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Crossing innovation and product projects management: A comparative analysis in the automotive industry

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Abstract

Projectification and platform approaches have been two main transformation trends implemented by industrial firms during the 1990s. For those firms, innovation management no longer deals with introducing radically and totally new products, but rather with applying innovative features within a regular stream of products and platforms. This paper proposes an analytical framework that can address the resulting interplay between innovative features and new products. This framework relies on the concept of *innovation life-cycle management* (ILCM). The paper presents the early results from the comparison of five case studies from three OEMs.

Keywords: Organizational learning; New product projects portfolio; Innovation management; Automotive industry; Comparative analysis

1. Introduction

Projectification and platform approaches have been two main transformation trends for industrial firms in the 1990s and at the beginning of the 2000s. For those firms, innovation management no longer deals with introducing radically and totally new products, but more likely with applying innovative features within a stream of new products and platforms. This implies management of the interplay between the maturation of innovative features and the regular stream of development projects based on existing competencies.

This paper proposes an analytical framework for a systematic comparison on innovation-product interplay management, and presents several early results based on data collected in the automotive industry. This sector provides an interesting empirical opportunity to study this question, since it faces a dramatic increase in the pace of launch both of new products and of innovative features.

We first present the empirical drivers of this research, set up the research question, regarding the important literature on project-led organisation and learning. We then settle the theoretical framework and methodology for analyzing the innovation/product interplay. In the third part we present five case studies, resulting from data collected in European and Asian carmakers. We finally present several lessons learnt from the comparison of these five cases.

2. Motivation of the research: the new challenge for product and innovation projects interplay

2.1. The current strategic context: renewing products more frequently while adding more radical innovative features

For the last 20 years, OEMs and suppliers have dramatically increased the pace of new products launches (Fig. 1). At the same time, OEMs launch more innovative features more often (Fig. 2). As a direct consequence, automotive companies face an emerging challenge: to increase the frequency, reliability, radical nature and profitability of the innovations developed in research and advanced engineering, and at the sale time to maintain their ability to develop

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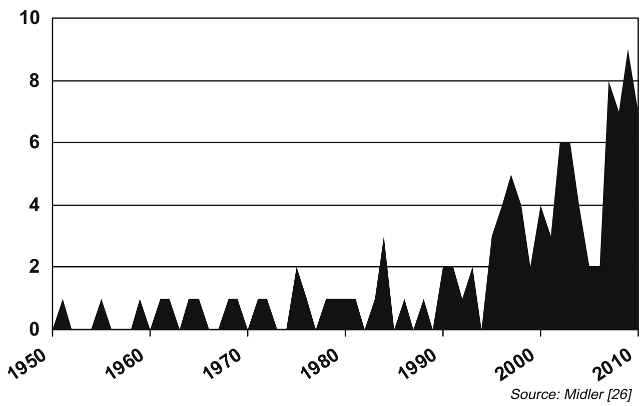

Fig. 1. Number of vehicle launched each year by Renault. (See above-mentioned references for further information.)

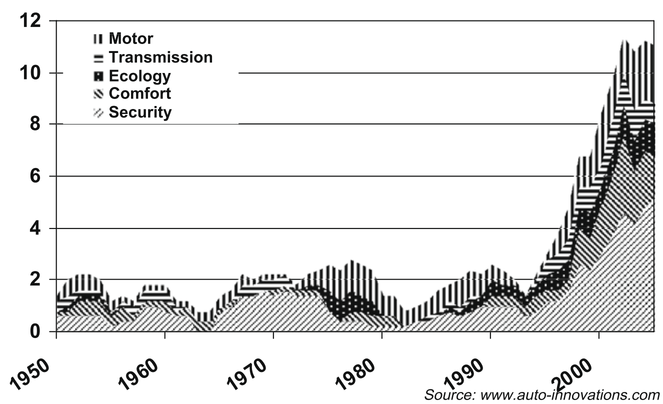

Fig. 2. Number of innovative features launched each year by automotive companies. Number of innovations from 1950.

more vehicles than ever in a context of very tight constraints on quality, cost and lead time.

Such a strategic challenge called for deep transition in car manufacturers product design processes in the last two decades.

