The link between sustainability and absorptive capacities: the case of the electric car in Renault

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Abstract

Sustainability or sustainable development are the buzzwords of the last decade. Scientists, politicians and civil society organizations call for attention and stress that the population today demands more than our planet can deliver in terms of resources. This trend demands radical rethinking regarding the way society lives, consumes and produces. Here, we focus on what the demand for sustainability implies for corporations regarding the urge to redesign or produce new more sustainable products.

Herein, we focus on electric cars, which is the result of sustainable processes and initiatives in the car industry. The case of Renault illustrates how the firm based its sustainable strategy on its absorptive capacities. By formalizing on an explicit layer through the label ECO2, Renault has been able to communicate its sustainable implicit knowledge. As a learning organization, it did not only develop the necessary knowledge to anticipate future changes, but it also created the dynamic capabilities to adapt once the expected changes occurred. Our findings show that sustainable knowledge creation, acquisition, combination, and exploitation is a 2-way process: inside-out and outside-in between the firm and its environment. In the chicken and egg dilemma, who came first? The electric car of Renault illustrates this process, and therefore represents an appropriate setting to explore these dynamic processes. Electric vehicles express and result from (1) environmental requirements, and (2) Renault's overall strategy, including its sustainable development strategy and its absorptive capacity.

Keywords: sustainable development, dynamic capabilities, absorptive capacity, knowledge, Renault, electric car.

INTRODUCTION

Sustainability or sustainable developments are the buzzwords of the last decade. Scientists, politicians and civil society organizations call for attention and stress that the population today demands more than our planet can deliver in terms of resources (Pollard, 2010). This trend demands radical rethinking regarding the way society lives, consumes and produces. Here, we focus on what the demand for sustainability implies for corporations regarding the urge to redesign or produce new more sustainable products.

We review the specific example of the electric car and examine which factors determine its success. Car companies have already tried to launch electric car versions earlier but did not succeed. Today, this might differ. Renault developed its version of the electric car. The developments in terms of consumer acceptance and also product performance look promising. Hence, what changed? Renault's absorptive capacity and the attention brought to sustainable activities represent the basis to explain such processes, as well as its successful implementation within the firm.

The paper is organized as follows: First, we present the theoretical background. We define the concept of sustainability or sustainable development[i]. Then, we present the concepts of dynamic capabilities and absorptive capacity, and how they relate to sustainability in organizations. In the second part, we present the empirical setting. We briefly describe the car industry, and we introduce the case of sustainability and the electric car of Renault. We discuss the results of the case study and its implications.

1. THEORETICAL BACKGROUND

1.1. Sustainable development

1.1.1. Sustainable development

Since the 1980s, sustainability has gradually reached increasing attention in business but also in academia. Among the different notions on sustainability (Dobson, 1996), we focus on the concept of sustainable development which is defined as the "development that meets the

needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Even though, sustainable development considers social, economic and environmental aspects (Elkington, 1998), we focus rather on the *environmental* component.

Here, we understand sustainable development as the inclusion of sustainability aspects in product development. Procter & Gamble for example launched a new sustainability strategy in 2007 and integrated sustainability in its business, operations and products. For instance, the company introduced a new laundry detergent which ensures effective cleaning at low temperature: Tide Coldwater as it is called in North America and Ariel CoolClean as it is referred to in Europe (White, 2009).

1.1.2. Urgency of sustainability

The urgency to consider sustainability is illustrated in a recent report (Living Planet Report) by the World Wide Fund For Nature (WWF). The non-governmental organization points out that the world's population demands more than the planet can deliver (Pollard, 2010). Today's society uses the equivalent of 1.5 planets to satisfy our demand.

If society continues like that, WWF estimates that the equivalent of 2 planets is needed in 2030 to satisfy society's needs (Pollard, 2010). To counterfeit the unsustainable consequences of the currents trends, WWF calls on governments, consumers and corporations to include sustainability in their activities.

