ISCTE Business School
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ADDING VALUE TO THE VRIO FRAMEWORK USING DEMATEL

Agathe Lacaze

Project submitted as partial requirement for the conferral of
Master in Management

Supervisor:
Professor Fernando Alberto Freitas Ferreira
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ABSTRACT

Strategic management is fundamental for organizational development. It plays a critical role in the accomplishment of business performance and, as result, in the achievement of competitive advantage. Currently, the increased use of strategic management has intentional impacts on a company's performance and differentiation, specifically in a globalized market. From this perspective, organizational evaluation is important, as well as the development of strategic management frameworks that can guarantee the achievement of sustainable competitive advantages for organizations. One of the most well-known frameworks for organizational resource assessment is the Value, Rarity, Inimitability and Organizational-oriented (VRIO) framework. It is worth noting, however, that this tool is not without limitations (*e.g.*, how to identify and weight resources and capabilities in the evaluation process), which have prevented progress. Hence, this dissertation aims to enhance the VRIO framework, allowing for its quantification in a transparent and robust manner. To reach this aim, the VRIO framework is combined with the DEcision-MAking Trial and Evaluation Laboratory (DEMATEL) method, and a real-life application is carried out. The incentives and shortcomings of this structured evaluation model are also analyzed and discussed.

Keywords: Strategic Management; Sustainable Competitive Advantage; Resource-Based View (RBV); Value, Rarity, Inimitability and Organizational-oriented (VRIO); Multiple Criteria Decision Analysis (MCDA); Cause-and-Effect Relationships; DEcision-MAking Trial and Evaluation Laboratory (DEMATEL).

EXECUTIVE SUMMARY

The aim of the present dissertation is to design a cause-and-effect relationship-based decision support system to quantify the Value, Rarity, Inimitability and Organizational-oriented (VRIO) framework, adding value to the formulation of sustainable competitive advantages. The enhancement of the strategic management field is necessary for the economic and social development of every organization. To this extent, any fluctuation in this area might influence the wellbeing of companies. Strategic management has progressed over the decades, responding to the modern business world surrounding it. Hierarchy seems to vanish in corporations due to globalization, causing change in the structure of strategic management. The crux of the present dissertation is to analyze quantitatively and qualitatively resources and capabilities. Furthermore, it is relevant to bear in mind the determining factors for considering a resource or capability as a sustainable competitive advantage. When a company needs to identify and determine its sustainable competitive advantage, which differentiates it from its competitors, the selection of resources and capabilities derives from a complicated function. It not only includes performance and environment, but also several other factors. Having this knowledge would improve decision-making processes. Many approaches and/or techniques have been developed based on the evaluation of sustainable competitive advantages. Nevertheless, the methodological limitations generally associated with most applications (*e.g.*, how criteria are identified and integrated into the evaluation procedures and how their weight is determined) have been slowing progress. Thus, we intend to implement an approach able to overcome identified methodological limitations, taking into consideration the intrinsic subjectivity of decision-making processes. The aim of this study is to also contribute to expand the incentives of competitive advantage formulation. In considering the limitations of the VRIO framework, its combination with Multiple Criteria Decision Analysis (MCDA) seems to hold great interest and practical utility. The combination of these approaches allows not only resources and capabilities to be identified, but also their cause-and-effect relationships to be analyzed and understood. The result of this combination enables quantification of the VRIO framework, adding value to it. Consequently, it permits decision makers to structure, consolidate and evaluate the issues at hand. VRIO is relevant to identify the different resources and capabilities likely to contribute to sustaining

competitive advantage, while cause-and-effect relationships can be analyzed through DEcision-MAking Trial and Evaluation Laboratory (DEMATEL). Therefore, the combination of both approaches creates a realistic decision support system, which integrates quantitative and qualitative factors. Considering the participative component of DEMATEL to collect data, it is worth noting that its application required interviewing a decision maker willing to contribute to the study. A decision maker from an international company, head of the international assortment department, cooperated, helping to identify and determine the problem. The main guiding question was announced as follows: *"Based on your own values and professional experience, what are the main critical factors that most influence sustainable competitive advantage of the Yves Rocher company?"*. This question allowed the decision maker to identify resources and capabilities through discussion, sharing ideas and perspectives. Then, it was feasible to gather the resources and capabilities, thanks to VRIO application, into four categories, namely: (1) *Financial Assets*; (2) *Physical Assets*; (3) *Human Capital*; and (4) *Organizational Culture*. The final step of this process was to identify hierarchies among the criteria identified in each area of focus. A structured model with diagrams was developed using DEMATEL. To assess the data gathered and evaluate the applicability of the adopted methods, it was necessary to test the new framework on the Yves Rocher's competitive advantage. Consequently, the decision maker was requested to analyze the impact level, per category, in each of the criteria previously identified. As a conclusion, the framework designed in this dissertation made it possible to quantify the VRIO framework, strengthening the conviction that the integrated use of VRIO and DEMATEL is relevant to the field of strategic management.