2.2. The empowerment and routinization of product development activities in the 1990s

During the 1980s, the increasing competitive pressure put emphasis on the ability of industrial firms to improve quality level, reduce cost, time-to market (so called QCT indicators) of new products, and last but not least, to manage the increasing complexity of products. Many industries addressed this shift: automotive, medical devices, consumer goods, and electronics. Pioneer research defined concepts and organizational frameworks for effective "projectification" of product development processes: heavyweight project management teams, concurrent engineering and early supplier involvement [11,24,25,31]. Industrial firms implemented these frames and methodologies during the 1990s.

Nevertheless, this overwhelming success rapidly showed its bad side: the "fat-design" problem. The focus on the QCT performance of a single product tended to favour one-shot solutions, developed specifically for one project, disregarding the firm global performance. To fight against this problem companies implemented platform strategies which relied on sharing components and subsystems among different products through a global part sourcing [9,18].

Given the increasing pressure on development performance, it became more difficult for firms to take risks in the context of development routines [1]. This led to "front-load" all the potential problems to the pre-project phase (the so called "fuzzy front-end" of the project). As a consequence, the pre-project phase more and more consisted both as a product definition process [28,30] but also as a risk-elimination process aimed at reducing the problem-solving effort of the development phase [7,8,14,29].

In the early 2000s, automotive firms were well armed to develop rapidly new products, and to have a global strategy for managing the diversity implied by this evolution. As a consequence, the gap among automotive OEMs around the world in product development performance has been narrowing in the 1990s [12].

2.3. Innovation management in the projectified firm

Although projectified organizations instituted core capabilities maximizing QCT indicators, these core capabilities tended to turn into core rigidities that modelled potential products through a stable architecture and existing competencies [19]. These organizations became reluctant to apply innovative features that were disruptive towards this organizational structure [13,15]. Such results confirmed the results found out in the construction industry [3,20].

Le Masson et al. [17] developed a general formalism to explore innovation reasoning, combining knowledge creation and concept development. Ben Mahmoud-Jouini and Midler [4] proposed a framework for exploring the interplay between product projects and learning processes within the design system of the firm, which articulates the product project management, the competencies creation process and the strategy formulation process. Learning processes imply pre-project research explorations and maturation, within project activities and from projects [5] by cross project comparison, formalisation and capitalisation processes [2].

Iansiti's work [16] improved our understanding of the linkage between technological knowledge activities and product development activities. He showed that development projects that "create a match between technological options and application context" perform better than others. In other words, knowledge creation carried out by research activities should be oriented towards the future contexts of application. Iansiti's work highlighted the technology integration process within a new product, but remained focused on technical improvement, disregarding deeper reshuffling of the product hierarchy. Furthermore, the multi-product deployment of the technology remained at the background of his work.

Cusumano and Nobeoka [9,10] studied the management of new components rollout in the context of automotive platforms. They show that the most efficient way to manage inter-projects linkages was to adopt a strategy of "concurrent technology transfer", a quick parallel rollout of new key components on the range of products of the firm.

Marsh and Stock established a model of "inter temporal integration" that addresses this multi-product issue [22,23]. By modelling the product learning cycle, their work aimed at identifying key mechanisms of dynamic capabilities at the interplay between development activities and knowledge activities. This framework remains at an emergent phase and still lacks empirical insights for the moment.

Brady and Davis [6] proposed a model of "project capability-building" which occurs when a firm moves into a new technology and/or market base. The model considers a dynamic sequence of a bottom-up project-led learning process with a top-down business-led learning process which fully refines, exploits and expands the firm's organizational capabilities and routines for a better execution performance. This approach particularly addresses the important question of dedicating "vanguard projects" to breakthrough innovations that can be incorporated in the firm's patterns in a dynamic exploration to exploitation process.

3. Theoretical framework and methodology

3.1. Research questions

The existing literature reveals a large range of different patterns for product and feature/technology projects interplays. Thus, we are exploring the following research questions:

- To what extent can different types of innovative features be matured in pre-development phases in order to secure product development project?
- In the interplay, how to manage the trade-off between the short-term focus of the development project and long-term focus of the innovative feature lifecycle?– What is the result for the innovation strategy performance?

The overall approach of the research is to compare innovation cases by characterizing the product/innovation interplay, the organizational processes and the resulting performance.

3.2. Innovation sample

We define an innovative feature as a technical solution providing a new functionality which is not included in any existing products of the brand.

