Learning a New Business by Managing Resources and Interfaces. From Dealer to Auto Maker - The Case of DR MOTOR

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SHORT ABSTRACT

In this study we adopt a resource network perspective to investigate the process of development of a new automobile venture, the DR MOTOR COMPANY. The analysis focuses on the development of the supply network and on the interaction between the firms involved in the creation of the DR5. We emphasize how DR-AG, a very small company compared to its giant competitors in the auto industry, "learned" and set up a new business by using its own and, to a great extent, suppliers' knowledge. We also look at how specific "interfaces" (mostly between suppliers) have been developed and used for the project. This paper contributes to the IMP field in three ways. First, it studies the issue of learning in networks (e.g., Håkansson et al., 1999) in relation to the specific case of new business development and from a small firm perspective; second, it provides a unique case study within the automotive industry; and third, it further develops key theoretical aspects within the IMP tradition, such as the application of the 4 Rs model and the concept of interfaces (e.g., Håkansson & Waluszewski, 2002 and 2007).

KEYWORDS: new venture, resource interaction, learning, interfaces, case study, auto industry

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INTRODUCTION

In this study we are adopting a resource network perspective to investigate the process of development of a new automobile venture. Specifically from the empirical point of view we are looking at how a small commercial company, the Italian multi-brand dealer DR Automobiles Groupe (DR-AG), has developed a new business, the DR MOTOR COMPANY, and moved upstream in the value chain by entering the auto industry segment.

In 2004 DR MOTOR started its activity by exploring different opportunities, including vehicle typologies and potential partnerships. Immediately, the business relationship with CHERY in China proved to be central in the development of the new venture. A prototype of a sport utility vehicle (SUV), the DR5, was developed throughout 2005 and presented to the Italian market in a motor show in 2006. By the end of 2007 the DR5 entered production and sales started by January 2008.

The analysis focuses on the development of the supply network and on the interaction between the firms involved in the creation of the DR5. We emphasize how DR-AG, a very small company compared to its giant competitors in the auto industry, "learned" and set up a new business by using its own and, to a great extent, suppliers' knowledge. These issues of learning and knowledge transfer in relation to a new business are studied here from a network perspective. A related aspect explored in the analysis is how specific "interfaces" with and, more significantly, between suppliers have been developed and used for the project. Finally, the auto industry context is taken into account to explore for specificities that would help in the understanding of the case.

We adopt a "learning in networks" theoretical perspective based on previous IMP group work (e.g., Håkansson et al., 1999). In the analysis we make use of the 4 Rs model (e.g., Håkansson & Waluszewski, 2002 and 2007) to map the resources used to carry out the different activities within the business network, and the concept of interfaces to tackle the new venture development from an interaction perspective. This paper contributes to the IMP field in three ways. First, it studies the issue of learning in networks in relation to the specific case of new business development and from a small firm perspective; second, it provides a unique case study within the automotive industry; and third, it further develops key theoretical

aspects within the IMP tradition, such as the application of the 4 Rs model and the concept of interfaces.

The following section will present some key issues on new business development from an IMP perspective. Next the 4 Rs model and the "interface" concepts are introduced and explained. The remainder of the paper is devoted to the case presentation and discussion.

THE DEVELOPMENT OF A NEW BUSINESS

The focus of this paper is on the formation of a new business venture, which has, for many years, been a phenomenon of interest in many fields (e.g., Gartner, 1985; Delmar & Shane, 2004; Boeker & Wiltbank, 2005). Here we choose to deal with it from a network perspective and follow the IMP tradition (Håkansson, 1982) to tackle the dynamic nature of learning through network resource interaction.

The idea of learning in networks underlines the fact that a firm has the opportunity to learn through others. It has been shown how valuable customers and suppliers can be in this respect, and how business relationships can be the actual means and locus of learning for the firm. We apply this view to the formation of a new venture, which in a sense represents an extreme case of learning as a firm itself is emerging around a new idea or project.

Thus, our purpose is to discuss how a firm enters into a new business as the outcome of learning and knowledge transfer from and between suppliers in the network. Our analysis focuses on the resource interaction and management of interfaces at the network level. As is further explained in the next section, these two concepts of resource interaction and interfaces are key tools in the IMP field, useful for conducting network analysis with the purpose of understanding the dynamic nature of networks and network development.

As resources change their significance, employment, and value depending on their interaction and combination in the network (e.g., Håkansson & Waluszewski, 2002 and 2007), we can assume that at the network level new combinations of resources and specific interactions can contribute to the development of new types of activities and even to new types of ventures. Often it is the case of customers trying to combine resources to fulfill their own specific business requirements and plans. Therefore customers often try to pull resources together from different suppliers and translate inputs into the desired outputs (e.g., Cusumano et al., 1991; Loeser, 1999; Batonda & Perry, 2003). However this requires a certain amount of knowledge on the customer's part. If we consider the particular case of a firm entering a new business with a new venture, then we can argue that the knowledge needed is even greater,

while, at the same time, such a firm probably has a limited amount of it as it is new to the business.

In this paper we argue that, to reach the desired output – in our case to enter a new business segment (become an auto maker) by developing a new product (launch the new SUV DR5) – the firm that doesn't necessarily have the competence ex-ante can learn from its suppliers (e.g., Dwyer et al., 1987; Gadde et al., 2003; Narayandas & Rangan, 2004). This can be done, first, by using the suppliers' knowledge that is already embedded in the components delivered and, second, by learning from them through interaction and by creating proper interfaces (Håkansson et al., 1999; Song & Di Benedetto, 2008). In this situation much of the learning is not limited to the customer; we argue that it takes place between suppliers. In other words, instead of the customer learning about each of the suppliers, the suppliers may learn from each other (and thereby learn how best to meet the needs of the customer's business). As a result, the amount of learning and (resource) interaction that the customer requires to develop a new business is reduced, as much is actually happening between suppliers. That is to say, the more suppliers of a firm learn from each other (e.g., how components go together and how one set of test results has implications for another), the less the customer needs to learn from each of the suppliers. Obviously this could be helpful in certain situations, such as for small firms with limited resources available, and for firms entering new areas of activity.

From an empirical point of view we study the development of a new venture, the DR MOTOR COMPANY and the DR5 SUV, by particularly emphasizing the "learning" aspect at the network level. The mapping of the "resource network" is carried out in conjunction with the analysis of the assembly/production process of the DR5 diesel vehicle. The interfaces between the customer and suppliers, and those between key suppliers, are classified and examined to shed light on their significance for DR-AG's new business. The fact that we are dealing with the emergence of a new auto producer makes this case even more distinctive as this is definitely an unusual event.