GENERAL INDEX

FIGURES

TABLES

MAIN ABBREVIATIONS USED

AHP	− Analytic Hierarchy Process
BPC	− Beauty and Personal Care
CEO	− Chief Executive Officer
CFS	− Critical Factors of Success
DEMATEL	− DEcision-MAking Trial and Evaluation Laboratory
DEX	− Decision EXpert
FAR	− Financial Assets Resources
HCR	− Human Capital Resources
MACBETH	− Measuring Attractiveness by a Categorical Based Evaluation Technique
MCDA	− Multiple Criteria Decision Analysis
MCDM	− Multiple Criteria Decision Making
MNE	− Multinational Enterprises
PSM	− Problem Structuring Method
OCR	− Organizational Culture Resources
OR	− Operational Research
PAR	− Physical Assets Resources
R&D	− Research & Development
RBV	− Resource-Based View
TODIM	− TOmada de Decisão Interativa e Multicritério
VRIO	− Value, Rarity, Inimitability and Organizational-oriented

INTRODUCTION

A. General Background

Strategic management is one of the most important disciplines for the economic and social development of an organization. It deals with the ongoing planning, monitoring, analysis and assessment of everything an organization needs to set and to meet its goals and objectives. Furthermore, changes in business environments might impact the wellbeing of the corporation. These fluctuations require firms to constantly assess their strategies for success and make accurate choices according to the changing environment. Strategy (re)formulation provides corporations with a structure that is able to anticipate and cope with change.

Even though organizations are mostly related to their core business, other economic and social factors influence their decision-making processes, which affect performance and differentiation. As a way to circumvent complexity in getting information created by competition among companies, its intricacy and/or privacy, some studies, methods and/or techniques have been conducted and developed with the aim of assessing how the sustainable competitive advantage a company could be reached with an efficient strategic management. To measure the success of a strategy, the Value, Rarity, Inimitability and Organizational-oriented (VRIO) framework has been developed to assess a company's inner resources available to reach competitive advantage. This was driven by certain experts who desired to integrate and quantify the tangible and intangible factors that decide whether a strategy is acceptable and sustainable or not. This is valuable in carrying out business strategy, which leads to better strategic planning and further growth of the industry. Nevertheless, improvement has been restrained by the methodological shortcomings usually associated with application (*e.g.*, the selection of criteria/determinants in the measurement processes and the way their cause-and-effect relationships are analyzed). Indeed, the VRIO framework presents some shortcomings such as its incapacity for undertaking an empirical quantitative study. For this purpose, it seems appropriate to draw up an alternative approach intended to quantify VRIO and add value to the sustainable competitive advantage evaluation. This methodology should address some of the current

conceptual limitations and consider the intrinsic subjectivity of the decision-making process. It should also lead to the expansion of the potential for sustainable competitive advantage formulation. Consequently, based on the baseline principles of the Multiple Criteria Decision Analysis (MCDA) approach, the use of the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method seems to be relevant in this study context, since it allows for the selection of determinants and their cause-and-effect relationships to be studied. This dual methodology will enable the quantification of VRIO to better face uncertainty and vagueness within decision-making processes.

B. Research Objectives

Due to globalization, strategic management structure tends to evolve to adapt to the new surrounding business world. Associated frameworks such as VRIO have been developed through strategic management emergence to assess firms' inner resources and allow them to achieve competitive advantage. However, this model needs to be updated, as it cannot be used to undertake an empirical quantitative study. The evolutionary components of strategic management and sustainable competitive advantage conceptualization will never stop progressing. As such, it seems appropriate to look further for new contributions in this field of research. These should be well-defined and consistent, bringing transparency and coherence to decision-making processes.

Considering this scenario, the present study aims to discuss a new approach that allows for the quantification of the VRIO framework, adding value to sustainable competitive advantage evaluation. ***Accordingly, this dissertation intends to develop a multiple criteria system based on the integrated use of the VRIO framework and the DEcision-MAking Trial and Evaluation Laboratory (DEMATEL) approach, guaranteeing transparency, simplicity and well-founded principles in the assessment of organizational resources and capabilities.*** This would require a system to be constructed that quantifies the VRIO framework, thereby facilitating the achievement of sustainable competitive advantage. To this end, a literature review will be carried out to understand current strategic management approaches, as well as current sustainable competitive advantage evaluation systems. Specifically, the dissertation aims to: (1) encourage the development of the strategic management concept through the combination of existing theories with a modern approach. This entails structuring a

complex decision-making issue through the identification of cause-and-effect relationships between factors or determinants; (2) identify the evaluation criteria and their cause-and-effect relationships; and (3) promote reflection, increasing the likelihood of adjustments and recommendations.

C. Methodology

As stated in the previous section, this dissertation aims to quantify the VRIO framework, adding value to the sustainable competitive advantage evaluation process. Consequently, our model is based on the fundamental convictions of the DEMATEL approach, which is considered an MCDA methodology. The construction of this model will convert the interrelations between factors into a comprehensive structured model. DEMATEL is acknowledged as an efficient tool in the identification of causality in components of a complex system (Gabus and Fontela, 1972). Accordingly, this methodology is relevant to the development of decision-making support systems, as it allows for the quantification of evaluation criteria through the organization and structuring of proposals made by decision makers.

To this effect, the methodology will run through three phases: (1) review of the methods used in past years to conceptualize strategic management, aiming to apprehend the latest trends in this field. The techniques and/or methodologies to be used will be also framed; (2) the VRIO approach will be applied to the Yves Rocher company to structure and analyze the competitive advantage of the organization. This will also define the organizations evaluation criteria and trade-offs (*i.e.* weights). Moreover, the DEMATEL approach will be applied to analyze the cause-and-effect relationships between the identified resources and capabilities; (3) the model will be tested in practice and the results will be analyzed and discussed.