1.1.3. Sustainability and corporations

Corporations are increasingly expected to ensure that their business operations are environmentally sound (Pollard, 2010; Allsopp, Johnston & Santillo, 2008). Corporate activities have tremendous impact on environmental aspects such as environmental pollution (air, water, land pollution); climate change and depletion of valuable resources (species and habitats, fossil fuels and minerals). Corporations have reacted to the rising demands from governments but also (or even more) from civil society actors such as non-governmental organizations (Allsopp et al., 2008).

Many corporations present "sustainability" statements on their websites like for instance Volkswagen: On its website the corporation states that "We take a far-sighted approach to the key issues of the future, such as climate change. We pursue a broad range of research and development activities and generate the pioneering technology that the mobility of the future will demand." Also, corporations publish increasingly sustainability reports (like for example Toyota and British Petroleum).

1.1.4. Sustainability as a catalyst for new industries

The debate around sustainable development has functioned as a catalyst for the development of new industries (windmills, renewable energies etc.) (Sine & Lee, 2009). Besides, the desire for sustainable development has lead to the establishment of environmental and social entrepreneurs such as Terracycle or OZOcar and related research (see Hall, Daneke and Lenox, 2010). Terracycle offers eco friendly products made out of non-recyclable waste materials. Amongst the products offered are toys or bags for example. The company is one of the fastest growing eco-friendly manufacturers and supplies retailers such as WalMart or Home Depot.

In 2002, Jordan Harris started his Green Car to Red Carpet campaign asking Hollywood stars to use electronic and hybrid cars to go to social events. After the successful campaign, Jordan Harris and Boo Rogers founded OZOcar – a car service offering a car fleet of hybrid cars in New York. The entrepreneurs stress that service, style and sustainability can go together. The rise in environmental entrepreneurs is in line with a recent study in which the authors examine the potential of sustainable entrepreneurs to make profit by simultaneously resolving environmental challenges (Dean & McMullen, 2007).

Hence, sustainability spurs innovation. On the one hand, new industries and services emerge as discussed previously. On the other hand, existing industries integrate sustainability concerns into their product and service development such as the electric car which is the central theme of this article.

1.1.5. Sustainability and management research

Sustainability is not only on the top of the business agenda but it has also spurred management research. Research on sustainability in management can be divided in four research streams. First, there is a considerable amount of research considering corporate sustainability initiatives as an instrument for profit and competitive advantage (Christmann 2000; York, 2009). York (2009) for instance argues that integrating environmental ethics into business decisions will lead to competitive advantage and increased profits.

The second group of research is rather descriptive and focuses on reviewing corporations' sustainability performances (Howard-Grenville, 2007; Meek, Pacheco & York, 2010). Meek, Pacheco & York (2010) for instance describe the influence of social norms and the foundation of environmental entrepreneurs and environmental friendly business activities. This descriptive research stream does not only review how firms address environmental challenges, it also investigates the development of new sustainable processes (Howard-Grenville, 2007) and new industries (Russo, 2003).

Third, there is an explanatory research stream which aims at examining the differences in corporate approaches to sustainability. Murillo-Luna, Garcés-Ayerbe, & Rivera-Torres (2008) examined four different corporate responses to environmental requirements and pressures in different industries.

Finally, there is a normative research stream which uses philosophical theories to fortify the demands that corporations should engage in sustainable business practices (Arnold, 2010). This research stream is however still at an early stage.

Our article is a combination of an exploratory and descriptive study. We review the sustainability performance of a particular company (Renault) and its innovative electric car. At the same time our research is exploratory since we examine the success factors of such sustainable product innovations. In particular we explored the role of internal knowledge processes as well as external factors such as the sustainability debate in society and consumer demand.