RESOURCE INTERACTION

Relying on Penrose's work (1959), we argue that resources combine with each other and generate new configurations that give rise to new activities and outcomes, such as new products and even new ventures. However, combining and recombining resources is not easy and often takes a long time (e.g., Håkansson & Snehota, 1995). Moreover, it is necessary to

possess the competence to combine resources; otherwise there will be more investments to satisfy. This can be generally considered learning by trial and error.

To study the resource network interaction and composition we use the 4 Rs model. This framework distinguishes four types of resources: products (Ps), facilities (Fs), organizational units (BUs) and business relationships (BRs) (Wedin, 2001; Baraldi & Bocconcelli, 2001; Håkansson & Waluszewski, 2002). Units and relationships, that is, the social resources, are organizing elements for the physical resources, that is, products and facilities. The 4 Rs model is useful in our study as it allows penetration into the interactions between single-resource items or groups of them. In fact, the focus should not be on the single-resource items, but on the interplay between items (see for instance Baraldi, 2003). By interacting, resources affect each other's features and usage. Together with the 4 Rs model, we use the concept of "interfaces" in this paper as well.

Resource interfaces (Håkansson & Waluszewski, 2002: 190-200) are the contact points that indicate how and how much two resources affect each other. In a business network the interfaces between resources are shaped through interaction. Naturally there can be many important aspects to take into consideration concerning interfaces, such as the technical dimension when focusing on Ps and/or Fs, or the social and business dimension if we look at BRs and BUs. Resource interfaces can be categorized in several ways. A distinction that we find useful for our study focuses on their heaviness (i.e., how difficult it would be to break them) and variety (i.e., how open-ended an interface is). Additionally we also consider the distinction made by Araujo et al. (1999) between standardized, negotiated, interacted, and translation interfaces.

These concepts will be applied to the analysis of the case as they will be useful in the understanding of the resource interaction and learning occurring in the supply network of DR MOTOR. In fact, to investigate the development of a new venture it is necessary to examine the composition of the whole network of resources coming together and the development over time of the interfaces between them. In this way the learning process can be better understood and the network dynamics depicted.

LEARNING BY TRANSFERRING RESOURCES AND MANAGING INTERFACES

Generally firms learn from their own activities and experiences. Alternatively, there can be a transfer of competence from other firms. This occurs, for instance, when a supplier delivers a component to the customer. Knowledge and competence are already embedded in the artifact.

Therefore we can say that, at a general level, every firm has business relationships that could be more or less a locus of learning and knowledge transfer.

Recalling our resource interaction approach we can say that the interaction between two resources generates knowledge as well. Knowledge will vary depending on which resources are interacting. Competence will be embedded in products, artifacts, and technologies in the case of physical resources, while learning and knowledge transfer will occur when social resources are interacting. An important aspect is that learning and knowledge exchange trigger processes that are not unilateral (e.g., from the customer to the supplier or vice versa); rather, actors and interfaces influence each other and it becomes a rather complex system at the network level. Additionally, learning within a BR and even within a network is characterized by loop processes in the sense that once the development (i.e., in the learning) has made a step forward, the actors go back to earlier steps in the process and look for ways to modify and improve them. For instance, when a new component is inserted in a machine, by looking at the existing system it may be possible to see other improvements that could be sustained by the technology, function, or principle behind the new component. This obviously always has immediate consequences for the interfaces at both the social and physical levels. In fact when a new component comes into play there will be an adaptation of the interfaces around it to enable the component to communicate properly with the other parts of the system; at the same time, the customer supplied with the new component is adapting his interface with the supplier as a consequence of the change, or, if the supplier is a new one, the customer is creating a new interface.

As underlined above, through resource interaction, knowledge can be transferred and learning can take place. However the consequences for the customer of the two elements are quite different. Having components delivered to your door or even to the right place and at the right moment of your production activities is different from learning through interaction. For instance, the effects in terms of resource commitment and future potential development are much higher for a firm that has the opportunity to engage in learning. On the other hand, efficiency, flexibility, and risk reduction are much greater if learning is kept to a minimum and instead suppliers simply deliver the output (e.g., a component) to the customer firm. Clearly, it is not possible to discern the knowledge transfer from the learning effect, but the intent here is to stress the difference and certainly the possibility to focus as a firm more on one than the other. In this study we investigate the customer firm’s ability to manage the learning and the transfer of knowledge (i.e., firm learning strategy).

Inspired by the work of Håkansson et al. (1999) about learning in networks, our analysis will be based on a framework where firm learning is determined by (1) the characteristics of the actors involved, (2) the characteristics of the BRs, and (3) the BRs context. This framework will be applied in our study and we will deal with learning in relation to the development of a new venture (the DR MOTOR COMPANY). When dealing with the first aspect, the actors' characteristics, besides accounting for usual ones (e.g., type of actor and turnover) we look particularly at their experience in the industry, their location and their level of resource commitment in the project. Concerning the characteristics of the BRs, these are previous cooperation, standardization of the product in focus, type of production, specific resources activated, and types of interfaces. Finally, when dealing with the BRs context, a broader approach than the mere investigation of the connected relationships (as suggested by Håkansson et al., 1999) is used and insights from the auto industry are brought in as well.

The remainder of the paper is organized as follows. After the methodological section we present the case. Initially the new auto-business venture (DR MOTOR) and the DR-5 project are presented. The development of the new venture is then illustrated and emphasis is placed on the problems faced by the firm in the process. The case analysis and discussion will conclude the paper.

METHODOLOGY

The data collection was conducted in Italy. Interviews started in November 2007 and were concluded in April 2008. A total of 18 semi-structured interviews, spanning from one to several hours in length, were conducted. An interview guide was prepared before each interview and adjusted based on the outcomes of the previous ones. Most interviews were tape-recorded and transcribed. Respondents included all the firm management, the engineers working on the prototype and in the plant following production, and sales and marketing personnel. All of them were informed of the purpose of the research prior to the interview.

E-mails and phone calls to follow up on interviews were made, and archival data, including company websites, business publications, and other materials provided by the informants, was collected. Interviews were stopped when the authors considered that a level of understanding had been obtained that was satisfactory for the purpose of the research. Upon completion of all interviews, all the gathered information was synthesized into a case history that includes a description of the decision-making process, actions that key managers took throughout the process, and outcomes that followed.