D. Structure

In addition to the present introduction, conclusion and list of references, this dissertation is divided into three chapters. The first two chapters incorporate the theoretical and methodological backgrounds, respectively. The third chapter contains the empirical

component of the dissertation. Here, the methodologies explained in the second chapter are applied (*i.e.*, VRIO framework and DEMATEL approach).

Chapter 1 seeks to provide an overall representation of the latest trends in strategic management conceptualization, in terms of its achievement of sustainable competitive advantage. For this reason, this chapter expounds the importance of strategic planning in organizational development. In addition, this chapter investigates the underlying concepts of the Resource-Based View (RBV) and the VRIO framework, including their main advantages and methodological limitations. Subsequently, *Chapter 2* explores why decision making needs to be supported. It firstly introduces the MCDA approach, which is linked to constructivism, allowing decision makers to reflect, readjust and/or validate their own perspectives. Secondly, the DEMATEL framework is presented, identifying the principle of causality on the chain components of a complex system through diagrams or matrices. The basic concepts, paradigms and fundamental convictions of this approach are explained, as well as their contributions to the proposed framework. Moreover, as a kind of MCDA technique, DEMATEL is known for its simplicity and ease of application to support the decision-making process in a transparent, intuitive and fair way. It allows us to overcome some of the methodological limitations of current methods. *Chapter 3* explores the combination of RBV and DEMATEL which should enable the quantification of VRIO and enhance strategic management. In this sense, the VRIO framework is applied to the Yves Rocher company with the aim of discerning the sustainable competitive advantage among the organization's inner resources and capabilities. Next, DEMATEL is implemented with the objective of visualizing complex interrelationships between internal resources and capabilities of the studied firm. This provides information to identify which factors are most relevant and how they influence other variables. Finally, this chapter concludes with several experiments and complementary analyzes to ensure the accuracy of the established model. Recommendations are also formulated based on the results achieved.

E. Expected Results

Having adopted an MCDA method, the present dissertation aims to develop a multiple criteria system to support the decision-making process geared to the quantification of the VRIO framework. Considering the chosen methodological approach, which is

characterized by the application of VRIO and DEMATEL to the Yves Rocher company, a rigorous investigation of the company's sustainable competitive advantage is expected. This involves understanding the value of this dual methodology to the strategic management field. Similarly, it is expected that the DEMATEL approach will provide improved transparency and simplicity to the process of perceiving sustainable competitive advantage in a company. This will bring added value to the VRIO framework, as it will allow for its quantification. Moreover, disseminating the findings of this study in an international academic journal is also planned.

PART I

THEORETICAL AND METHODOLOGICAL BACKGROUND

CHAPTER 1

LITERATURE REVIEW

Strategic management is fundamental for organizational development. It plays a leading role in the accomplishment of business performance and, as result, in the achievement of competitive advantage. It not only provides the guidelines for corporative projects, but also contributes to the accomplishment of an organization's strategic and operational goals. Nowadays, the increased use of strategic management has thoughtful impacts on a company's performance and differentiation, specifically in a globalized market. From this perspective, it is important to develop a strategic management framework which can guarantee the achievement of a sustainable, competitive advantage for organizations. Taking this into account, this chapter aims to: (1) present the latest trends in strategic management; (2) provide an overview of the Resource-Based View (RBV) and the Value, Rarity, Inimitability, and Organizational-oriented (VRIO) framework; and (3) identify the limitations of the VRIO framework, highlighting suggestions for its improvement.

1.1. Strategic Management: Latest Trends

In compliance with Porter (1996), *strategy* is dealing with the creation of an unrivalled and prized position, involving a diverse range of activities. Nevertheless, there is no obvious, single and general definition of strategy. There are several approaches to the conceptualization of strategy, fitted individually to each organization to run its business. Strategy simply guides corporations by setting directions to achieve goals, to get from point A to point B. In the aim to obtain a consistent strategy, organizations must set goals, vision and mission aligned according to its operating environment. It is important to develop coherent allocation of resources and capabilities to encourage the achievement of the strategy (Barney, 1991).

Surviving in the market, despite competition, is the main goal of a corporation. Barney (1991) stresses the importance of achieving competitive advantage, meaning that organizations should learn how to assess their performance. Nevertheless, a great number of

companies fail to accomplish this (*i.e.*, the non-stability of the market due to a non-constant environment is killing those companies). For this reason, an evolutionary strategy is needed. Accordingly, since any shift in the environment may be detrimental to the strategy direction, paying more attention to the threats and opportunities that could arise is necessary.

Globalization and business openness are a prevailing context in which multinational enterprises (MNE) conduct trade. Redefining firms' capabilities is necessary to keep up with a movement that is deeply changing cultures, trade exchanges and cultural habits (Dowrick and Golley, 2004). Nowadays, organizations are geographically disperse, and the need to organize team management in a strategic way is at the heart of their consideration (Nag *et al.*, 2007). Besides, following a pre-determined strategy may be jeopardizing for organizations, which continue as normal until danger really appears, instead of focusing and anticipating any unexpected change (Bouhali *et al*., 2015). Once these factors have been considered, implementing strategic management among organizations is imperative. Strategic management is a useful tool often adopted by organizations, as it includes several techniques helping leaders and managers to perform specific tasks, to collect data and to be involved in effective decision-making processes. By using these methods, awareness of the environment, including opportunities and threats, is increased. This, in turn, acts to reduce the risk of failure (Kalkan and Bozkurt, 2013). Furthermore, according to Bouhali *et al.* (2015: 74), implementing strategic management in corporations will lead to: (1) *"better awareness of needs and of the facilities related issues and environment"*; (2) *"sense of direction, continuity, and effective staffing and leadership"*; and (3) *"opportunity to influence the future, or assume a proactive posture"*.