1.1.6. Sustainability and consumers

Obviously, sustainability is on the top of the business and research agenda. As mentioned in the latest report by WWF consumers play a crucial role in sustainable development. This makes sense, since even if corporations include sustainability issues into their corporate operations and offer sustainable products, there has to be a market for sustainable products. A central question is whether consumers care about ethical and especially green issues. Consumer institutes (Consumers International, 2004; Grail Research, 2009) and academics investigate whether consumers are aware of sustainability issues and whether they are willing to buy sustainable products or even pay a price premium for sustainable products (Anderson & Hansen, 2004; Hiscox & Smith, 2008).

The main conclusion of ethical consumption research is that consumers are aware of environmental issues and even indicate that they would be willing to include sustainability issues into their purchasing decisions. However, a review on existing literature shows that consumers do not act according to their good intentions. There is an attitude-behavior gap (Auger & Devinney, 2007; Devinney, Auger, & Eckhardt, 2010) and the green strategies might only work when an ethical or sustainable mindset among consumers exists (Vugt, 2009).

An existing sustainable mindset among consumers is however not the only condition for successful sustainable products. At the same time, corporations need to absorb its environment and make sense out of external sustainability cues.

1.2. Dynamic Capabilities and Absorptive Capacities

Studies on knowledge, learning and absorptive capacities received increased attention in the strategic management literature. According to Lane *et al.* (2006), more than 289 studies were conducted on such topics. In 2010 and 2011 alone, more than ten articles related to knowledge, learning and absorptive capacities have been published in leading strategic management journals. This illustrates the growing interest towards such concepts and approaches to explain managerial dynamics and processes. In their recent article, Noblet and Simon (2010), present an extensive literature review on the topic (see Cohen and Levinthal,

1990; Nelson et Winter, 1982; Lane et Lubatkin, 1998; Kim, 1998; Zahra et George, 2002, Lane et Al 2002).

In previous studies, absorptive capacities were used to explain many phenomena – organizational performance (Cohen and Levinthal, 1990; Levinson and Asahi, 1995 ; Mowery et al., 1996; Drnevich, 2011), the firm's ability to acquire external knowledge (Daghfous, 2004), external and internal communication (Cohen and Levinthal 1990; Grant 1991), la culture (Kédia and Bhagat 1988), the development of new types of knowledge, environmental dynamism (Romme, Zollo, Georges and Berendes 2010), the modification, transformation and creation of new resources based on existing ones (Danneeles 2011) and sources of competitive advantage (Simon *et al.*, 2010).

For the purpose of this paper, we are especially focusing on the impact of absorptive capacity on innovation and research and development. The theoretical foundation of the concept of absorptive capacity is the theory of dynamic capabilities (Noblet and Somon, 2010).

1.2.1. Dynamic Capabilities

Some authors (Lee, Gwendolyn K, 2008) emphasize the fact that dynamic capabilities are part of the organizational capability stream, just like core competences, core capabilities, and combinative capabilities (Dosi, Nelson, and Winter, 2000; Kogut and Zander, 1992; Nelson, 1991; Nelson and Winter, 1982; Prahalad and Hamel, 1990; Teece, Pisano, and Shuen, 1997; Nonaka et Takeuchi 1997; Zollo and Winter, 2002). According to Schreyögg *et al.* (2007) "The concept of organizational capability has attracted a lot of interest primarily in the field of strategic management. In the resource-based view (RBV) organizational capabilities have been identified as one major source for the generation and development of sustainable competitive advantages". Organizational capabilities exist in all firms. However, they can change and evolve over time due to changes in the environment (Tushman and Anderson, 1986). Therefore, according to Noblet and Simon (2010) dynamic capabilities are defined as the representation of absorptive capacities and a source of competitive advantage (Zahra and Georges 2002).

1.2.2. Absorptive capacity

Former studies defined absorptive capacities from a resource perspective, more specifically from learning and knowledge approaches (Kay, 2010; Zhang et al..2010; Volberda, 2010; Lichtenthaler, 2009; Bergh, 2008; Noblet et al., 2008 ; Todorova, 2007; Lane et Al, 2001).