ENTERING A NEW BUSINESS: THE DR MOTOR CASE

In January 2008, with the roll-out of the first DR-5 SUV by the DR MOTOR COMPANY (DR MOTOR), part of DR-AG, we witnessed the official entrance of a new producer and brand in the auto industry. DR-AG is one of the largest car dealerships in Italy; in 2004 it began developing a new business as an automobile producer (DR MOTOR) with its own brand ("DR"). DR-AG comprises 13 firms representing different autonomous operating units. DR-AG headquarters and units are located in the area of Macchia di Isernia in the Molise region (central-south part of Italy). DR-AG's turnover in 2006 was €250 million and it employs about 190 people.

DR-AG was created in 1984 by Massimo Di Risio when he took over a Lancia's dealership from his father; Lancia is an Italian car brand owned today by the FIAT GROUP. During the 1980s and early 1990s DR-AG developed a strong presence as a car dealer (both new and second-hand vehicles) on the Italian market. In 1994, DR-AG made an agreement with the FIAT GROUP to become an official dealer of the Alfa Romeo and, in 1998, obtained the mandate to sell all vehicles of the FIAT GROUP as an official branch. Between 2001 and 2004, DR-AG also became an official dealer for most international auto producers[1] for the Molise region.

Summing up, today DR-AG operates in three different business areas: car dealership, car maintenance and assistance, and vehicle manufacture. The manufacturing activity was started by Massimo Di Risio in 2004. The basic motivation behind the new venture was the owner's wish for further growth and the natural limits of the dealership business, which was geographically limited to the Molise Region. In fact the dealership could not expand any further as DR-AG has most brands' mandates, and these all have regional boundaries (i.e., the same firm cannot have more than one region).

DR MOTOR has two manufacturing plants located in Macchia di Isernia (IS), where it assembles various vehicles. Each manufacturing plant is devoted to a different project: the KATAY and the DR3&5 project. DR MOTOR invested in new tools and machinery in 2006 and 2007 to assemble the vehicles. For much of the equipment, such as the water-seal control system, the investments were suggested directly by the suppliers. The first project was

[1] DR obtained the mandate for BMW, LAND ROVER, and MINI in 2001; for CITROEN, RENAULT, NISSAN, and MITSUBISHI in 2003, and OPEL, FORD, PEUGEOT, TOYOTA, SEAT, KIA, HYUNDAI, VW, SMART, AUDI, MERCEDES, CHRYSLER, JEEP, and JAGUAR completed the offering in 2004.

KATAY, which is a DR-AG brand used to sell in Italy Chinese cars equipped with CMD (COSTRUZIONI MOTORI DIESEL s.r.l.) diesel engines. Basically, DR MOTOR imports from the Chinese car manufacturer GONOW two different kinds of off-road vehicles that sell under the KATAY brand name. The KATAY project was DR MOTOR's first experience with car assembly. According to DR MOTOR's management, the KATAY project can be considered as preparation for the DR3&5 project.

In the DR3&5 project, DR-AG designs, assembles, and sells its own vehicles using the DR brand. The DR3 project (the "3" indicates a three-door vehicle) is still at its initial stage, while the DR5 (five-door vehicle) was launched in December 2007 and the first deliveries were made in March 2008. Since the launch, DR MOTOR has been selling only the gasoline and gpl versions of the DR5; the diesel version is expected to be on the market by the end of May 2008. In the first few months of production, between 15 and 20 DR5s (mostly gasoline) per day were produced in the DR MOTOR plant. This vehicle is sold at a very competitive price and with a new distribution strategy (e.g., using IPER supermarkets as a distribution channel). The vehicle is sold full-optional as the standard package. This choice was meant to avoid offering customized vehicles, which entails a more complex production line and much more technical competence.

Between the three types (gasoline, gpl, and diesel) there are substantial differences. The three all share the same exterior look, which was developed based on the TIGGO, a CHERY AUTOMOBILE company (CHERY)[2] SUV produced and sold in China. But the diesel version, compared to the gasoline and gpl versions, has undergone developments in the mechanical, engine, electronic, and security aspects. After briefly reviewing the main characteristics of the gasoline and gpl versions here, below we will focus on the diesel version.

The DR gasoline version comes from the CHERY manufacturing plant in China, and it arrives in DR without any change compared to the CHERY SUV that is sold in China under the name "TIGGO." In other words, the TIGGO comes from China already conforming to European standards, and it is sold directly in Italy as the DR5. The gasoline engine delivered

[2] CHERY was founded in 1997 in Wuhu, Anhui Province, China. Today, CHERY is the fourth-largest passenger vehicle manufacturer in China and it exports products to over 60 countries. CHERY has two automotive manufacturing plants, a transmission plant, an automotive engineering research institute, and an automotive planning and design institute. It employs 23,000 people and has total assets of over RMB 22 billion. It has the annual production capacity to produce 650,000 completed vehicles, 400,000 engines, and 300,000 transmissions.

with the TIGGO by CHERY is the outcome of the cooperation between AVL[3] and CHERY. In 2003 CHERY commissioned AVL with the development of four new engines that would meet Western standards, particularly concerning emission levels. Teams from the two companies worked side by side in Austria and in China, and the outcome was a series of engines called ACTECO.

Once the TIGGO arrives in Italy, some changes are made in order to make the DR5 ready for the market. The actual differences between the TIGGO and the DR5 involve only some external changes, such as the bumpers and hood, the brand's stickers, and a few components in the vehicle's interior (for example, the carpets, the fifth safety belt, and the steering). In regard to the mechanical components, the DR5 gasoline SUV has the same engine and gearbox as the CHERY SUV. Also, the electrical components are the same.

About the production of the gpl fuel version of the DR5, in the DR MOTOR plant the technical team placed on the TIGGO a gpl system provided by an Italian company, OMVL SpA (a SIT group company). Therefore, compared to the gasoline version, the only difference is the gpl system that is added to the gasoline engine.

For the DR5 diesel project, it was necessary to develop a new engine and mechanical solution as CHERY is unable to provide a diesel engine. Building on the DR SPORTEQUIPE[4] competences in mechanical engineering, DR MOTOR set up a team of engineers to study the prototype of the diesel version. Starting from the CHERY car body, it was necessary to find the diesel engine and electrical parts to go together. After several months DR MOTOR found a supplier for diesel engines, the Italian FPT[5]; the German company BOSCH[6] supplies the electronic components.