We selected four innovation domains that cover a large diversity of features and address different learning domains, from end-user acceptability of the new feature to technological maturation or disruptive business model exploration: safety and driving assistance systems; comfort and convenience; infotainment and telematic services; power train efficiency and low emissions.

3.3. Framing the product/feature interplay with the concept of Innovation Life-Cycle Management (ILCM)

The key analytical concept of our research is the *innovation life-cycle* (*ILC*) or what we called *innovation route* in our preliminary studies [21]. We define this concept as the set of investigations aimed at exploring different innovative features, preparing them for the application to specific contexts, and capitalizing the related knowledge within the core product-process organization.

We distinguish four types of phases in the ILC. The *exploration phase* consists in exploring and preparing an innovative feature for upcoming development projects. The *contextualization phase* consists in preparing a specific proposal to adapt the feature to a vehicle pre-project. The *development phase* consists in developing the feature within the vehicle development process. Once the first feature has been marketed, the *deployment phase* consists in capitalizing on this first experience to rollout the feature on a coherent range of products (Fig. 3)

We use this framework to analyze empirical data following a cross-cases methodology.

We use five dimensions to highlight differences in the ILCM of several companies:

The learning dynamic: What are the explored dimensions through the process? What is the level of anticipation

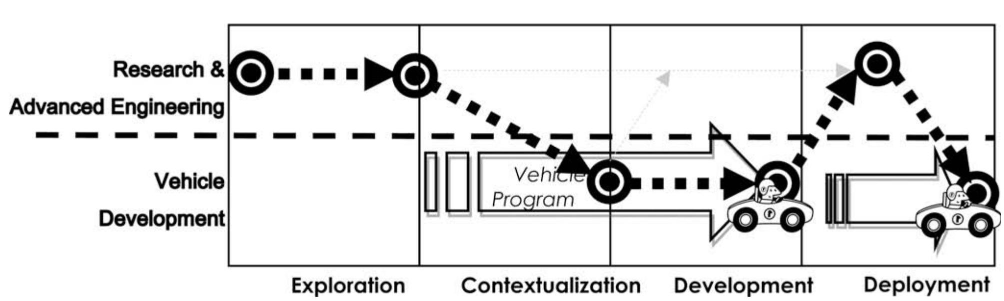

Fig. 3. The innovation life-cycle.

before product development on customer benefit as on technology maturation?

Decision process: Is there a formalised stage gate process for ILCM? Is it bottom-up or top-down oriented? Who is involved in those decision processes and what are the risks taken along the feature's life-cycle?

Working team on innovation: Is there an official team in charge of managing the innovation life-cycle? Is it heavyweight or lightweight? What are its main competences scope and continuity through multi-product deployment of the innovative feature?

Innovation life-cycle institutionalisation within the carmaker's organization: How is the innovation processes connected to product development and functional divisions? What is the business model of the innovative feature within the company?

Cooperation processes with suppliers: How and when do the carmakers involve the suppliers in the ILC? How does the firms share cost, risks and benefits?

3.4. Estimating the innovation management performance

In order to evaluate the performance of an ILC, we adopted a four-criterion-ranking, based on:

Customer Value: How significant is the benefit brought by the Innovative Feature to the end-user?

Integrability: How easily can the innovative feature be applied to different types of vehicles?

Maturity: How reliable and effective is the technology used to make the innovative feature?

Profitability: To which extent does the OEM can make a profit out of the innovative feature?

Specific scales to track the evolution of these trackers are developed, by separating two different characteristics attached to each of these trackers: its expected level, but also its uncertainty level.

3.5. Research team, data collection and progression

The research is organised as an international research collaboration, associating European (CRG, Ecole Polytechnique), Japanese (MMRC, University of Tokyo) and American (IMVP, MIT and Wharton) research teams who aim at understanding the challenges facing the global automotive industry.

The teams have involved three OEMs from Europe and Japan since 2006, giving the opportunity to study seven innovative features lifecycles. We expect that the final results will come out in 2009, after the involvement of six other OEMs from Asia, Europe and USA.

