

Development of Design capabilities in smaller companies in the automotive industry: a methodological approach.

Desenvolvimento de recursos de design em pequenas empresas da indústria automóvel: uma abordagem metodológica.

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ABSTRACT: This paper reflects part of a broader investigation on the development of methodologies to identify, value and manage design capabilities in order to create a sustainable competitive advantage. With the automotive industry and smaller supplier Portuguese companies as background, this paper explores the resource-based view theory (RBV) and the dynamic capabilities theory as a theoretical construct for a further development of research tools.

In the automotive industry, OEM (Original Equipment Manufacturers) continue to control the overall design of the vehicle, as part of the ability to manage the offer portfolio and brand communication. However, the industry have been moving towards an increasing participation of smaller suppliers in product development processes, pushed towards capabilities' development as a requirement to continue competitive in the OEM's suppliers network.

The role of design and design management capabilities have been explored as strategic resources or core competencies. However, Design is not typically found in smaller supplier firms as resource (as opposed to Design studios in larger companies) but found as a process in resource-capability combinations, establishing the need for a new research approach. Therefore, the RBV is a tool to value the design process as a sustained competitive advantage. The RBV conceptualizes a framework to determine or identify the strategic resources available or needed within a company. At these lenses, the basis for a sustainable competitive advantage lies in the application of the bundle of valuable resources identified and at the firm's disposal and the combinations with its capabilities.

KEYWORDS: Automotive Industry, Small Firms, Industrial Design, Strategic Management, Resource-Based View.

RESUMO: Este artigo reflete parte de uma investigação mais ampla sobre o desenvolvimento de metodologias para identificar, valorizar e gerir os recursos de design, com o objetivo de criar uma vantagem competitiva sustentável. Com a indústria automóvel e as pequenas empresas portuguesas fornecedoras como pano de fundo, este artigo explora a teoria da *Resource Based View* (RBV) e a teoria das *Dynamic Capabilities* (DCT) como um construto teórico para o desenvolvimento de ferramentas de investigação.

Na indústria automóvel, os OEM (fabricantes de equipamentos originais) continuam a controlar o design geral do veículo, como parte da capacidade de gestão do seu portfólio assim como a comunicação de marca. No entanto, o setor tem seguido um caminho para uma participação crescente de fornecedores menores nos processos de desenvolvimento de produto, impulsionados para o desenvolvimento de capacidades como requisito de competitividade na rede de fornecedores dos OEM.

O papel dos recursos do design e da gestão do design foram já explorados como recurso estratégicos ou competências fundamentais. No entanto, o Design não é normalmente encontrado em empresas de menor dimensão como recurso (em oposição aos estúdios de Design em empresas maiores), mas sim como um processo de combinações de diferentes capacidades e recursos, estabelecendo a necessidade de uma nova abordagem de pesquisa. Portanto, a RBV é uma ferramenta que visa a valorização do processo de design como uma vantagem competitiva sustentada. A RBV concetualiza uma estrutura para determinar ou identificar os recursos estratégicos disponíveis ou necessários dentro de uma empresa. Deste ponto de vista, a base para uma vantagem competitiva sustentável está na aplicação do conjunto de recursos

valiosos identificados e à disposição da empresa em forma de combinações das suas diferentes capacidades e recursos.

PALAVRAS-CHAVE: Indústria Automóvel, Pequenas Empresas, Design Industrial, Gestão Estratégica, *Resource-Based View*

1. Introduction

The starting point of this paper is author Mari Sako, associated researcher of the most influential IMVP – International Motor Vehicle Programme - of MIT, whom defined the automotive industry (where network links are dense) plus dealers, service providers, systems and materials suppliers as a resource-based view industry concept. Furthermore, she also reflects on the concept of industry which is no longer defined as a group of firms producing products demand-oriented or supply-oriented (Sako, 2007).