The DR5 Diesel Project

[3] AVL is an Austrian firm leader in the production and sales of combustion engines (all kinds of powertrain systems), instrumentation, and test systems for the auto industry. In 2006 the turnover was about €537 million and it employs 3640 people.

[4] DR SPORTEQUIPE is one of the 13 units of DR-AG. Their activities and competence are focused on car racing.

[5] Fiat Powertrain Technologies (FPT) is a company of the Italian car's manufacturer FIAT GROUP. FPT was established in March 2005 with the aim of grouping together, in a single company, the FIAT GROUP's skills and know-how in the areas of engines and transmissions. With an annual output of around 3.1 million engines (gasoline and diesel) and 2.5 million transmissions, FPT is one of the most significant players in the powertrain sector worldwide. FPT is present in 7 countries with 15 plants, 10 R&D centers, and 20,000 employees.

[6] Bosch is a German group operating in four different sectors: automotive, industrial, consumer goods, and building technologies. The turnover in 2007 was €44 billion and it employs 260,000 people. The Bosch Group comprises 300 units in more than 50 countries. In the field of automotive technology, BOSCH produces a variety of products, such as gasoline and diesel systems, chassis systems, and car electronics.

In the DR5 diesel project, the car body from CHERY is used (the same used for the gasoline and gpl versions); the critical task was to find the right suppliers for the diesel engine and the electronic equipment. For the diesel engine, CMD, already involved in the KATAY product, was contacted, along with other firms. However, the first to agree on the supply was FPT. In the industry of diesel engines, FPT is the developer of the "common rail" system that has impacted the market since its introduction in the mid 1990s. Today, almost all car producers in the world use that kind of engine. DR MOTOR found in FTP the best diesel engine supplier and, at the same time, an Italian firm that was located relatively close by. As for the electronic parts, because of the technical characteristics of the FPT diesel engine, DR MOTOR considered FTP's suggestion to use electronic components supplied by BOSCH. BOSCH accepted and DR MOTOR obtains the electronic components built in Germany by BOSCH through FTP.

The DR5 diesel project represents much more development and investment by DR MOTOR than is the case with the gasoline and gpl DR5s. In fact, the DR5 diesel model is not just the result of outsourcing and marketing and commercial efforts (like the DR5 gasoline and gpl versions), but it required investments and development by DR MOTOR including design, new technical and operational competence, and in-house assembling of the vehicle.

Competences necessary for the development of the DR5 Diesel Project

Among the most important competences required by DR MOTOR to start the DR5 diesel project was the technical and engineering knowledge necessary to study the assembly of the car body with the engine and electronic components. Another key competence was the capability to design exterior components of the vehicle. Most of the competences came from the DR SPORTEQUIPE and from internal designers. Competences in the after-sales activities and in organizing the distribution network were needed; therefore, in 2007, DR MOTOR started to hire external consultants coming from other firms in the industry (e.g., FIAT GROUP, TATA). One key competence that DR MOTOR is focusing its efforts on is quality control. DR MOTOR is investing in this type of competence and in related activities since none of the components needed in the vehicle are produced in-house. Therefore all components have to be checked and tested to reach satisfactory quality levels. This shows how the investments that, in the auto industry, would typically go towards R&D are here mostly directed towards quality control and improvement of existing components. Manufacturing competence (seven former production and logistics managers from the FIAT

GROUP) has been acquired by DR MOTOR as well. According to the DR MOTOR management there are few aspects that are specifically related to the development of the DR5 diesel project. To succeed, DR-AG believed that cost-efficiency and fast development and launch of the car models was critical. In fact DR MOTOR did try to jump most development phases by looking for ready-to-use components and focusing on the system integration. In this way the typical four-year development time for a new vehicle[7] was reduced to two years; most important, this was done by DR MOTOR with much fewer resources than traditional processes require. For instance, the adoption of an existing BOSCH electronic control unit into the DR5 diesel saved DR MOTOR several months of software development. Moreover, the actual production is merely an assembly of different components coming from suppliers located in different countries.

Interestingly, the point of reference for the assembly line in DR MOTOR is not that of a typical car producer but instead that of a bus producer. This because of the low number of vehicles produced when compared with the big auto companies and because bus producers need to be flexible in producing (in the same line) many different types of vehicles.

Another key asset is the market knowledge possessed in the firm due to the many years spent as a dealer as well as the direct contact with the customer. At the same time, DR-AG also possesses a good knowledge of the producer side as it sells most of the vehicle brands in the world. Finally, DR MOTOR management wanted to leverage the experience of the DR SPORTEQUIPE engineering and design competence as well as the flexibility and experience of the service/repair people, and thus tackle in this way all technical issues and problems.

The vehicle design is perceived by the firm both as a marketing strategy and an investment to reach EU safety standards. Therefore, it is not only a matter of aesthetics; much is needed to render acceptable the specifics of the vehicles since many components are coming from China and do not observe EU standards. An example in this sense is the front bumper. The front bumper mounted on the CHERY vehicles does not meet EU safety standards and does not pass the “pedestrian test” – a test used to check how a human body would be affected should it be hit by the front of the vehicle. DR MOTOR chose to design its own front bumpers and to have them produced and delivered by a different Chinese company. Obviously this necessary change gave DR MOTOR an opportunity to modify the aesthetics of the bumper as well. The same goes for the front hood.

[7] The typical phases of developing a new vehicle are the following: initial market study, prototype design and construction, testing and definition of details, industrialization, pre-scale production construction, production start, presentation, and sales start.

Besides the creation of the assembly line, to develop the prototype an R&D center and a design center were also formed. These were committed to making the Chinese car body conform to European standards, and also to studying the development of the assembly line. Particularly, the issue concerning matching the diesel engine made in Italy and the Chinese chassis had to be faced in the early stage. This meant the understanding of all the technical problems that could arise in the manufacturing (see the section about the project development difficulties). A group of designers drew adaptations of the CHERY SUV, in particular with regard to external and internal components. For example, hoods and front and rear bumpers were redesigned. Modifications were realized in the interior of the SUV as well, such as in the steering wheel and the upholstery.