4. Innovation life-cycle management: five case studies

This paper draws on five cases studied from 2006 to 2008. We selected the cases to be representative of significantly innovative features, to illustrate quite different types of innovations and exemplify the research questions above. The first two cases show how two different OEMs (one from Asia, one from Europe) did manage the lifecycle of a similar feature, called ACCESS in this paper. We studied three different feature lifecycles within the same vehicle project of another European OEM, through a typical vanguard strategy.

We had access to key managers and to in-house documentation of the car manufacturers and tier-one suppliers that were involved in the ILC process. We conducted a total of 42 interviews (an average of six interviews for each case, each one lasted between two and three hours) of diverse manager's profiles (covering project management, research, purchasing, technical, marketing, suppliers). We also had access to in-house archives from the time of the project (emails, presentations, milestone reports). We discussed the progresses and results in the research committee gathering the research team and VPs from OEM and suppliers.

4.1. ACCESS lifecycle at OEM_A and OEM_B

4.1.1. ACCESS lifecycle at OEM_A

Exploration: OEM_A is an European OEM. During the 1980s, Exterior Equipment Department and its supplier's counterparts lived a period of changes shifting from mechanical key controlled locks to electric radio-controlled centralized locking systems. But such interest for more advanced automatic opening system decreased in the beginning of the 1990s. From 1992 to 1994 the Research Department launched a research project which led to the first draft of the ACCESS system.

Contextualisation: In mid-1996, a vehicle project called for significant innovative features for product differentiation. The vehicle project leader quickly identified ACCESS feature as a high customer value feature and thus proposed to the board a version of ACCESS feature, mixing the in-house system and supplier system. The project asked for important functional enhancement compared to the previously studied solution. Important technological changes were introduced to meet these new requirements. Engineering departments were reluctant, due to the important risks, but the supplier accepted the challenge. In December 1997, the board decided that ACCESS feature should be applied to the vehicle. At that time, the vehicle was close to the design freeze milestone.

Development: An "Innovation Project Manager" was dedicated to coordinate the development teams and suppliers impacted by the system. The ACCESS project involved numerous surprises caused by unexpected interferences between the vehicles and the ACCESS innovative features. Customer un-anticipated miss-uses of the new feature generated problems during the commercial launching. The system was finally right on time, even if it caused some quality problems to OEM_A.

Deployment: But this first version of ACCESS was not deployed on other vehicle. The technical problems that emerged during this first application led to come back to technological options that were proposed by the suppliers on the first vehicle, but were too costly. Today, this ACCESS system is deployed on eight models from three platforms. ACCESS is now under the responsibility of a joint electronic–mechanic team, which has been recently co-located.

4.1.2. ACCESS lifecycle at OEM_B

Exploration: OEM_B is an Asian OEM. In the early 1980s, the Mechanical Division wondered how it could benefit from the generalization of electric power in cars. It launched a two-year study focus on the electrification of the steering column lock. At the same time, the exterior equipment division triggered a parallel study aimed at developing automatic door locking. Both studies failed to show enough benefit to justify more resources, even though the auto-lock project was sold as optional equipment in a luxury car.

Contextualization: The topic was 'silent' until 1995, when the Board voted a customer value based strategy, applying innovative features to upcoming vehicles. The dedicated steering committee nominated a taskforce responsible for introducing the ACCESS feature in the market. The members of this taskforce were the former pilots of the above cases. They rapidly merged their experience to propose a coherent ACCESS system. They initially targeted the directly upcoming car project, which was a luxury one. After six months of study, they realized that no solution could match the cost and functional expectations. Taking advantage from this new trial, they targeted another upcoming vehicle project and managed to build a scenario that met the cost (scale effect) and technical functional requirements.

Development: The early collaboration engaged among the different technical departments was identified as a key success factor for the implementation of the feature. Technical departments realized that this feature forced the management of new interactions between components, as well as adapting the validation procedures within the vehicle development project. Finally, OEM_B launched the new vehicle on time, and widely based the marketing plan on the promotion of the ACCESS system. The car sales and ACCESS equipment rate were high in comparison with company's standards.

Deployment: Then, OEM_B decided to rollout the feature on other vehicle platforms. The same team supported its rollout to more than a dozen of different vehicles in five years time. In order to enhance the customer value on each vehicle, they developed refined versions of the feature to fit to each market segment. Meanwhile, the enlarged knowledge about this feature permitted sourcing of different components of the system from a broader panel of suppliers, which dramatically decreased the cost of ACCESS from one vehicle project to another.