In our current society, the definition of strategic management is evolving, adapting to the new surrounding business world. Consistently, strategic management is understood as a function of senior management or other leadership positions (Furrer *et al.*, 2008). Through business openness, boundaries fade away over time, leading to disappearing hierarchies in organizations and bringing change in the strategic management structure (Ansoff, 1969). This also comes from leadership, which is more turned to employee experience (Ansoff, 1969). This phenomenon is linked to the interdependence of current businesses with a high number of stakeholders and sources. Additionally, due to economic and political changes, strategic management has to seek collaborators' cooperation for firms to perform better (Furrer *et al.*, 2008). Thereby, typical roles in organizations are also impacted and thus changing. With the borderless world, resulting from globalization, companies are becoming more global and leaders are more open to delegate responsibilities to an increasing number

of employees (Furrer *et al.*, 2008). Surrounded by a complex business environment, organizations are facing new challenges, requiring the development of a strategic way to manage employees (Edewor and Aluko, 2007).

According to Edewor and Aluko (2007), leaders have, therefore, fostered strategic collaborations across their teams and various business units to increase creativity and provide innovative alternatives to risky environmental issues. As a consequence, and relating to the external environment, contextual problem solving will allow for the adaptation of the internal business environment. Nevertheless, defining what is meant by "strategic management" is of great importance. Bracker (1980), for instance, focused on defining the concept necessary in any organization and community. The notion of strategy has been mainly a semantic problem since its first mention in the Old Testament. Many writers concentrated their attention on the notion of strategy but failed to explore its historical evolution comprehensively (Daidj, 2018). According to Albarran *et al.* (2018), the underlying principles of strategy were discussed by Homer and Euripides, among many other early writers. The word *strategy* comes from the Greek *strategos*, meaning "a general", which in turn comes from "army" and "leadership".

The Greek verb *stratego* means to *"plan the destruction of one's enemies through effective use of resources"* (Albarran *et al.*, 2018: 112). The notion of strategy has been prominent throughout history in military and political contexts and has been discussed by world-known authors such as Shakespeare, Montesquieu, Kant, Mill, Hegel, Clausewitz, Liddell Hart and Tolstoy. Many militarists and political theorists have also used the strategic ideas created by these authors, such as Machiavelli, Napoleon Bonaparte, Bismarck and Yama-Moto (*cf.* Bracker, 1980). After World War II, the need for a business-related notion of strategy increased as business shifted from a comparatively stable environment to a more quickly evolving and competitive environment. Ansoff (1969) ascribed this environmental change to two important variables, namely: (1) marked acceleration in the pace of shift within companies; and (2) accelerated application of science and technology to the management process. The rapid pace of change places a premium on the capability to anticipate change, exploit fresh possibilities and take timely actions to avoid threats to the company (Bracker, 1980). New techniques stimulated interest in the recognition of analytical and explicit decision-making methods that enhanced the capability of management to cope with the increasingly uncertain future.

According to Bracker (1980) and Daidj (2018), strategic management is the immediate organizational implementation of the scholarly realm's ideas of business strategy.

In other words, strategic management involves analyzing a company's inner and external environments to maximize resource usage in relation to objectives. This declaration can be seen as a macro definition of the concept of strategic management. The main advantage of strategic management is that it provides organizations with a structure to develop the ability to anticipate and cope with change. It also helps to create the capability to deal with uncertain futures by identifying a goal-fulfilling process (Bracker, 1980). Nag *et al.* (2007) elaborate further on the strategic management definition. According to the authors, the primary point of departure is the premise that a scientific field is a community of scholars who share a common identity and language. The roots of this assumption can be traced back to knowledge sociology, in which science is viewed as a fundamentally social company (see also Kuhn (1962); Merton and Storer (1973); Latour and Woolgar (1979)). Some have described scholarly groups as "tribes" or "intellectual villages", due to their own unique cultures, norms and language (Geertz, 1983). Language offers the foundation for a distinctive identity shared by members of a community (Nag *et al.*, 2007), and thus the basis of strategic management.

Among the various authors who started to investigate the position of leadership and the opportunities for strategic selection, the most well-known is Taylor (1947), who launched the conceptualization of "science of work". Barnard (1938), Simon (1947) and Selznick (1957) are also known for their contributions to the field. An important contribution of these authors is their linkage of the study of organization with economic ideas (*cf.* Furrer *et al.*, 2008). Moreover, the real birth of strategic management emerged in the 1960s with Chandler's (1962) book *"Strategy and Structure"*, Ansoff's (1969) conceptualization of *corporate strategy* and the Harvard textbook *"Business Policy: Text and Cases"* (*cf.* Learned *et al.*, 1965).

Research is shifting from a deterministic one-way strategy to a more contingent view with these writers, where organizations need to adapt to their external setting. Rumelt (1984) and Furrer *et al.* (2008) argue that studying diversification, restructuration and corporate-level strategies are the main concerns of today's society. Subjects such as agency theory and transactions cost arose with the development of new boundaries of organizations when outsourcing the value chain or making alliances abroad (Furrer *et al.*, 2008). Indeed, new concerns such as growth, innovation, spreading and entrepreneurship are trendy for redefining strategic management. Furrer *et al.* (2008) also highlight the progress achieved on firm competitive advantage thanks to the Resource-Based View (RBV) and the Value, Rarity, Inimitability and Organizational-oriented (VRIO) framework. The evolution

identified demonstrates a step toward a combination of corporate strategy and competitive strategies. Since Hofer and Schendel's (1978) seminal work, conceptualizing corporate and company (or competitive) strategy has acquired extensive recognition in strategic leadership. After defining the concept of strategic management and its latest trends, the RBV and VRIO framework will be studied in order to illustrate the most recent trends of strategic management in organizations.