To develop the DR5 diesel prototype there was a strong collaboration between the R&D and the design centers, particularly to tackle the production engineering issue. In fact, as a new car producer, DR MOTOR needed technical and industrial competences to fulfill the DR5 diesel project. One of the critical aspects was to put together the engine and chassis, but it was also necessary to assemble external parts such as bumpers and hood with the CHERY car body. Moreover, it was necessary to study a solution to setting up the front lights on the car body. To sell the DR5 in the Italian market it was necessary to homologate different vehicle parts, such as the bumpers or the engines' soundproofing. Moreover, many crash tests were necessary to deal with the car safety issues. After various tests were run, all kinds of problems were solved thanks to the efforts of the DR SPORTEQUIPE and external technical consultants. By the middle of 2006 two identical DR5 diesel prototypes had been made. These were delivered to FPT and BOSCH respectively, to get their final approval. DR MOTOR carried out several tests in Italy to homologate the DR 5.

Overall, the DR5 diesel project's development period lasted two years. According to DR MOTOR's top management the project has been challenging; there was a lack of in-house experience and competences to organize the manufacturing process of the DR5 SUV diesel project, the manufacturing plant area was too small to develop the DR5 diesel project and needed modifications, unexpected problems in homologating the DR5 diesel SUV emerged, and unexpected high sales level of the DR5 gasoline and gpl models made the management decide to put aside the development of the DR5 diesel project to satisfy the existing demand for cars. To address these problems DR MOTOR's top management planned to open another manufacturing plant in the second half of 2008. This new factory should also improve the productive capacity of the DR3 and DR5 SUVs in order to reach the planned 40,000 vehicles by the beginning of 2009.

The initial investment in the DR SUV project was about €12 million. The DR5 diesel project compelled first of all investments to study the automotive market. In the beginning it was important to study the Asian market to find the right car body supplier. Moreover, it was important to analyze the forecast demand for an SUV in the Italian market and determine how to customize the vehicle to meet European standards. From this point of view the investment in marketing activities was high and DR MOTOR aims to reach its objectives without external support.

DR MOTOR's relationships with CHERY and FPT

The evolution of the supply network around the DR MOTOR venture is summarized in the table below.

Figure 1. The development of the BRs and DR MOTOR supply network

BEGINNING OF RELATIONSHIP	January 2004	May 2004	May 2004	End of 2004	2005	2005	2005	2005
SUPPLIER	CHERY	KAIKAY	JITAY	JONWAY	FPT	MM	BOSCH	VDO CHINA

In the development of the DR5 diesel project, the relationships with CHERY and FPT have been critical. The two BRs have been very influential in determining other BRs.

According to the top management of DR MOTOR, CHERY is the right supplier because it is one of the few companies already producing a relatively high-quality SUV in China. Additionally, it represents one of the most important public companies in China and, as a consequence of this, it is export-oriented and is focusing on establishing commercial agreements in Europe. Additionally and most important, CHERY was the first producer that agreed to supply DR MOTOR with the DR5 gasoline model and the body for the DR5 diesel with the necessary changes. In particular, CHERY was willing to modify some elements of its production line to satisfy DR MOTOR's requirements and also some productive processes, such as the final quality control on the vehicle. However, in the negotiations with CHERY, it

was hard to establish the delivery status of the vehicle. DR MOTOR was looking for car bodies without engines and mechanical parts (for the diesel version) but equipped with wheels and rims as that would have made it easier to move the car bodies in Italy. CHERY didn't accept DR MOTOR's proposal because it could raise problems on their own production line. For CHERY, this meant more steps in the production. So DR MOTOR had to accept CHERY's conditions in order to have the car bodies supplied.

However, for its part, CHERY had to accept a few conditions from DR MOTOR as well, in particular regarding homologation. In fact CHERY had to follow DR MOTOR's suggestions to make glass, headlights, and safety belts conform to European standards. CHERY learned from DR MOTOR how to change and make the new components. There were a lot of contacts between the technical teams of the two firms, especially at the beginning of the relationship, to share know-how. The DR MOTOR technical team went several times to China to check on CHERY's production line, and CHERY representatives traveled to Italy to observe the DR MOTOR production line.

As for the engine and mechanical parts, FPT is the supplier. According to DR MOTOR's management, FPT is a valuable strategic supplier because of the high quality of the diesel engine, and due to the geographical and cultural aspects. These two aspects facilitated the development of the project and the relationship between DR MOTOR and FPT. In fact, the geographical proximity allowed DR MOTOR to reduce costs and the average delivery time of the components. The cultural aspect was also important in carrying out negotiations. Compared to the relationship with CHERY, it was simpler for DR MOTOR to communicate with the FPT and to close the deal.

Another important aspect that drove DR MOTOR to create a relationship with FPT was linked to the strong network that FPT has with important mechanical and electrical suppliers related to the powertrain system. In fact, thanks to FPT it has been easy for DR MOTOR to obtain other key components (e.g., power brakes and pressure switches) necessary to assemble the diesel engine with the gearbox and the car body. Therefore we can say that FPT represents a strategic supplier for the DR5 diesel project. For instance, when DR MOTOR formed a supply relationship for the diesel engine with FPT, as a consequence it formed a link with BOSCH as supplier (via FPT) of specific electronic components (e.g., junction boxes). The relationship between BOSCH and DR MOTOR has developed through FPT mainly for technical reasons. However, although the supply from BOSCH goes via FPT, during the development of the DR5 diesel prototype there have been direct contacts between BOSCH and DR MOTOR. In fact, when the R&D team of DR MOTOR finalized the first prototype,

it was sent directly to the BOSCH manufacturing plant in Germany to receive technical approval. For six weeks BOSCH tested the electronic components which would have been later on assembled in the DR MOTOR facilities. During that period there were contacts among the engineers of DR MOTOR and BOSCH to exchange technical competence to get the components to function properly together. The few problems detected were solved thanks to BOSCH's suggestions.

As for FPT, the supply of diesel engines and gearboxes started after assessment work on the DR5 diesel prototype (see details in the next section concerning the mechanical problems faced by DR MOTOR). In the middle of 2005 DR MOTOR delivered a DR5 diesel prototype to the FPT manufacturing plant located in Turin to obtain technical approval. FPT tested the mechanical assembly of the diesel engine and the gearbox on DR MOTOR's car body. After three months of testing, FPT returned the prototype to DR MOTOR suggesting improvements to some aspects (for example, to fix the engine's wiring). Throughout the development project DR MOTOR has obtained important technical feedback from FTP about developing the DR5 diesel.