Today's conceptual definition of an industry is of a firm carrying an indefinitely large number of activities, activities related to the discovery and estimation of future wants, to research, development and design (Richardson, 1972). Hence, the resource-based view theory defines that an industry is primarily a set of activities which are bound by a dense network of cooperation and affiliation (Sako 2007). These activities must be carried out by organizations with appropriate capabilities – knowledge, experience and skills (Richardson, 1972). Furthermore, according to seminal author, Edith Penrose (1959), firms are widely acknowledged to be bundles of resources and capabilities.

The automobile is a complex product, formed by several components as well as technologies. Such, that it is almost impossible to differentiate as modular or integral in its whole. Automotive engineers and industry managers began to pay attention to modular concepts in the early 1990s, following a past logic of unbundling production activities to be carried out by suppliers. Moreover, industry's definition of a 'module' is of a large piece of physically adjacent components produced as a subassembly by a supplier and then installed in a single step in an automaker's assembly plant. Examples are, the instrument panel; the front seats; and the rolling chassis (Macduffie, 2013).

As the modularization idea was being developed for production, it was a short move until top management start to think about outsourcing design responsibilities similarly. Hence, automotive groups sought the allocation of design tasks to suppliers, under the frame of 'module design,' to tap their specialized knowledge. Furthermore, suppliers welcomed these approaches as well as instigated them, seeing 'module design' to take on higher value-added activities (Macduffie, 2013).

2. The Resource-Based View Theory

This theory, originally from the scientific field of strategic management research, conceptualizes a framework to determine or identify the strategic resources available or needed within a company. The fundamental principle of the RBV (Resource-Based View) is that the basis for a competitive advantage of a firm lies primarily in the application of the bundle of valuable resources identified and at the firm's disposal and the combinations with its capabilities.

Many authors and researchers (Penrose, 1959; Wernerfelt, 1984; Barney, 1991) have placed numerous discussions and arguments as an attempt to describe and explain what a competitive advantage is and most important, how can a competitive advantage be sustainable. The competitive advantage concept has long been a focus area of strategic research; hence many approaches have taken shape and several theories have been proposed and researched. Understanding sources of competitive advantage for firms has become a major area of research in the field of strategic management (Rumelt, 1984). These approaches have been developed and talked about in a few seminal academic works. One of the approaches is the Resource-Based View (RBV). Later on the approach was complemented by the Dynamic Capabilities Theory.

As a theory, RBV articulates the relationships between resources, capabilities and competitive advantage of a firm. RBV attempts to explain competitive advantage and its sustainability based on competences and capabilities developed by the firms with the availability and deployment of resources they possess. Hence the evolution and development of the RBV as a theory and strategic tool is needed to be addressed to understand the role played by key resources and capabilities for attaining sustained competitive advantage within the firm.

One of the authors that is deeply related to the origins of the RBV, is Edith Penrose. Her seminal work (Penrose, 1959) attempts to understand the process of a firm's growth and the limits of it. Penrose had an assumption that firms can be appropriately modelled as if they were relatively simple production functions. According to Penrose, a manager has a task to exploit the bundle of productive resources controlled by the firm using an administrative framework created in the firm, to generate advantage (Penrose, 1959). Hence, Penrose emphasizes that a firm's growth is based on a firm's resources and limited by managerial resources.

The Wernerfelt (1984) and Barney (1991) articles are seminal works in the RBV stream. While Wernerfelt emphasizes resources and diversification, Barney provides the most detailed and formalized depiction of the business-level resource-based perspective.

Birger Wernerfelt, analyzed firms from the resource side rather than from the product side (Wernerfelt, 1984). This author developed a simple economic tool for analyzing a firm's resource position relating it within its profitability. Nevertheless, Birger Wernerfelt stated that, "For the firm, resources and products are two sides of the same coin" (Wernerfelt, 1984), an innovative strategic approach. As a matter of fact, Wernerfelt's paper (Wernerfelt, 1984) launched the basis for the RBV theory that later author Jay Barney (Barney, 1991) matured and detailed.