1.2. RBV and VRIO Framework

The VRIO framework is a part of the RBV theory. RBV had been developed and extended to the VRIO by Barney (1991) in order to developed strategic management among organizations. Indeed, this perspective assesses the connection of the business' internal attributes and its performance to achieve competitive advantage. Also, as argued by Barney (1991), the VRIO framework has developed more rapidly than other frameworks examining firm's internal weaknesses and strengths.

The competitive advantage pursuit and the sources of economic profitability has always been at the heart of consideration for strategic management. Consequently, new forms of strategic formulations emerged from the late 1980s in order to solve these issues (Lavie, 2006). Theories such as RBV have been established based on the importance of the internal resources in differentiating business performance (Barney, 1991). Indeed, in a volatile and increasingly challenging environment, resources are dynamic capabilities, the business' main assets, which rely on its capability to obtain sustainable competitive advantage (Teece *et al.*, 1997). According to Lavie (2006), RBV is one of the most influential strategic theories. Rooted in Penros's early input, RBV took an inward-looking view, perceiving organizations as heterogeneous entities made up of a bundle of individual resources. Indeed, Rumelt (1984) and Wernerfelt (1984) promote RBV to demonstrate that the development of internal resources is strongly linked to an increase in profitability. Barney (1991) also emphasizes two fundamental assumptions: (1) resources are spread in a heterogeneous way across firms; and (2) resources cannot be shifted from a firm to another without any cost.

According to Wernerfelt (1984), establishing the definition of resources is of great importance, because assets which are tangible and intangible are tied semi-permanently to a company. Barney (2001: 101) defines resources as *"all assets, capabilities, organizational*

processes, firm attributes, information, knowledge, etc. controlled by the firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness". In other words, they are associated with the subset of a company's resource portfolio (Wade and Hulland, 2004). All in all, these authors promote the strategic implication of resources to achieve competitive advantage and gain in profitability (Wernerfelt, 1984; Barney, 1991). Indeed, Kristandl and Bontis (2007) underline that a firm will obtain and secure potential sustainable exceptional gains from their resources if it is able to adapt to a dynamic and stable environment, where the capability to permanently adapt to new challenges leads to the procurements of abnormal gains. This is linked to the firm's resources but also leads to sustain the internal resources of a firm (Kristandl and Bontis, 2007). Following this, a firm is not necessarily required to sustain competitive advantages but must ensure a steady path of the temporary advantages to establish a competitive advantage, which differentiates the organization.

From the RBV perspective, competitive advantage results from the use of strategic resources, both assets and capabilities, leading to a company's sustainable advantage. The distinctive growth of these resources could result from the individual asset portfolio of a company, both tangible and intangible, making transfer or trade difficult (Wade and Hulland, 2004). Nowadays, RBV embodies an important foothold in the strategic management literature. Barney (1991) decided to complete this theory with the VRIO model.

The VRIO framework is an extension of RBV. It was developed by Barney (1991) in order to analyze different resources and capabilities, and what they award to the organization which owns them. The VRIO framework aims at identifying resources with potential for having sustained competitive advantage. Lin *et al.* (2012) also argue that a company, which identifies its potential bundle of valuable, rare, inimitable and organizational-oriented resources, will allow for successful strategic management of its organization. To explain this phenomenon, Barney (1991) has offered an enhanced framework identifying four pillars. The aim of this exercise is to perceive and sustain competitive advantages that a firm might have. Through this, the internal strengths and weaknesses will be identified (Barney, 1991).

Regarding the first criterion, which is *value* and what it awards, Barney (1991) described it as a resource/capability that provides competitive advantage when it is increasing in net revenues and/or it is decreasing in costs. After determining the value of the resources and capabilities a company owns, it is important to assess their *rarity* (Barney, 1991). The author argues that resources and capabilities must not be controlled by several

organizations, otherwise they are not rare and there will be no sustained competitive advantage. Next, companies owning valuable and rare resources are often considered as strategic innovators, with *inimitable* resources and/or capabilities. Indeed, they are designing and using strategies, which differentiate themselves from other companies as they are lacking the relevant resources and/or capabilities to do so (Barney, 1991). Finally, in order to fulfill the VRIO model, the three advantages Barney (1991) developed must be completed by the last pillar, which is about the *organization* within the company. The author defined the organization term as the structure, the management and the policies employed in the company. All of this will allow the achievement of sustained competitive advantage, permitting the differentiation of the company from the others. *Figure 1* illustrates the operational procedure that supports the VRIO framework.

Is a resource or capability …					
Valuable?	Rare?	Costly to Imitate ?	Exploited by Organization?	Competitive Implications	Economic Performance
No	---	---	No	Competitive Disadvantage	Below Normal
Yes	No	---		Competitive Parity	Normal
Yes	Yes	No		Temporary Competitive Advantage	Above Normal
Yes	Yes	Yes	Yes	Sustained Competitive Advantage	Above Normal

Figure 1: The VRIO Framework

Source: Barney and Wright (1998: 11).