Analysis of the Assembly Process and the Supply Network of the DR5 Diesel

The DR5 diesel vehicle is assembled in the DR MOTOR plant located in Macchia di Isernia (Italy). The manufacturing process that takes place in the DR MOTOR plant is structured in five main steps corresponding to the five main physical stations in the plant.

The CHERY car body arrives in Italy (from the Wuhu manufacturing plant) without any significant extra components (e.g., wheels, hood, engine, bumpers, and other mechanical parts). Before the actual manufacturing process can begin, there is the pre-assembly of the power unit that will be placed later into the car body. The power unit is composed of two main parts: the diesel engine and the gearbox. At the beginning of the production line the technical team puts together these two components (using the kit supplied by FPT) with the immobilizer provided by MM[8] and the ECU (electronic control unit) provided by BOSCH. The output of the pre-assembly-line activity is a complete power unit ready to be inserted in the car body. From this moment on there are five main phases in the assembly line. At each phase different components come together (see table 1).

[8] Magneti Marelli is an Italian-based multinational designing and producing hi-tech systems and components for the automotive sector. With a turnover of €5 billion in 2007, 28,000 employees, 46 production sites (56 production units), 9 R&D centers, and 27 application centers, the Group has a presence in 16 countries. MM is part of the FIAT GROUP (like FPT).

TABLE 1. Production Phase, Components, Supplier and Supplier Location

Phase	Components	Company	Plant location	Country
Pre-Assembly Phase	A. diesel engine B. gearbox C. (minor components of the engine)	A. FPT B. FPT C. FTP suppliers	A. Pratola Serra (AV) B. Termoli (CB) C. Italy	A. Italy B. Italy C. Italy
1	A. rear and front deck B. rear wheels C. shock absorbers D. fuel tank E. steering gearbox F. first part of exhaust system	A-F CHERY	Wuhu city	China
2	A. brake hoses B. exhaust pipes C. rear bumpers D. spare tire	A. CHERY B. CHERY C. KAIKAY D. CHERY	A. Wuhu city B. Wuhu city C. Taizhou city D. Wuhu city	China
3	A. stirrups B. pulleys C. linkage for gearbox	A-C FPT	A-C Pratola Serra (AV)	Italy
4	A. fulfillment of the exhaust system B. front shock absorbers assembling C. anti-roll bar assembling D. steering column assembling E. cluster F. ECU	A. FPT B. CHERY C. CHERY D. CHERY E. VDO CHINA F. BOSCH	A. Pratola Serra (AV) B. Wuhu city C. Wuhu city D. Wuhu city E. Wuhu city F. Stuttgart	A. Italy B. China C. China D. China E. China F. Germany
5	A. front bumpers assembling B. hood assembling B1: gasket C. spoiler assembling D. carpets E. DR brand assembling	A. KAIKAY B. JITAY B1. JONWAI C. KAIKAI D. GSMWHEELS E. IGEA	A. Taizhou city B. Xuancheng city B1. Taizhou city C. Taizhou city D. Napoli E. Lanciano (CH)	A. China B. China B1. China C. China D. Italy E. Italy

The fundamental component that is the basis of the whole project is obviously the car body on which all other components will be placed. The car bodies (and the bumpers) coming from China are delivered by ship. Shipments on this route are made weekly, and the trip takes

about a month. The car body is the first component on the assembly line, the structure on which the other parts will be placed.

Most of the components in the above list come to the DR MOTOR plant to be directly used in the production of the DR5 diesel. Exceptions are the hoods and bumpers. DR MOTOR receives the bumpers in its manufacturing plant from the Chinese company KAIKAI. These are immediately delivered to VERINDPLAST, an Italian firm located near DR MOTOR that paints and treat the bumpers for DR MOTOR. This is because KAIKAI was not able to supply DR MOTOR with the painted bumpers. DR MOTOR chose VERINDPLAST as its supplier because of its importance and prestige in the Italian market. There is also a geographical reason, as VERINDPLAST is very close to Macchia d'Isernia.

The situation with the hood is similar to that of the bumpers. DR MOTOR receives the hoods from the Chinese company JITAI. To put them on the vehicle, a thermo treatment called "cataphoresis" is necessary. This process protects the hood from rust. JITAI was not able to supply DR MOTOR with a processed hood, so DR MOTOR chose an Italian firm, the SAN MARCO COMPANY (SAN MARCO), to provide this treatment. SAN MARCO has strong experience in the coating and special treatment field of activity. Its manufacturing plant is also very close to DR MOTOR's plant in Macchia d'Isernia. When SAN MARCO completes the cataphoresis process, the hoods are sent directly to VERINDPLAST to be painted. After that, the hood comes back to the DR MOTOR plant for the final assembly.

To build the DR5 SUV, DR MOTOR needs additional components, which are supplied directly to FPT. FPT puts together these smaller parts into the larger motor system and delivers the final product to DR MOTOR directly. This allows DR MOTOR to skip some steps in the assembly line with all the consequent effects (e.g., reduced investments in both equipment and competence, faster process). In this way FPT's manufacturing procedure is maintained and respected. This means that, besides the effects on investment levels and efficiency, DR MOTOR can rely on FPT's quality and experience of many years of manufacturing. FPT thereby represents one of the most important suppliers of DR MOTOR; it not just supplying a component produced in-house, but a system of different components coming from a number of firms belonging to FPT's existing supply network.