The concept of absorptive capacities has been defined as (Cohen et Levinthal, 1989, 1990) the "ability to recognize the value of new information, assimilate it, and apply it to commercial ends". Mowery and Oxley (1995) offer a complementary definition and refer to absorptive capacities as "a broad set of skills needed to deal with the tacit component of transferred knowledge and the need to modify this imported knowledge". Kim (1997, 1998) introduced a third definition of absorptive capacities as "the capacity to learn and solve problems". Finally, Zahra and Georges (2002) brought an integrative definition. According to them, absorptive capacities are "a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability".

At the firm level – our focus in this paper – absorptive capacity is generated in a variety of ways. Research shows that firms which conduct their own research and development (R&D) are more able to use externally available information (e.g., Tilton, 1971; Allen, 1977; Mowery, 1983). This implies that absorptive capacity may be created as a byproduct of a firm's R&D investment. Other work suggests that absorptive capacity may also be developed as a byproduct of a firm's manufacturing operations.

Generally, the environment influences the firm's absorptive capacities (Van den Bosch et al., 1999). According to Van den Bosch et al. (1999) there is a co-evolution, from which new organizational forms emerge leading to combined capabilities. This is why Van Den Bosch et al. (2003) define absorptive capacity as "a multilevel construct… the lowest level to apply absorptive capacity is the individual level… at this level the link between absorptive capacity and learning is most evident…the inter firm level…".

One of the youngest research streams focuses on studying the link between absorptive capacities and innovation/ R&D (Bergh et al., 2008; Deeds et al., 2001; Lin et al., 2002; Fosfuri et al., 2008; Fabrizio, 2009; Gao, 2008). According to Noblet and Simon (2010),

several models were created to explain the dynamics of absorptive capacities (Cohen and Levinthal, 1990, Van Den Bosch et al., 1999; Zahra and Georgesen, 2002, Lane and Al; 2006; Todorova and Durisinen, 2007)

From an innovation perspective, Kim (1998) focused on the car industry in Asia, especially the case of Hyundai. The author found that "effective organizational learning requires high absorptive capacity, which has two major elements: prior knowledge base and intensity of effort. Hyundai Motor Company, the most dynamic automobile producer in developing countries, pursued a strategy of independence in developing absorptive capacity". "In its process of advancing from one phase to the next through the preparation for and acquisition, assimilation, and improvement of foreign technologies, Hyundai acquired migratory knowledge to expand its prior knowledge base and proactively constructed crises as a strategic means of intensifying its learning effort".

In our empirical section, we will explore the link between sustainability, dynamic capabilities and absorptive capacity in the car industry. We focused on the electric car of Renault.

2. EMPIRICAL SETTING

2.1. The Car Industry and the case of the electric cars

The automotive industry designs, develops, manufactures, markets, and sells motor vehicles, and is one of the world's most important economic sectors in terms of revenue. It is one of the oldest, biggest and most extended industries.

According to the European Commission, Europe is considered as the number one car manufacturer in the world. The main players are PSA and Renault in France, Volkswagen, BMW, DaimlerChrysler in Germany, Fiat in Italy, etc. The car industry is a main employer and highly R&D intensive (i.e. program Cars 21). The industry has faced and is facing two main challenges: first, the impact of the worldwide crisis on major car players, such as in the U.S., and second, the expectation towards sustainable development as discussed at the beginning of the paper. European institutions for example express an interest towards green business. Hence, new regulations appeared. These trends fit car makers' anticipation. For

several years, car manufacturers have invested in order to establish sustainable processes within their firms and to produce vehicles that would reduce their negative impact on the environment (reducing the corporate environmental footprint).