Jay Barney, explores that in a Resource-based view conception, there is a relation between firm resources and sustained competitive advantage. Meaning that the resource-based view (RBV) concept, offer strategists a means of evaluating potential factors, so that they can be deployed to confer a competitive advantage to a firm. According to this theory, an organization can be considered as a collection of physical resources, human resources and organizational resources (Barney, 1991). Resources of organizations that are valuable, rare, imperfectly imitable and imperfectly substitutable are the main source of sustainable competitive advantage for sustained superior performance (Barney, 1991). This author assumes that firm resources are heterogeneous and immobile and that a firm that exploits its resource advantages is simply behaving in an efficient and effective manner (Barney, 1991).

However, not all resources are of equal importance, nor possess the potential to become a source of sustainable competitive advantage. Nevertheless, Jay Barney explains that, understanding the causal relationship between the sources of advantage and successful strategies can be very difficult in practice (Barney, 1991). Hence, Barney developed the VRNI criteria (Barney, 1991) where the firm's key resources should be evaluated as: Valuable, Rare, Imperfectly Imitable and Non-Substitutable (Barney, 1991). These criteria form a framework suggesting questions to be addressed in order to understand whether a given firm resource is a source of sustained competitive advantage (Barney, 1991). This resource-based model of sustained competitive advantage also has a variety of implications for the relationship between strategic management theory and other business disciplines. Hence, strategic management decisions should point to develop, nurture and protect resources that follow these criteria.

Another important theorist of the resource-based view concept is George Day and Robin Wensley, which introduce the idea of sustained competitive advantage (G. Day, R. Wensley, 1988). These authors propose an integrated view based on positional and performance advantage as a consequence of relative superiority in the skills and resources existing on a business. "These skills and resources reflect the pattern of past investments to enhance competitive position. The sustainability of this positional advantage requires that the business set up barriers that make imitation difficult. Because these barriers to imitation are continually eroding, the firm must continue investing to sustain or improve the advantage." (G. Day, R. Wensley, 1988). Hence, the proposed framework identifies as superior skills and superior resources the sources of advantage. Only the sources of advantage can become a source for a firm's strategic positional advantage as superior customer value and lower relative costs. This strategic positional advantage would then be the performance outcome that leads to a

sustained competitive advantage (satisfaction, loyalty, market share and profitability). These authors also state that part of the profits should be re-invested directly on the sources of advantage as a way to sustain them (G. Day, R. Wensley, 1988).

Nevertheless, authors George Day and Robin Wensley emphasize the importance of the correct diagnosis of the current and prospective advantages of the business within the served market (G. Day, R. Wensley, 1988). They also make the following question "How do managers know whether the available assessments are aiding the search for advantage or hindering it with misleading and partial information?" Hence, the lack of a good internal assessment on the firm's actual skills and resources can mislead to a correct strategic positional advantage.

Author Robert M. Grant (1991) have similar views. According to Grant, the resources and capabilities of a firm are central considerations in strategy formulation; resources are also termed as primary sources for profitability of firms. However, criticising the resource-based theory itself due to the lack of a single integrating framework and due to the lack of effort on developing a practical application of the theory (Grant, 1991), he proposes a framework for a resource-based approach to strategy formulation. This proposed framework is based on the comprehension of the relations between resources, capabilities, competitive advantage and profitability as well as to understand how the competitive advantage can be sustained over time. Grant further argues to identify the resource gaps and develop a resource base for the firm. Robert M. Grant also focuses on filling of resource gaps by exploiting resources to extend positions for competitive advantage and broaden the firm's strategic opportunities. As per (G. Day, R. Wensley, 1988), sustaining the advantageous situations requires the constant development and reinvestment on resource bases.

Through Wernerfelt (Wernerfelt, 1984), the strategic position of the firm should be according to its internal assets and not to the market. This author used the "two sides of the same coin" metaphor for product/market strategic positioning. From this point, seminal authors, Ingemar Diericx and Karel Cool (I. Diericx, K. Cool, 1989) wrote that managers often fail to recognize that a bundle of assets, rather than the particular/product market combination chosen for its deployment, lies at the heart of their firm's competitive position. Hence, low or no attention is given to the inside of the firm, to its own assets where the core resources and assets lie. Furthermore, these authors (I. Diericx, K. Cool, 1989) discuss the notion of accumulation of asset stocks. Meaning that strategic assets stocks are accumulated by choosing appropriate time paths or flows over a period of time. Also in this paper, and particularly for the R&D case, it is explained that the presence of time compression diseconomies implies that maintaining a given rate of R&D spending over a particular time interval produces a larger increment to the stock of R&D know-how than maintaining twice this rate of R&D spending over half the time interval (I. Diericx, K. Cool, 1989).