Lavie (2006) states that the accumulation of resources which are valuable, rare, inimitable and organization-oriented will provide a greater competitive advantage. According to Priem and Butler (2001), the valuable and rarity pillars are better linked to efficiency and productivity, whereas the inimitability pillar with a good organization within the firm leads to a long-term competitive advantage. The four pillars cannot provide competitive advantage without the others. Although applications of the VRIO framework have increased over the past few years, it is not free from limitations and drawbacks. This will be discussed in the next point.

1.3. Shortcomings of the VRIO Framework

As RBV, the VRIO framework has been widely diffused at managerial practice. The model has been deeply studied to firstly analyze whether managers are able to identify a firm's resources and, secondly, to perceive its potential limitations.

According to Priem and Butler (2001), if every organization undertakes the same analysis, it would come up with the same conclusions as the others. Indeed, Barney (1991) assumes that valuable and scarce corporate resources could be a mean of competitive advantage, which leads to standard generalizations. Furthermore, Knott (2015) sheds a light on some critiques already made about the VRIO framework. The first one is related to the selection of attributes to be evaluated. This research empirically demonstrates that consumers tend to pick and assess resource results (such as quick response time) or resource backgrounds (such as using a model for direct selling). It also demonstrates that VRIO drives consumers away from collective evaluation capability – a conceptual problem that also exists in RBV (Knott, 2015). Another well-established criticism to RBV is its supposed trend to generate static and inward-looking descriptions (Lockett *et al.*, 2009).

From the operational, practical perspective, the resource-based theory is marked by the inability to conduct empirical performance measurement. Due to the heterogeneity of companies, it is difficult – or even impossible – to compose a homogeneous sample of companies to support survey results (Lockett *et al.*, 2009). Furthermore, the resource-based approach focuses on a company's inner organization and does not consider external variables such as market demand. Thus, even if a company has the resources and the ability to gain competitive advantage, there may be no demand because the model does not consider "the customer" as a variable. In addition, the framework pays little attention to the dynamics of market demand. These findings support RBV criticism by dynamic capability viewers (Eisenhardt and Martin, 2000), indicating that RBV is inaccurate in quickly evolving environments and overemphasizing the potential for leveraging current resources.

Since the term "resource" does not appear to be self-explanatory to non-specialists in this field of theory, criteria for choosing resources and capabilities to be assessed by the VRIO framework presents a big field of possibilities. As mentioned previously, the literature only provides restricted guidance on how the resources themselves can be abstracted from resource results or backgrounds. The findings suggest the need to break down output features such as product attributes or effectiveness and define inner drivers (Knott, 2015). They also emphasize the need to highlight collective characteristics such as a precious culture (Barney,

1986), as well as constituent components of the value chain, and the need to approach the positive-only tenor of most RBV presentations. Moreover, according to Lavie (2006), a new preoccupation arises in which international business and trade openness are prevailing. As Lavie (2006) points out, scholars – such as Barney (1991) – developed this framework envisioning firms as independent entities, which does not seem to be correct in the context of inter-firm alliances. In current time, the business context is shaped by the fast evolution of alliances, which is therefore impacting the network of resources. Following this, Gulati *et al.* (2000) introduced the concept of "network resources", which examined how resources, embedded in the company's alliance network, shape decision-making and alliance formation. Network resources are external resources integrated in the company's network of alliances which provide strategic possibilities and impact company conduct and value.

Finally, there is a restricted potential of RBV to create accurate predictions (Priem and Butler, 2001). In this sense, Priem and Butler (2001) argue that the usefulness of the RBV seems to be greater by generating better understanding when providing a strategy structure, making Barney's (1991) statements less reliable. Indeed, our current society is evolving every day, facing new challenges than Barney (1991) had not faced when he developed the VRIO framework. Also, Kraaijenbrink *et al.* (2010: 6) assess several critiques on the Resource-Based View, discussed as follows: *"*(1) *the recourse-based view has no managerial implications*; (2) *the Resource-Based View implies infinite regress*; (3) *the Resource-Based View's applicability is too limited*; (4) *sustained competitive advantage is not achievable*; (5) *the value of a resource is too indeterminate to provide a useful theory*; (6) *the Resource-Based View is not a theory that is about the firm*; and (7) *the definition of a resource is not clear to work with"*.

To conclude, Lockett *et al.* (2009) highlight the incapacity of the VRIO framework to do an empirical study on performance measuring due to the heterogeneity of firms (*i.e.*, composing a homogeneous sample is hard or even impossible). The authors also stress that the model is focusing only on the internal organization of a company, meaning that external factors, such as the demand side of the market, are not considered. Even though a company can have the necessary resources and/or capabilities to gain a competitive advantage, the latter would not be complete as the demand side – *i.e.*, the customer – had not been taken into consideration. As a consequence, this model has to be nuanced and needs to be adapted to present-day conditions and considerations. An update of the VRIO framework would help managers to establish strategic management in organizations, which are often spread worldwide, with divergent preoccupations and environment. The lack of quantification of

the VRIO framework is a clear limitation and the degree of subjectivity needs to be reduced. Consequently, alternatives must bring the aim of completing the VRIO framework.

