilisation system	Individual or shared: Contractualisation vertical or horizontal of objectives ; contractualisation level (member, team, group, etc....) Financial incentives or career management
	Evaluation model	Instruments and rational methods of decisions taking (role and importance of TC...) Experiences of previous projects
	Schedule/time management	<i>Strict schedule and imposed, by who ?</i> flexible and negotiate schedule, socially construct Number of month of development
III.	3.1. Innovation process management	<i>Links with the technological development:</i> <i>Disconnected (innovation technological separated from NPD) or connected</i> <i>Traditional engineering or based on NPD</i> <i>Kline et Rosenberg (1986) design model:</i> Sequential and hierarchical where innovation process is linear and rigid with separated activities Loop where information moves between departments and decisions level Modularity : Technological modifications <i>Architectural modifications</i>
	3.2. Organizational learning	Knowledge management: <i>Central /or interfaces</i> formal or informal Knowledge capitalization and experiences feed-back: Centralized/Decentralized Informal : career management, agents come back in his department or function Formal support : instrument of capitalization

IV.	<i>Supply chain relation management</i>	Supply chain traditional model: rigid and hierarchical integration, risk transfer, specifications strict of the components and of the process, supply management by purchase function. Co-supplier model: risk sharing, co-design initiative capacity, autonomy and flexibility, member of NPD team, supply chain management within the NPD team.
	<i>Supply chain contractual links</i>	High contractualization centered on prices after fixation, concurrence and diversity between suppliers. Validation by a continue and iterative process, contractualisation after collaboration and discussion on cost, few suppliers.
	<i>Supply chain time management</i>	<i>Strict schedule and imposed, by who ?</i> Flexible and negotiate schedule.

ANNEX 2: TOOLS AND UTILIZATION MODALITIES

<i>Value analysis</i>	M Formal / Centralized	A.V. by the department in charge (engineers or marketing) et imposed to the team
	P Formal / Decentralized	A.V. team transversal and imposed
	E Informal / Centralized	A.V. by the department in charge, flexible
	I Informal / Decentralized	A.V. within the team all along the development.
Target cost management		
<i>Cost calculation and estimation methods</i>	M	Estimated by direction et imposed by direction
	P	Estimated by one or many department and imposed by direction
	E	Estimated by 1 or more departments and negotiated
	I	Estimated by one or many department and negotiated in the team
<i>Validation et legitimization of the target</i>	M	Targets imposed at the team level
	P	Contractualised and decomposed targets
	E	Non contractualised targets at the product level
	I	Non contractualised and decomposed
<i>Target importance</i>	M	<i>Obligation for the product level</i>
	P	Obligation for each member
	E	Information for the product level
	I	Information for each member
<i>Responsibilities on decisions of modifications or design</i>	M	<i>Rigid targets under NPD manager responsibility</i>
	P	Rigid targets under responsibility of each member of team
	E	Targets flexible and modifiable by the NPD manager
	I	Targets flexible and modifiable by each team member
<i>Supply chain target management</i>	M	Targets imposed (rigid) and determined by the firm before contractualization
	P	Negotiated targets before contractualization and rigid after contract
	E	Targets determined by the firm and flexible after contract
	I	Targets negotiated and flexible after contract
Project Direct Costing		
	M	NPD mger in charge of it with results obligation (DPO)
	P	Each member responsibility with results obligations
	E	NPD mger in charge of it with incentives
	I	Each member responsibility, with incentives
Design to Cost		
	M	Controller in charge of it, with obligations (DPO)
	P	Each member responsibility, with obligations (DPO)
	E	Controller in charge of it, with incentives
	I	Each member in charge of it, with incentives

<i>Forecast Business Plan</i>	M	Risk Provisions, accounting at product level
	P	Risk Provisions at each sub team,
	E	No provision, at product level
	I	No provisions, at sub team level
<i>Quality Function Deployment</i>	M	Method imposed NPD manager in charge of it
	P	Method imposed dedicated team in charge of it
	E	Support Method NPD manager in charge of it
	I	Support Method NPD team members in charge of it
<i>Activity Based Costing</i>	M	Imposed in costs calculation of NPD, controller in charge of it
	P	Imposed to team members
	E	Support for costs calculation, used by controller
	I	Support for costs calculation, used by the whole team
<i>Benchmarking...</i>	M	Method of costs calculation and design imposed and controller in charge of it
	P	Methods imposed and all the member in charge of it
	E	Support Method used by controller
	I	Support method used by the team