As market is dynamic, firm's resources also need to change over a period of time to make them relevant in regimes of rapid change. This perspective, based on the dynamic capabilities and its outcome for the resource-based view was developed by authors David Teece, Gary Pisano and Amy Shuen (Teece, Pisano and Shuen, 1997). The dynamic capabilities have been defined as firm's processes that use resources specifically the processes to integrate, reconfigure, gain, and release resources. While the resource-based view primarily concentrates on types of resources and capabilities for its strategic importance, the dynamic capability concentrates on how these resources and capabilities need to change or update over a period of time to keep their relevance relatively to the changing market conditions.

The resource-based view theory considers resources and competencies as static, meaning that they can be addressed as stationary at a certain time frame and will also remain so over a period. The main point is that when firms are having resources that are valuable, rare, inimitable and non-substitutable, it enables these firms on developing value enhancing strategies that are not easily copied by competing firms (Barney, 1991; Wernerfelt, 1984). However, in the current era of dynamic economy, there is the need for firms to build up new capabilities or competencies for sustaining such competitive advantage (Teece, Pisano and Schuen, 1997). Dynamic capabilities thus are the organizational processes or strategic routines by which firms develop new configuration for updating resources as per the time changing market requirements. Such concept requires that organizations establish processes that enable them to change their routines, services, products, and even markets over time. Initially, to cope with market forces, the market-based view was conceptualized, subsequently the focus shifted to the resource-based view. Finally, to respond to challenges of the ever-changing globalized world, the concept of Dynamic Capabilities became a well-accepted theory.

The dynamic capabilities approach is especially relevant today when global competitive forces are changing the industrial landscape. Hence, ways of achieving competitive advantage are changing fast. As such, firms need to have timely strategies, flexible infrastructures, and an ability to utilize resources and capabilities coupled and innovate ways (Teece, Pisano and Schuen, 1997). Therefore, in contrast with traditional resource-based view assumptions, competitive advantages gained in the dynamic marketplace may be based on capabilities, which have greater homogeneity and substitutability across firms. Competitive advantages achieved through dynamic capabilities are therefore based on the ability to change the resource base of the firm. This means dynamic capabilities alter resource bases by creating, integrating, recombining, and releasing resources (Eisenhardt and Martin, 2000). Dynamic capabilities have been tightly coupled with a dynamic or rapidly changing environment (Teece, Pisano and Schuen, 1997). Furthermore, Barreto (2010) conceptualizes an alternative definition for dynamic capabilities based on past research:

"A dynamic capability is the firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base" (Barreto, 2010: 271).

3. The Resource-Based View Theory: Critical Appraisals

Through this comprehensive review, an interesting critical appraisal of the resource-based view theory done by Richard Priem and John Butler, came across (Priem and Butler, 2001). These authors examine the resource-based view theory (Barney, 1991) in terms of theory, method, empirical evidence and operational validity.

Examining the resource-based view in terms of theory, Barney's definitions indicate that additional conceptual work is needed if the foundation of the RBV is to meet the lawlike generalization standard. The underlying problem in the statement "that valuable and rare organizational resources can be a source of competitive advantage" (Barney, 1991: 107) is that competitive advantage is defined in terms of value and rarity, and the resource characteristics argued to lead to competitive advantage are value and rarity. Instead, the characteristics and outcomes must be conceptualized independently to produce a synthetic statement (Priem and Butler, 2001).

Another, seminal appraisal from Priem and Butler (2001) regarding Barney's article (Barney, 1991) and the logic of the RBV is that "value is the fundamental component determining the extent of competitive advantage. If a firm consistently generates value greater than that generated by other firms in its industry, it must have at least one rare resource. If a firm has rare resources, however, it does not follow that it will generate value greater than that of other firms in its industry (Priem and Butler, 2001).