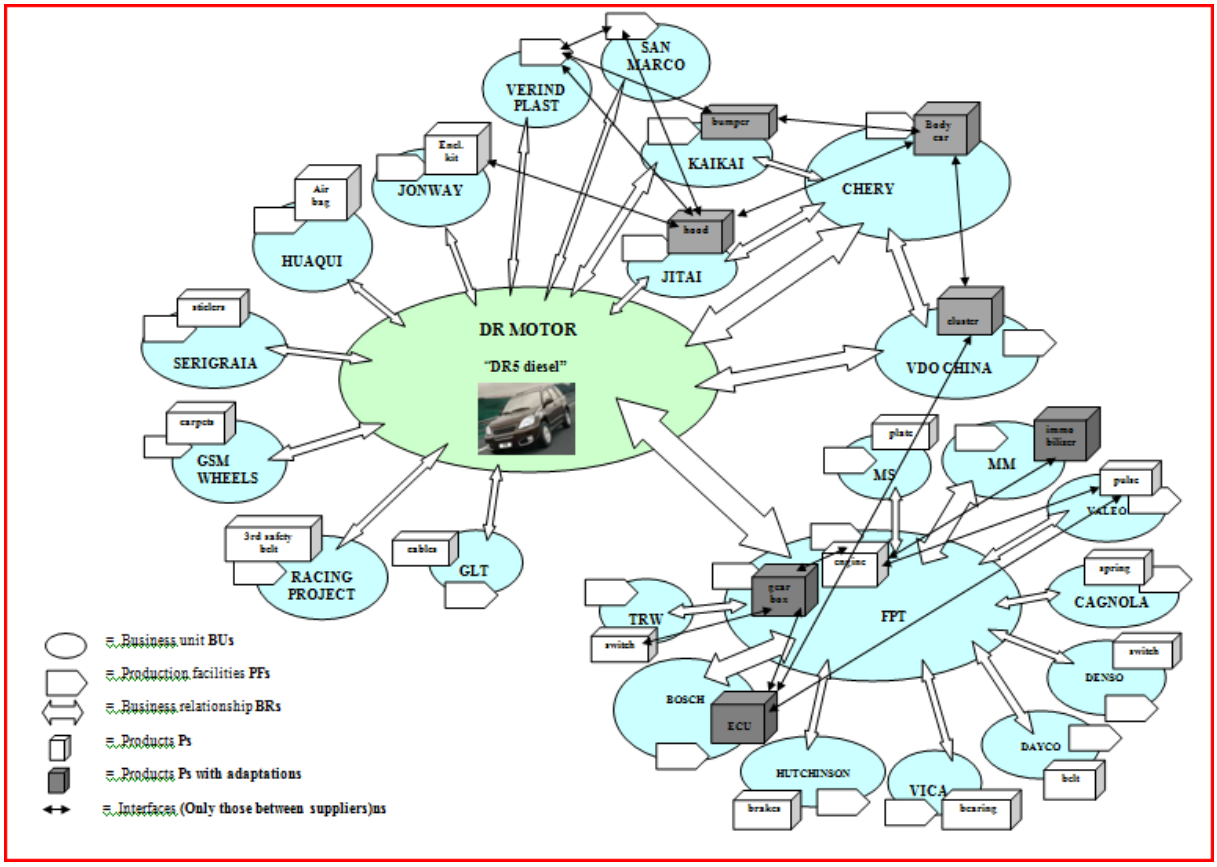
It should be noted, though (as we will explain in more detail in the following sections), that the components supplied to FPT (e.g., in the case of BOSCH) are channeled through existing business relationships, but they are custom-made for DR MOTOR, that is, they are designed to fit the DR vehicle. DR MOTOR buys other small components through FPT. These minor components and the suppliers to FPT are ECUs from BOSCH; power brakes

from HUTCHINSON; belts from DAYCO; electronic switches from TRW ITALIA; pulse generators from VALEO FRANCE; pressure switches from DENSO; axle shaft bearings from OFFICINE VICA spa; end and lock plates from MS AMBROGIO spa; and coil springs from MOLLIFICIO CAGNOLA ANGELO. Most of these components are used to put the diesel engine together with the gearbox. In the DR MOTOR manufacturing plant, components such as belts, switches, and generators are used to assemble the engine with the gearbox. Moreover, some of these components are used to join the mechanical part of the DR5 (engine and gearbox) to the car body, for example, the axle shaft bearings and the coil springs. In addition to these parts, the ECU coming from BOSCH is handled and delivered by FPT.

In order to complete its supply to DR MOTOR, FPT also suggests to DR MOTOR the components necessary to finalize the assembly of the mechanical part with the car body. For this reason FPT has become not only the supplier of the diesel engine and the gearbox, but also the "intermediary" providing DR MOTOR with the other components. It also seems easier for DR MOTOR to obtain these components through FPT. In fact, according to DR MOTOR, FPT has historical and strengthened relationships with those suppliers that facilitate the supply to the DR MOTOR manufacturing plant.

All supply relationships around the DR5 diesel vehicle are summarized in Figure 3. On the left side are ordinary BRs characterized by buying and selling of standard components. On the right side are the key BRs with CHERY and FPT and the connected bunch of supplier-supplier BRs. The figure shows the actors involved (the BUs) and the BRs that bond with each other in relation to the DR5 diesel. Moreover, the components (Ps) (modified components are shown in gray) are shown in correspondence with each responsible plant (Fs). The thin black arrows are the interfaces between suppliers and products related to the DR5 project; the interfaces between BUs are excluded as they are already represented by the BRs' thick white arrows.

Figure 2. The DR5 Diesel Resource Network



Learning a New Business by Managing Network Resources and Interfaces

In this final section we will focus on the learning dimension related to the development of a new business. The focus is on how DR-AG learned and set up a new venture by using in-house and, to a great extent, suppliers' knowledge. Part of the knowledge necessary has been developed by the firms through trial and error (i.e., experiential learning) and part is embedded in the components and systems delivered by the suppliers (i.e., knowledge transfer). In the DR5 diesel project a lot of the resource interaction and learning occurred between suppliers. Specific interfaces with and between suppliers have been developed and used for the DR5 diesel project. This indicates that learning, interaction, and commitment in this supply network are not centered at the customer site.

Recalling the framework employed by Håkansson et al. (1999) to study learning in networks, the first aspect that is critical to learning is the characteristics of the actors involved (1). In the DR MOTOR case there are two important aspects to consider. The first is the size of DR MOTOR versus the size of its suppliers; the second aspect, related to the first, is the level of resource commitment to the project; the third aspect is the actual type of firm the supplier is.

DR MOTOR is a small firm among giants of the auto (or related) industry. This situation obviously has many disadvantages such as reduced bargaining power and less ability to get closer and be heard (e.g., with respect to special requirements and modifications). However, on the other side it also provides an important opportunity to connect (and exploit) significant resources held by the large corporations once the relationship is established. As for the commitment, it would obviously appear very different among the involved firms if they were related to the total amount of investments they make in their activities; for example, it is a large commitment for DR MOTOR but one that is relatively very small for FPT or BOSCH. Finally, the fact that suppliers are potential competitors, in particular CHERY, complicates the situation. Clearly CHERY exploits DR MOTOR for certain aspects related to the marketing and achievement of standard approvals in Europe, while DR MOTOR gets its "cheap and ready-to-be-assembled" components. However, as the management of DR MOTOR also commented, there is no written or spoken agreement impeding CHERY from entering the same market and competing with the DR5. This situation clearly influences the learning possibilities and the motivation to transfer knowledge between the two.