The Multiple Criteria Decision Analysis (MCDA) approach could be combined with the VRIO framework. This approach had been developed as a supporting tool for decision-making processes. MCDA is linked to a constructivist approach, allowing decision makers to reflect, readjust and/or validate their own perspectives. Three phases of the MCDA approach should be considered, namely: *structuring*; *evaluation*; and *recommendations* (Belton and Stewart, 2002). On the one hand, the VRIO framework points out the importance of uniqueness, rarity and inimitability of specific resources and/or capabilities. On the other hand, MCDA is a useful tool to select the best resources and capabilities, subject to several evaluation criteria, to reach competitive advantage. Through its ability for simplification, MCDA is a holistic approach that benefits and differentiates decision making. It will integrate indicators in the model, which can be quantitative or qualitative (Malczewski and Rinner, 2015).

As a well-established MCDA technique, DEcision-MAking Trial and Evaluation Laboratory (DEMATEL) is also presenting incentives to complete the VRIO. DEMATEL identifies the principle of causality on the chain components of a complex system through diagrams or matrices. It aims to convert the interrelations between factors into a comprehensive structural model, dividing them into a cause group and an effect group. DEMATEL ranks the decision criteria for long-term decision-making process and also indicates the improved scopes. Thus, DEMATEL could have potential contributions to the VRIO quantification. This approach can solve management decision issues efficiently. Combined with VRIO, results can be very fruitful. It could result in a differentiation tool for corporations through its capability to deal with complex decision-making conflicts. Also, the combination of both frameworks will allow companies to better face uncertainty and vagueness within decision-making processes, and to better answer to the current competitive environment. In the next chapter, an in-depth overview of both MCDA and DEMATEL approaches will be introduced. The potential combination of these approaches and the VRIO framework will be the focus of the next chapter.

SYNOPSIS OF CHAPTER 1

This first chapter aimed to provide an overview of the basic knowledge of strategic management and its latest trends. The underlying concepts of the RBV and VRIO frameworks were investigated and their dimensions were explained. Lastly, a brief review of the shortcomings of the VRIO framework was presented, with an introduction of different alternatives able to complete the traditional VRIO. On the one hand, strategic management is the process which allows for the definition of goals, vison and mission and the direction for the present. On the other hand, it also helps creating the capability to deal with future uncertainties by identifying and elaborating a goal-fulfilling procedure. Through strategic management, a firm's inner and external environments are assessed to maximize the usage of resources related to objectives. Thus, if the environment changes, reformulation of the strategy is possible due to the evolutionary components of strategic management. Providing organizations with a structure able to anticipate and cope with change is at the heart of the strategic management. Additionally, strategic management has evolved over the decades, adapting to the new surrounding business world. Due to globalization, hierarchy tends to disappear in organizations, bringing change in the strategic management structure. Strategic management must seek for collaborators' cooperation, allowing firms to perform better. Frameworks such as RBV and VRIO have been developed through strategic management emergence. The RBV framework emphasizes the importance of internal resources in differentiating business performance. From the RBV perspective, the distinctive growth of these resources could lead from the individual asset portfolio of a company, making transfer/trade difficult, and consequently ending up in a sustainable competitive advantage. The VRIO framework is a strategic analysis tool – an extension of the RBV – designed to help organizations to identify a potential bundle of *valuable*, *rare*, *inimitable* and *organizational*-oriented resources, allowing for successful strategic management. This will result in a long-term competitive advantage. Nevertheless, the VRIO presents some shortcomings, such as the incapacity for undertaking an empirical quantitative study, leading to too much subjectivity within the framework. Alternatives must be proposed with the aim of completing VRIO. The combination of MCDA and VRIO will allow to better face uncertainty and vagueness within decision-making processes. It will also help to answer to the current competitive environment, as well as to perceive and sustain competitive advantages that a firm might have. In the next chapter, an overview of MCDA and DEMATEL will be discussed.

CHAPTER 2

METHODOLOGY: APPROACH AND TOOLS

In the previous chapter, the Resource-Based View (RBV) and Valuable, Rare, Inimitable and Organizational-oriented (VRIO) frameworks were presented as strategic management tools. Every method has its own characteristics, advantages and limitations. This second chapter intends to introduce the Multiple Criteria Decision Analysis (MCDA) and DEcision-MAking Trial and Evaluation Laboratory (DEMATEL) approaches, providing their general backgrounds to support decision making. Following the identification of basic concepts of both approaches and their fundamental convictions, an analysis of the potential contribution resulting from the combination of these methods and the VRIO framework is provided.

2.1. Basic Concepts and Fundamental Convictions of the MCDA Approach

In daily life, individuals have to make choices. They encounter decision-making processes, even if decisions are insignificant. In almost every decision, there are several conflicting objectives (Zionts, 1979). For instance, when choosing a car to purchase, four objective decision criteria stand: (1) price (*i.e.*, the cheaper the better); (2) economy (*i.e.*, the more economical the better); (3) spaciousness; and (4) sportiness (*i.e.*, the sportier the better). Zionts (1979) explains these different goals are in conflict. To illustrate, the more spacious will not be the more economical, nor the sportier is the cheapest car. According to preferences, trade-offs have to be made among these conflicting objectives. Also, in any decision that involves a number of conflicting criteria, the same type of trade-offs have to be undertaken in order to find the most suitable solution (Zionts, 1979). To this effect, the decision-making process may be structured within the context of the Multiple Criteria Decision Analysis (MCDA) approach, as this framework involves multiple decision criteria and focuses on helping decision makers to develop solutions to their decision problems (Wang and Chen, 2015).