Renault is not only a major car manufacturer but also considered a pioneer in terms of sustainability. Moreover, it initiated a new era with a novel generation of vehicles: electric cars. For instance, the Nissan Leaf was elected "car of the year 2011", which demonstrates Renault's positioning and strategy. Renault aims at marketing electric cars by the end of 2011.

What drove Renault's development of its electric car? How important is the lively debate about sustainability in society? And finally, how has Renault absorbed the necessary knowledge from the environment but also from within its corporate borders?

The car industry and the example of electric cars in Renault represent an appropriate, suitable and pertinent setting to explore the processes of absorptive capacities and their link to sustainability.

2.2. Methodology

2.2.1. Research design

Sustainability is a complex, multidimensional concept linked to a variety of stakeholders. In order to examine this complexity, we used a qualitative analysis to explore sustainable development activities from an absorptive capacity perspective.

2.2.2. Sampling design

A combination or a mixed sample is very well suited to test ideas at early stages of exploratory research (Miles and Huberman 1994). Three informants participated in our study. They are involved in at least one of the activities regarding the electric car at Renault, with specific knowledge on the marketing, R&D and sustainability dimensions at Renault. All three participants combine more than 40 years of experience at Renault.

2.2.3. Data collection

Secondary data – industry and government reports– was used to better understand the car industry, the electric cars and define the main points to be addressed during the interviews. This first step allowed us to identify the key dimensions of the questionnaire, which encompasses industry, technical and managerial aspects.

The objective of our semi-structured interviews was to achieve a horizontal analysis in order to compare the perspectives of the three informants on similar topics (Giordano et Jolibert, 2008). We did semi-structured phone interviews with subject matter experts. This two-way communication technique enriches the depth and details of information provided (Cooper and Schindler 2001).

Regarding operational considerations for individual in-depth interviews, we followed Giordano et Jolibert (2008): a diversity of the profile – in terms of knowledge and expertise – of our informants, and a small sample size in order to allow in-depth analysis. Following Eisenhardt (1989), two investigators conducted each interview. Facts and impressions were cross-checked after each interview; and all three rules were followed: (1) interview notes were completed within one day of the interview; (2) all data was included, and; (3) each interview note was ended with impressions.

The interviews, conducted between October 2010 and January 2011, lasted between seventy and one hundred minutes. Each participant was asked to comment on the following topics:
(1) their definition of sustainable development; (2) the concept of sustainable development at Renault : its origins, and its pillars; (3) the implementation of sustainability at Renault, and how it was linked to their overall strategy; (4) the key success factors of such a strategy; (5) dioxide emissions being part of the sustainability program; (6) the presentation of the ECO2 label at Renault, and; (7) the role of the electric car in the sustainable development strategy of Renault.

Among all available tools, interviews with experts are pertinent for exploratory research. They are well-informed of the car industry – both locally and globally – and its evolution over time. Furthermore, their activities involve sustainable activities, as they are developed at

Renault. Moreover, the use of experts has several advantages (Malhotra, 1996:40) for the purpose of this study:

- Gather information on the car industry and the electric car, which are complex by nature, especially since they are technology based, and how the electric car and related issues are linked to sustainable development.

- Based on a rich and long history, the car industry involves huge amounts of investments in R&D, and therefore is quite "confidential", i.e., based on tacit knowledge, which is difficult to create, and observe. Therefore, experts represent a valid source of information to better capture the specifities of such an industry and express the expectations and the challenges of the electric car and how it was affected by external debates on sustainability, and how it affects Renault's approach to sustainabilty.

2.3. Results, Discussion and Implications

We first present the history of sustainability at Renault, and how it was integrated in Renault's overall strategy and processes.

The firm initiated sustainability even before the term was coined. For example, a lab of industrial hygiene to protect Renault's employees was created more than 40 years ago. Moreover, the water management on the different production sites illustrates the early involvement of Renault in terms of environmental concerns. Furthermore, in 1973, following the first oil crisis, Renault started developing models with low levels of oil consumption, such as the Renault 5. In fact, low levels of consumption were associated with low levels of emission.