4.2. Three innovative features at OEM_C

OEM_C, an European OEM, marketed at the end of 2006 an innovative car, called InnovCar in this article. This vehicle is for OEM_C a strategic product, realizing 5% of total company sales. It is part of the Multi Purpose Vehicle (MPV) segment. In order to increase its market share on this highly competitive segment, OEM_C realized that it had no choice but to innovate. The project team tried to implement a total of 83 innovative features, out of which 48 were finally marketed, typically 2–3 times more than other OEM_C vehicles.

Three major innovative features were studied. Two were successfully implemented: the WINDSCREEN and the SEATS. The third one, called TRUNK, was abandoned during the development phase.

4.2.1. WINDSCREEN lifecycle at OEM C

Exploration: The windscreen is an important feature that contributes to key vehicle attributes (cruising ambiance, style and structure). Thus, automotive glass has been an intense domain of innovation since the early 1990s (athermic glass, complexity increase of the shape), especially at OEM_C. In 2000, OEM_C initiated with a supplier a research programme for a completely new type of windscreens: very large windscreens (40% bigger than the biggest existing ones) and highly curved windscreens. At that time, no production process was available at any supplier to produce such windscreens, and it was identified that the only alternative would be to make a technological leap.

The first step was focused on preparing a concept-car, prefiguring a future vehicle, called Vehicle A in this article, to be marketed a couple of years later. This concept-car was seen as an occasion of collective learning between the supplier and OEM_C.

Contextualization: The second step was Vehicle A development, which adopted a very complex shape (derived from, but simpler than the one of the concept-car) for the windscreen. OEM_C thus applied the knowledge created with the supplier during the period 2000–2002. The marketed vehicle benefited from this complex windscreen, but end-users did not consider it as valuable because at that time, the exterior design had not taken advantage of all possibilities of innovative windscreens.

At the beginning of 2003, the project managers of InnovCar adopted the innovative windscreen, which would give it 2–3 years advantage relative to competitors. It selected the same supplier that worked during the previous phases.

Development: This third step was an important and risky challenge for InnovCar managers: no one could evaluate the end-users value for the feature at the beginning of the process; the feasibility of such windscreen, and its integrity in vehicle architecture was still very unsure and there was no possible backup development scenario for the car if the innovation development failed. Nevertheless, InnovCar project manager accepted the challenge and secured the project by adopting specific design processes: nine months frontload from initial go-no go milestone on the vehicle project; agenda for the exterior design of the car to fit the constraints of the innovative feature; supplier selection process to maximize knowledge capitalization from previous experiences. Such development process allowed the feature to be ready and reliable at the commercial launch of the vehicle.

Deployment: After these successes, OEM C's strategy was to deploy this innovative windscreens lineage through its new vehicles.

4.2.2. Modular SEATS life-cycle at OEM_C

Exploration and contextualisation: One other strategic feature for a MPV is its "modularity": end-users not only look for a vehicle able to offer 5–7 seats, but they also want the vehicle to store for a lot of luggage in case few people are in the car. At the beginning of the 1990s, an OEM_C competitor introduced rear seats removable from the car. This innovative feature gave this OEM a real competitive advantage, and became later a standard of the MPV segment. Nevertheless, the trouble with this feature was the difficulty of removing the seats (comfortable seats tend to be heavy) and of storing them. InnovCar SEATS are innovative because they can fit into the vehicle floor. It is thus easy for the end-user to change the interior configuration of the car.

Surprisingly, the flexible seat idea came late, during the development phase. One could have foreseen that this type of innovation could have been anticipated. Actually, such a feature is so contingent to car body and components that off-the-shelf exploration is very difficult to justify, as application to a specific vehicle will need major and costly rework.

The SEATS idea emerged from one supplier through a Request for information process, and was selected by the project team as a key differentiating advantage.

Development: So, even if the seats development process should have been considered completely out of time on this project, the project leader decided that the vehicle development scheme would have to adapt to the specific needs of these seats. It was decided, in 2003 (less than three years before the official commercial launch) that part of the chassis would be redesigned, and the spare wheel would be removed, to provide more room into the vehicle floor.