The resource-based view theory has developed as a series of related propositions that seek to explain the relationship between a firm's resource endowment and its performance and growth. However, it has not generated clear unambiguous hypotheses in the manner of more narrowly conceived theories of firm behaviour or even transaction cost economics. The paper (Priem and Butler, 2001) discusses the practical difficulties arising in the RBV methodologies.

On the operational side, one fundamental question for strategy researchers would be the utility of the RBV in developing practical management tools in the form of actionable prescriptions for practitioners. As per Priem and Butler critical appraisal, advising practitioners to obtain rare and valuable resources in order to achieve competitive advantage and, further, that those resources should be hard to imitate and non-substitutable for sustainable advantage, does not meet the operational validity criterion (Priem and Butler, 2001). Furthermore, prescription regarding competitive advantage itself, however, still is hindered because the criteria for value in the RBV remain, at present, in an exogenous "black box" (Priem and Butler, 2001).

4. Operationalising the Resource-Based View of the firm

One can conclude the dissatisfaction with the traditional strategic management tools as a framework for creating and sustaining competitive advantage. As the main cause of difficulty in operationalising the RBV is its high level of abstraction. Through the review of Priem and Butler's critical appraisal on the resource-based view of the firm theory, researchers often mention, but have rarely addressed questions related to the operationalisation of the resource-based view theory. Hence, operationalisation formalises the theoretical concepts into applicable models and guidelines for strategy formulation and decision-making process for practitioners and managers.

From the reviewed critical appraisals, one of the main difficulties suggested was to clearly identify the sources of sustained competitive advantage. Ford and Mahieu attempt to operationalise the resource-based view theory. In their paper, they refer the absolute need to operationalise the RBV because of its inherent high level of abstraction. "This makes it difficult for practitioners to recognise which resource-based strategy will lead to sustainable advantage (Ford and Mahieu, 1998).

In their attempt to operationalise the RBV theory, Ford and Mahieu evaluate all the operative resource-based models through four characteristics: (1) they should provide guidelines to identify and select valuable resources, (2) portray the resources' intrinsic endowment dynamics, (3) depict how managerial policies affect resource management and (4) describe the ability to trace consequences of potential strategies over time. They conclude that none of the analysed models embody all four characteristics required (Ford and Mahieu, 1998).

Furthermore, Ford and Mahieu operationalise the resource-based view theory in five steps embodying three levels of analysis: (1) the firm's environment, (2) the firm, and (3) resources. Those three levels encapsulate and structure the four necessary conditions for operationalisation, as referred before (Ford and Mahieu, 1998).

Although Ford and Mahieu took a significant step in a comprehensive, structured and systemic understanding of RBV. However, this pace is still insufficient for the needs of the ongoing research because they do not address the full complexity and non-linearity of design introduction. Furthermore, only by approaching the idea of resource-capability combinations can we introduce the purpose of this investigation as it is a much complex and nonlinear type of issue.

Hence, Scott Newbert (Newbert, 2008) tested the RBV hypothesizes at a conceptual level. This author published an empirical study examining the relationships between value, rareness, competitive advantage and performance. Results from conceptual level studies do provide insight in what attributes resources and capabilities must own to improve a firm's competitive position (Newbert, 2008). These are the same attributes, that authors George Day and Robin Wensley (G. Day, R. Wensley, 1988) emphasize the importance of the correct diagnosis. Furthermore, Newbert introduces the need to predetermine which characteristics of resources and capabilities ought to be correlated with competitive advantage and/or performance. Even if a given resource may have the potential to produce a valuable service, that service will remain buried until deployed through a relevant capability. Hence, even if a resource (or a capability) might have potential value, its value can only be realized when it is combined with a matching capability (or resource). Moreover, the more valuable the firm's resource-capability combinations, the greater the advantage it will enjoy as a result of their exploitation.