Renault is a major player in the car industry. The production and use of cars has negative impacts on the environment. Therefore, Renault decided to take action. In 1995, Renault decided to formalize its environmental policy. As a consequence, the company established well functioning sustainable production sites in 1999.

Sustainability at Renault encompasses all dimensions and activities in the company. No director of sustainable development was appointed in the firm. "If there was one, that would be Carlos Goshn". Instead, we can find several managers in charge of environmental issues, an HR director, a CSR director, a director of public affairs, and the recently created "Institut

Renault de la mobilité", all of them being involved in sustainable activities. These key people play a major role in diffusing and piloting sustainable activities using bottom-up and up-to-bottom approaches.

2.3.1. The pillars of sustainability at Renault

Sustainable development at Renault is based on three pillars: (1) profit-based; (2) environment-based; (3) societal-based (stakeholders). Sustainability at Renault is not limited to philanthropic activities. It anticipates new environmental regulation. Its aim lies in making profits and in integrating sustainability in its strategy.

Mobility plays a major role in Renault's overall strategy as illustrated by two citations taken from our interviews: "Sustainable mobility at affordable prices", or "sustainable mobility for all". It involves all the activities in the value chain, from R&D, design, manufacturing, marketing, and the use and, recycling activities. Part of Renault's approach is similar to its competitors – build cars and limit their CO_2 emission. However, Renault also initiated specific actions, such as its involvement towards electric vehicles, and also its sustainable signature – ECO2.

By going global in countries such as Russia or Brazil, Renault also had to take care of local sustainability and environmental issues. Furthermore, by entering the electric car segment, the firm decided to center its strategy on the concept of "life cycle" – from manufacturing to recycling.

2.3.2. The Key Success Factors of sustainability at Renault

Several factors explain Renault's success in sustainability. First, sustainability fits the firm's culture. From a historical perspective, Renault has a strong social dimension. Furthermore, the company developed the technical knowledge to launch smaller models (Clio, Twingo) rejecting fewer levels of CO_2. Moreover, its international dimension, as mentioned above, and the participation of all employees played a key role.

These factors were based on several actions undertaken by the firm. The ECO label, as an internal and external communication, created the necessary foundations and content to

position the firm in terms of its sustainable strategy. The launch of electric vehicles, as well, reinforces the image of the company and its commitment towards the environment and sustainability. Overall, the breaking point consisted in anticipating major unavoidable changes impacting the car industry, such as global population growth and new regulations.

Sustainability is implemented through daily actions at Renault. Everyone, in the company, is trained on the topic. Moreover, an "eco-driving" (eco-conduite) program was launched to limit and control emissions for employees driving long distances throughout the year. The firm created even a game to explain the definition and the challenges inherent to the concept. The main objective is to involve all employees regarding all their activities.

2.3.3. ECO2 as the sustainable label in Renault

In 2007, Renault created ECO2, a label to communicate internally and externally its strategy in terms of sustainable development. It is based on 3 pillars: (1) the definition of CO_2 emission; (2) recycling activities; (3) environmental norms in manufacturing plants.

Two messages are communicated with the ECO2 label:
(1) The label is based on recycling and the fact that the firm's objective consists of educating and preparing the general public on the "Life Cycle Assessment", the idea that ecology is based on recycling. This tool reinforces the dialogue between the firm and its stakeholders.
(2) In order to face environmental challenges, the firm has to move fast, and therefore, it needs to develop solutions available for the mass. Hence, ECO2 means Ecologic and Economic.