Actually, this impacted on the whole vehicle and required investment. But the decisions were made in less than three months. Moreover, the selected supplier for these seats was not part of OEM_C traditional panel of suppliers before InnovCar project. This risk was hedged by creating different levels of communication between OEM_C and the supplier, for quick problem-solving loops.

After this vehicle development, the seats met a commercial success. Because of the very short time to develop the feature, some minor quality problems had to be managed, but these had been anticipated by the OEM specific taskforce.

Deployment: Even before the commercial launch of InnovCar, OEM_C decided to apply a similar feature on other vehicles.

4.2.3. TRUNK lifecycle at OEM C

Exploration: The last innovation case is related to the trunk of the InnovCar. It proposed a radically new way to open it. Because of the large vertical dimension of a MPV trunk, traditional opening solutions are problematic when there is little room left behind the parked car.

Based on this consideration, OEM_C has developed since 2000 a research programme focused on innovative concepts for trunks. One concept (called "Shutters" in this article) emerged during this work, which could potentially solve the cluttering problem. Prototypes were made on existing cars (but not on MPV vehicle), in order to test the technical feasibility of the feature.

Contextualisation: Not surprisingly, when the Shutter feature was proposed for InnovCar the InnovCar team were not convinced by this upfront solution so they decided to rethink the innovative trunk from scratch. The vehicle development team decided to open up a period for creativity and looked for innovative concepts that would solve this problem of trunk cluttering. During two months, an intense work was done within the vehicle development team to find out innovative concepts to realize a very compact trunk opening system.

Development: Two concepts emerged after this creativity phase: one was, unsurprisingly, the shutters concept; the other, called "baggage hold", was much simpler, but partially unsatisfactory. The project manager decided to quickly prototype the two concepts on an existing vehicle, similar to InnovCar. A focus group was set up. For both features, the results of the focus group were disappointing. The end-users were interested by the feature, but seemed not to be ready to pay for it. This was problematic for InnovCar, because both features implied incremental costs, and increased the vehicle weight. Consequently, the project manager decided to give up the development of the innovative trunk.

After this failed application of the feature, the research department decided to continue to work on their primary solution. After two years of refinement, they tried once more to "sell" it to a new vehicle development team. The vehicle project manager refused to apply the innovative feature, roughly for the same reasons.

5. Findings from the cases

The ILCM framework highlights dramatic differences between innovation practices of different companies. We discuss here several findings of this first panel of five features. We expect to validate these hypotheses through the rollout of this methodology on a larger panel in the coming year.

5.1. Innovation as an interplay

In the context of automotive industry, the cases confirm that, innovation management does not consist in a linear process which begins with "research" and ends with "development", but in an interplay between product development projects and knowledge activities (from early preparation to standardized application on vehicles). This interplay brings richness as well as complexity in the process. Development projects stand as learning fields for innovative features, because it is possible for the teams working on them to get a deeper access to questions related to the end-user value or the business model of such feature.

Therefore, our analytical model gives a framework to track the activities that a company has to perform in order to transform an idea into a commercial innovative feature applied on a full range of products. This framework can be then fruitful to understand and compare different company strategies.

5.2. Limits of off-the-shelf metaphor and the key role of vanguard projects in ILCM

In a context of increasing pressure on vehicle development projects, one could imagine that only off-the-shelf innovative features would have a chance to go to the market successfully. Instead, the cases studied at OEM_C illustrate another pattern. InnovCar project proved to play a key role in selecting and maturing innovative features. Such a result emphasizes the importance of contextualization phase in ILCM. It also shows the importance of learning and adaptability capabilities *within* the vehicle development process to find out new compromises given by the unavoidable surprises of the contextualization phase.

This result contradicts the on going trend in auto industry that promotes a real routinization of product development phase, asking for complete upfront validation of any innovative feature. OEM_C, as the famous Prius by Toyota [27], illustrate the importance of "vanguard projects" [6] even in such stable dominant design context.

5.3. The European and Asian Innovation life-cycle management

ILCM analytical framework reveals two highly contrasted approaches, in term of performance and process.

The European manufacturer, OEM_A, arrived on the market at an opportune moment, with a clearly targeted feature. However, it suffered from a quality crisis because of poor anticipation and discontinuity in the study on technical maturity and integrity of the feature within a vehicle context.

In contrast, the Asian OEM_B was very efficient to mature the technical solutions, to integrate them within the vehicles, but rather badly performing to define an accurate functional target, and a good business model to launch profitable innovations.