The second aspect influencing the learning is the characteristics of the BRs (2), that is, previous cooperation, standardization of the product in focus, type of production, specific resources activated, and type of interfaces. Clearly there was not much previous cooperation, principally because this is a new venture (and basically all relationships have been developed from the start). As for standardization, that is key to the small DR MOTOR in making its project progress with relatively limited resources and knowledge. As we described in the previous section, is the possibility of finding already-existing standard solutions that has enabled DR MOTOR to save time and investments in the project development.

As for the specific BRs, many are simple exchange relationships (e.g., Huaqui and Racing Project) while others, such as the one with FPT and CHERY, have been much more valuable from a learning perspective. For CHERY in particular, a lot is related to the above-mentioned fact that CHERY is a potential competitor of DR MOTOR. Therefore, although the relationship between the two companies is good, and a certain commitment has been made and adaptations have occurred at both sites, according to the DR MOTOR management there is not yet a clear long-term vision of the relationship. FPT in this sense has been particularly valuable as a BR. FPT carried out most of the tests on the DR5 diesel and it instructed DR MOTOR concerning operations in the assembly of the vehicle. Additionally, FPT pulled competences (e.g., with BOSCH and MM) together from different suppliers and, in a sense,

packaged them for DR MOTOR. This point is connected also to the last aspect we deal with concerning the learning in networks, which is the BRs context.

The BRs context (3) reveals the actual impact of connected relationships, and this is quite evident from the case, especially if we consider the DR MOTOR-CHERY and the DR MOTOR-FPT relationships. Both of these BRs are well connected to other suppliers' suppliers. The level of interaction between these actors is high and often the BR is an old and close one. For instance, the BR between FPT and CHERY connected to the FPT-MM and FPT-BOSCH relationships. MM is supplying the immobilizer via FPT, while BOSCH supplies the ECU. MM is part of the FIAT GROUP and is therefore a sister unit of FPT. BOSCH has been supplying the FIAT GROUP since its origins. These two connected BRs are of extreme importance with respect to competence development and to the DR5 diesel technical development. FPT and BOSCH invested time and resources in finding the right components that could work on the DR 5 diesel. One can assume that the more interconnected the BRs among suppliers are, the more development and learning can take place. This means also that the more learning that occurs among suppliers, the less the customer needs to learn (to invest and to risk). This is certainly a key aspect to consider when starting a new business as in the case of DR MOTOR.

When analyzing the BRs context we argue also for the importance of industry-specific characteristics. Here the industry of reference is the auto industry and we look at three specific aspects. First is the geographic distance of suppliers, which is often pointed out as a key issue supporting many activities, from technical development to logistics. A problem with geographical distance is China and the Chinese suppliers. For DR MOTOR, having key suppliers such as CHERY and KAIKAI located in China is undermining the supply logistics, such as JIT, and warehouse and stock management, and it poses problems for production and efficiency levels. For instance, the car bodies and the bumpers coming from China are delivered by ship. Shipments on this route are made weekly, and the trip takes about a month. If delays occur in China, or if the customer needs to have the components before they can arrive by ship, the only alternative is air transport, which would substantially boost the transport cost. Another aspect is that not only are Chinese suppliers far away, but DR MOTOR is not getting closer (yet) to the Chinese ground. However, DR is planning is open a Shanghai office to increase its oversight of its Chinese suppliers (i.e., performing supplier audits, checking quality of components, monitoring shipping). The idea is also to have some engineering competence to start the development and improvement of car components locally. This would bring Chinese suppliers and DR MOTOR much closer.

The second aspect is the size of the auto makers, which, typically, because of strong entry barriers, are large. In the case of DR MOTOR, the very small size compared to the actors such as FPT, CHERY, and BOSCH (not to mention competitors such as Toyota and Honda) is a limitation. Implications for influencing investments and learning possibilities have been discussed. We have dealt with these aspects to some extent previously when we dealt with the characteristics of the parties involved.

Finally, there is the emerging phenomenon of the Chinese auto industry, which, in just a few years, has revolutionized the delicate balance of the global auto industry. China's auto industry has grown 15% on average every year since the early 1990s. According to the China Association of Automobile Manufacturer in 2005, about 6 million vehicles were sold in China. Since 2005, CHERY has represented the largest fully independent auto maker and one of the few companies exporting products (Ma & Wu, 2006). As we have seen, DR MOTOR relates to this situation in two ways. On one side, DR MOTOR is a way in to the Western market for eager Chinese firms such as CHERY, and on the other, it exploits the opportunity to acquire cheap components from China in a market where Chinese cars are not yet present.

CONCLUSION

In this study we adopt a resource network perspective to investigate the process of development of a new automobile venture. Specifically we are looking at how a small commercial company, the Italian multi-brand dealer DR-AG, has developed a new business as an auto maker (DR MOTOR) and integrated vertically by moving upstream in the value chain. Insights from the case study show the importance of suppliers in the development of the new venture.

The analysis focuses on the creation of the supply network and on the interaction between the firms involved in the DR5 diesel project. Particular attention is given to learning, and two aspects are examined: the learning of the customer (DR MOTOR) and that of the suppliers. We observe how the customer learns from trial and error (experiential learning) and from the supplier's teaching. In addition, we consider the knowledge embedded in the components and systems that are delivered by the suppliers as central to the process of building competences and the new project. This point relates to the issue of the actual value of others' knowledge. In fact most of the knowledge in the DR5 diesel project taken into consideration is developed by suppliers and in collaboration between suppliers, and then

transferred to the customer. Thus, much of the learning takes place in the BRs among suppliers.

Learning and knowledge transfer from suppliers have important implications for the development of a new venture, particularly when the customer has limited resources available. In fact, on the customer's side, the necessary competence can be reduced when learning, investments, and interaction take place in the context, that is, when they are connected with supplier-supplier relationships. Additionally, seeking (and finding) ready-to-use solutions will also reduce the amount of necessary learning for both customer and suppliers. All this is particularly crucial for new ventures and projects with limited resources, as was the case of DR MOTOR.

This study suggests a few implications related to the auto industry. For instance DR MOTOR shows how geographical location and firm size are not so critical for the auto-making business if the network is supportive. It is therefore important to build and manage interfaces between components, suppliers' activities, and production processes at the network level, as they sustain the project development and the learning.

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