2.3.4. The case of the electric car at Renault

Regarding electric vehicles, the ecological challenge is very present. In order to face it, a breaking point was necessary, from technological perspective, and from a consumer perspective: a wide adoption from the general public. For the electric car to be a success, it needs to be affordable. Therefore, Renault bets on high volumes. The battery represents a key aspect in such a challenge. It affects the price, and, if not recycled, it negatively impacts the environment. Consequently, Renault decided that the selling price does not include the battery. The firm remains the owner of the battery and the customer rents it. Renault is in

charge of its maintenance and recycling. The company thereby controls its life cycle. Batteries will have 4 lives: (1) for new vehicles, (2) for lemons, (3) as energy storage, and, (4) for the next generation of the electric car (Renault recycles the battery to create newer ones).

However, the electric car does not represent the ultimate stage or goal in terms of sustainability. Of course, it requires specific adaptations at Renault from a sustainability perspective, but it might represent only 10% of Renault's sustainable development strategy. For instance, local sustainability needs have to be considered when Renaults creates plants all over the world, such as in Brazil. Moreover, Renault plans to build its first "Zero carbons, Zero aqueous discharges" in Tanger. The launch of Renault's electric cars, at the end of 2011, involves all departments of the firm – from marketing, to pay and training, from internal and external communication to CRM, and the development with new partners. Like any other car, the electric car will be sold through similar distribution networks, using the same sales force.

2.3.5. The Chicken and the egg: Who comes first? An absorptive capacity perspective

Since sustainable development and the development of electric vehicles at Renault are separate entities, we had a closer look at how they are intertwined. First, both similarly express the absorptive capacity of the firm to develop new knowledge, which is necessary to create and develop corporate strategy; but also to anticipate major changes in the environment, especially the introduction of new regulations. Second, both demonstrate the dynamic capabilities generated once the regulations were established to adapt to the new social and economic order. Therefore, sustainability and electric cars illustrate the complex relations of the firm and its environment through its stakeholders.

Internally, the Top Management Team (TMT) at Renault quickly understood and anticipated the fact that environmental considerations would not be a differentiation factor anymore but rather be part of the fundamentals. The TMT, very early, made the necessary adaptations to anticipate, prepare, and face the new regulations. From technical perspective, it created the knowledge and expertise to reach its objectives – CO_2 reduction.

Therefore, Renault did not only anticipate the changes and made the necessary strategic moves by developing the corresponding capabilities and knowledge, but it also decided to market and communicate on such moves.

Externally, Renault's reference document presents the stakeholders that influence and are influenced by the firm's position in terms of sustainable development[1]:

(1) Renault's approach is customers/people oriented. Furthermore, their decisions are influenced by local fiscal policies. (2) Providers are part of the sustainable development policy of the firm. (3) Regulatory agencies are strict in Europe. (4) In 2008, European car makers agreed to reduce their CO_2 emissions on a voluntary basis.

Renault also developed partnerships with key actors to participate in the success of electric cars: EDF (French Electricity provider), parking owners, supermarkets, etc. that all participate in creating the infrastructure around electric vehicles.

What came first: Renault's anticipations or the environment's need to be regulated? Between the egg and the chicken, does the answer matter? We might rather consider it as a *process* instead of applying a chronological perspective.

2.3.6. Sustainability and the electric car in Renault : A process analysis

The electric car represents the egg and the chicken dilemma. It illustrates a double dynamic between internal and external aspects. Electric cars benefit from all the developments in the sustainable business, especially recycling, low or no carbon emission, and batteries not being sold, etc. Sustainable development was initiated internally. Then, the environment and stakeholders' expectations change and evolve. Therefore, sustainability at Renault was consolidated when adapted to these external influences. To summarize, Renault created tacit knowledge, not formal by nature. Then, the firm understood the need to transport the knowledge to a formal level. Once this step was accomplished, the company decided to market, communicate and base its strategy on this newly formal knowledge. Simultaneously, the external environment was looking for information that Renault was ultimately able to provide.

As one interviewee mentioned, "it is not just chronological events, it is more complicated".

On the one side, the firm needs to anticipate certain developments and activities such as recycling activities, and then, bring solutions and adapt whenever necessary.