In its study, Newbert (2008) concludes that the value and rareness of a firm resource-capability combinations contribute to its competitive advantage, hence contributing to its performance. In this study (Newbert, 2008), by inclosing the independent variables in terms of resource-capability combinations (as opposed to individual resources or capabilities) correctly captures the dynamics by which resources and capabilities have long been argued to contribute to competitive advantage (Newbert, 2008).

Furthermore, Newbert's (2008) study finds evidence on the idea that a competitive advantage via the implementation of a resource-based strategy is an important means by which a firm can improve its performance.

Concluding, author Scott Newbert was able to find that competitive advantage fully mediates the rareness-performance relationship, it appears that to increase any performance gains from its resources and capabilities, a firm must first achieve the competitive advantages that outcomes from their combined exploitation. Hence, improving performance is not a direct function of the value or rareness of a firm's resource-capability combinations but rather of the advantages it creates from their exploration. Hence, firms need to deploy those resources and capabilities to which they do have access but through new and different combinations such that they are able to reduce costs and/or respond to environmental conditions (Newbert, 2008).

5. Conclusions

The role of design and design management capabilities have been explored as strategic resources or core competencies (Borja de Mozota, 2003) or more recently by Muratovski (2015), emphasizing the increasingly recognized role of design as a strategic resource. Opposing to the status quo existing in some larger companies, Design is not usually found in smaller supplier firms of the automotive industry as a resource but established as a process in resource-capability combinations due to the highly dynamic environment that characterize this industry. Hence, this condition creates the need for a new research approach, integrating the resource-based view theory.

The theory highlights the internal resources and capabilities of a firm in strategy design to achieve a sustainable competitive advantage. Hence, internal resources and capabilities determine strategic decisions made by firms even though competing in their external business environment. Furthermore, firm's abilities do add value in the customer value chain developing new products (R&D), hence expanding to new markets. When firm's capabilities are considered as supreme in the creation of a competitive advantage, it will focus on the reconfiguration of value chain activities – resources and capabilities. Hence providing an opportunity on identifying the capabilities within the value chain activities which provide a sustained competitive advantage. Furthermore, the resource-based view draws upon the resources and capabilities that reside within the organizations in order to develop a sustainable competitive advantage.

Resources might be considered as inputs that enable firms to carry out its activities. Nevertheless, not all the resources of the firm are to be considered as strategic resources and hence sources of competitive advantage. According to the resource-based view of the firm theory, a competitive advantage occurs only when there is a situation of resource heterogeneity (different resources across firms) and resource immobility (the inability of competing firms to obtain resources from other firms). If the resource is not perfectly mobile (i.e., the resource is not free to move between firms, or if a firm without a resource faces a considerable cost burden in developing, acquiring or using it, that a firm already using does not), then the resource is likely to be a source of sustained competitive advantage (Barney, 1991). Concluding, that process combinations – design included - are the most difficult to copy or to move from one firm to another, reinforcing the competitive position of companies able to master their development.

Furthermore, we have learnt from Edith Penrose seminal literature that, *resources consist of a bundle of potential services (...) the services yielded by resources are a function of the way in which they are used* (Penrose, 1959: 25). Hence, while a given resource may have the potential to produce a valuable service, it does not necessarily mean that will create a competitive advantage since it will remain buried until deployed via a relevant capability (Newbert, 2008). Similarly, rareness does not necessarily come from the possession of rare resources and rare capabilities but the ability of pair them into a combination. Hence, the best performing firms will not necessarily be the ones that explore the most valuable and rare resource-capability combinations, but instead, those firms that explore these combinations most effectively.

Finally, Galbreath (2005) findings suggest that resources may potentially impact higher on firm success when examined as part of an interconnected system rather than when examined individually. Therefore, there is a need, not only for analysing the relationship between design (resource) as a competitive advantage (input) for firms and their performance (output), but also the resources and capabilities combination, including design as a contributor element, with the background of an industrial segment operating on a complex and dense network, as the one as the European Automotive System. This relation will be

translated into a research model, combining the specific design processes, and illustrating the relations between resources, capabilities, competitive advantage and ultimately yielding to performance within a resource-based view strategy.

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