Such a result leads to the conclusion that innovation process performance cannot be reduced to technical learning performance through the traditional indicators of quality, cost and lead time. This result calls for an articulation between the engineering capabilities, the customer and profit capabilities.

Table 1 shows how such contrasted performances mirror deep differences in life-cycle management processes, as analyzed through the five organizational dimensions.

5.4. Towards a comparison of innovation strategies

Such differences between innovation capabilities and innovation/product projects interplay management lead to formalise two different global patterns for innovation strategy of the firm.

On one side, a product project oriented strategy gives priority to innovations that prove their financial value from the product project perspective, with short-term customer value as a key go/no-go driver for the selection

Table 1
Organizational contrasts between OEM_A and OEM_B

	Access at OEM_A	Access at OEM_B
Learning dynamic	Driven by value – Priority given to confirmation of customer value rather than learning on technical issues. Strong barrier to entry on projects	Driven by technical issues – Priority given to technical maturity and integration into the vehicle
Decision-making and risk management process	Top-down – Decisions to incorporate an innovation into the project required repeated and forceful intervention by the company's senior management	Bottom-up – The risks associated with the innovation were assumed relatively easily by operations personnel in the engineering fields, as they were by the projects
Institutional adoption of the innovation trajectory	Project-driven – The feature can advance because it was selected. The need for risk/attractiveness trade-off that is very favourable for the initiator	Function-driven – Relatively simple mobilization of projects as part of the learning process ("guinea pig projects", through successive iterations)
Work method	Project management – Coordination and encouragement by a project manager assigned to the innovation	Horizontal coordination – The development teams coordinate the development
Type of inter-company relationship	Exploration: performed by the manufacturer, who defines the generic function. Contextualization: total prescription of innovation for the vehicle. Competitive environment of multiple uncompensated suppliers. Development: black box model, commitment regarding system specifications compliance. Deployment: platform continuity, subject to the competitive process on other platforms	Exploration: performed by the manufacturer, who defines the generic function. Contextualization: initial selection based on expert evaluation, followed by study contract. Development: continuous communication, with a redefinition of objectives in the process. Deployment: platform continuity, subject to the competitive process on other platforms

Table 2
Matching the cases with innovation strategy orientation patterns

Business model innovation life-cycle drivers	Technology/brand orientation	Product project orientation
Technical divisions	ACCESS (OEM_B) WINDSCREEN (OEM_C) TRUNK (OEM_C)	
Vehicle projects	WINDSCREEN (OEM_C)	ACCESS (OEM_A) SEATS (OEM_C) WINDSCREEN (OEM_C)

process. In this strategy, the firm manages the innovative feature portfolio through the needs of product project portfolio.

On the other, a strategic view with a more global and long-term perspectives emphasizes brand values and/or technology policies. In this pattern, product project portfolio has to integrate the constraints of the strategic innovations learning tracks.

Our cases explore a variety of situations on this matter (see Table 2). OEM_A has a strong product project oriented strategy while OEM_B adopts a clear technology orientation. OEM_C appears with a balanced strategy: SEATS and TRUNK cases demonstrate the driving forces of vehicle projects to shape innovation portfolio management. However, WINDSCREEN life-cycle reveals how the brand can develop key differentiating innovative attributes through successive vehicle projects. In addition, the unsuccessful TRUNK story shows how upfront technical divisions can maintain their innovation learning tracks beyond vehicle project refusals to market their solutions.

6. Conclusion and further research

This paper questioned and enlarged the platform development and technology integration paradigms in projectified firms. Within the context of stabilized product lines, we considered the innovation challenge as the interplay between product/platform projects and innovative features.

We developed a conceptual framework, based on the concept of innovation life-cycle management, in order to compare the evolution of features from their early emergence to their cross-products deployment. This framework characterizes both the process leading the innovation life-cycle and the performance related to this process.

We presented an outlook of the application of this framework on five features introduced on various independent platform projects and firms. The results confirm the importance of interplay between product project portfolio management and innovation life-cycle management. The study reveals significant differences both in the way firms manage this interplay and the results they achieve in terms of time to market as customer value. The next phase of the research is to deploy a questionnaire-based approach for a systematic comparison of different ILCM practices and performance in the automotive industry.

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