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[1] http://www.renault.com/fr/Lists/ArchivesDocuments/Renault

The electric vehicle cannot be a success on its own. It is like the egg and chicken: an electric car needs an ecosystem around it to survive; and the ecosystem needs the electric car in order to develop itself.

This process and dynamic perspective is based on the following elements:

- The necessary infrastructures and places to charge the battery, repair & maintain the car. They should be visible, easy to use, and accessible.
- The involvement of key actors: (1) the government should provide places to charge the battery, which guaranties a higher number of sales, (2) develop new partnerships to nurture the ecosystem
- Sustainability communication

Therefore, the electric vehicle is not the ultimate stage of development in terms of sustainable development. It represents a breaking point (no CO_2 emission), and a continuity (ECO2label) at Renault.

Following Simon and Noblet (2010), absorptive capacities play a major role in explaining a firm's innovation (De Jong and Freel, 2010; Murovec and Prodan, 2009) and its competitive advantage (Teece, 2007). Renault was able to get the best both internally and externally. Through its absorptive capacities the firm created, acquired, assimilated, transformed and exploited knowledge in order to create a sustainable competitive advantage. Moreover, the model developed by Van Den Bosch et al (1999, in Simon and Noblet, 2010), explains the links between absorptive capacities and the outputs of the firm – the electric car herein.

The decision for Renault to develop a strategy based on electric vehicles results from high levels of absorptive capacity and the need to engage in sustainable activities. It also supports the findings of Lewin et al. (2004, in Simon and Noblet, 2010). According the authors, learning and absorptive capacities are higher for innovating firms compared to followers.

Furthermore, from a knowledge perspective, our findings support the model developed by Todorova and Durisin (2007), who added the "knowledge" dimension in Cohen and Levinthal's model (1990). When firms can assess the value of the knowledge created, they are able to use it over time. For instance, Renault was involved in sustainable activities even before the term was coined. It created the necessary basis (technical knowledge) such a low consumption models in the 1970's with the Renault 5. When sustainability was officially defined externally by regulations and consumers' will, the firm was ready since it had

anticipated such developments. The knowledge was already created, and Renault was able to deploy it in the right direction.

CONCLUSION

Sustainable development has two dimensions. First, it can be regarded as a practice and second it can be integrated into products (and services). Both interpretations reinforce each other as illustrated through our case study on the electric car developed by Renault. Our study illustrates the interrelation between a firm and its environment from an absorptive capacity perspective. By anticipating the importance of sustainable development, Renault was able to prepare itself early on and assimilate necessary knowledge from its environment and internalize it within the company to finally develop sustainable product options.

Our study provides insights into the challenges inherent to the concept of sustainability. It therefore contributes to the dynamic capabilities literature in two ways. First, it illustrates the necessity for corporations to innovate and develop needed capabilities inspired by the external environment. Second, our study illustrates the importance of regulation. In the discussed case study, regulations can foster and stimulate corporate innovation and knowledge creation.

Despite our paper's implications and contribution, there are two limitations to bear in mind. First, we focused on a single case study (the electric car at Renault). Hence, generalizations are not possible. Nevertheless, the focus on a single case can have other advantages such as providing a detailed examination of that case as well as exploring potential concepts. This can then be a useful starting point for research projects building on our paper. A second limitation is linked to our research method: We interviewed three corporate managers. Despite their competencies and considerable expertise at Renault, additional interviews with lower level managers and employees could have added additional information. However, we focused on higher level managers as our interest was on the overall corporate strategy.

Sustainable development and the absorptive capacities of Renault worked well together. The interrelation between those two components can be considered as a prerequisite for the success of the electric car at Renault. Renault's capacity to integrate, acquire, assimilate and use knowledge in its product development and management enabled the company to differentiate itself from its competitors.

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[i] Herein, we use the terms "sustainability" and "sustainable development" interchangeably