Belton and Stewart (2002) actively participated in the elaboration of the MCDA-related concepts. Firstly, *criterion* had been defined as a standard of judging, on the basis of

a decision-making context. Indeed, these standards affect the way a decision is made. They also consider the different *choices* that are needed in any course of action. Hence, *decision-making context* is a situation faced in the everyday life of individuals. Indeed, dealing with different decisions always requires a number of factors to be balanced. Belton and Stewart (2002) emphasize that the intent of the MCDA approach is to assist decision makers to coordinate and synthesize data in a way that would lead them to feel comfortable about taking decisions, reducing the potential for post-decision regret by guaranteeing that all decision criteria or factors had been properly taken into consideration. As pointed out by Wątróbski and Jankowski (2015), it is also important to select the MCDA method that suits the best to the decision-making problem at hand.

Bana e Costa *et al.* (1997) seek to offer an overview of the thought streams in the field of MCDA. They present a letter from Benjamin Franklin to a friend in 1772. In this text, two important principles of the MCDA are approached: structure and evaluation. Bana e Costa *et al.* (1997: 29) also discern some of the main MCDA-related concepts such as *"conflicting criteria, uncertainty, pairwise comparisons, value judgements, compensation, weights, aggregation, etc."*. Despite these early insights, the first independent conference devoted to MCDA research came up two centuries later with the emergence of a new economic environment rising with the 21st century. This was facilitated by the information and communication revolution which gave birth to new technologies and, thus, to a new kind of consumer (Ferreira *et al.*, 2011). Following this trend, new business models and decision-making mechanisms were used to improve firm performance (Ferreira *et al.*, 2011).

Regarding the complexity and competitiveness of the business environment, a better use of control methods was required. Therefore, a more robust solution needed to be created. According to Ferreira *et al.* (2011), Operational Research (OR) arose formally in 1935. It was initially developed during World War II, for both military and non-military activities, but the concept was better-known as a war tool in this period (Bouyssou, 2005). Then, the concept evolved to provide a higher degree of rationality to the decision-making processes (Roy and Vanderpooten, 1997; Checkland, 2001), turning into a tool of managerial decision science (*cf*. Agrawal *et al*., 2010). According to Landry *et al.* (1996), OR provides a strategy to place a building situational model under scrutiny and applies it to ascertain solutions to solve decision issues. Due to its fast growth, research proliferated investigating the successes of OR. This resulted in new methodologies standing for decision makers in their choices.

As a gradual change, traditional OR methods were elaborated up to 1960, affected by single-criterion analysis, driven by mathematical practices and oriented toward

improvement (Bouyssou, 2005). This approach became known as hard, traditional or orthodox (Roy, 1990). Nevertheless, limitations came out rapidly when dealing with more complex issues. As Mingers and Brocklesby (1997) demonstrate, the truly optimal decision only exists if only one criterion is considered. In a real decision-making situation, multiple criteria are taken on board, as a single criterion is insufficient (Bogetoft and Pruzan, 1997). Certainly, several competing and often non-commensurable goals should be addressed. Therefore, it is difficult to find a real optimal solution, which will suit all decision makers under each of the conditions considered. Consequently, two different branches emerged: Multiple Criteria Decision Making (MCDM); and Multiple Criteria Decision Analysis (MCDA). These methodological approaches did not aim to replace the traditional one, but to complete it (Mingers and Brocklesby, 1997; Mingers and Rosenhead, 2004).

According to Ferreira *et al.* (2011), the limitations of traditional methods allowed MCDM and MCDA methods to emerge. Particularly, the MCDA approach allowed an alternative paradigm to be introduced, where decision situations are characterized by a decreased need for data and determined by non-optimal circumstances, easiness and transparency (Checkland, 2001; Rosenhead and Mingers, 2001). This approach also considers decision makers as active elements of the decision process, providing conditions that allow upward planning and uncertainty acceptance. Loken (2007) further explains that decision makers are at the heart of this choice (*i.e.*, *decision*). Decision makers can be individuals or groups.

Nevertheless, this period was characterized by the emergence of the first proposals associated with multiple parameters due to the need to address structural approaches composed of an increasing variety of new and competing interests (Roy, 1985). As a result, theories stressing the use of multiple criteria started to shape more specific and detailed methodologies which evolved over the years. Mateu (2002) demonstrates that the MCDM approach displays helpful tool which will allow the decision maker to determine the best decisions to take. There is, therefore, a need to guarantee that the procedures are rational and perfectly legitimate, by a decisive argument, as its scope is limited to a comparative study of the relationship between alternatives for the specification of optimal solutions. Consequently, even if the MCDM model is dealing with multiple objectives, it is still linked to the optimum paradigm (Munda, 2008).

The MCDA approach arose when objectivity limitations had been recognized as impacting the decision-making process. Individuals should shape their preferences in line with their own values. At a theoretical level, the goal of the MCDA approach is to provide

decision makers with constructive and interactive support to obtain the best argument reflecting their own convictions. Consequently, Loken (2007) notes that this approach gathers several methods which help people make decisions. Operationally, the main aim of the MCDA approach is to split decision issues into smaller pieces to deal with complexity. When judgments and considerations are established, an overall picture is presented to decision makers (Dodgson *et al.*, 2009). All in all, Loken (2007) underlines that MCDA emphasizes on the term "decision analysis" instead of "decision making" as the approach helps decision makers to make better decisions, through organization and synthesis of collected data. In this sense, decision makers feel confident and comfortable about their decisions. The author also assumes that all applicable parameters have been properly accounted for, thanks to the use of the MCDA approach. This will lead to a reduction of regret in the post-decision period. Ideally, the MCDA methods would allow decision makers to recognize and define key decision-making considerations and avoid making major decisions out of habit.

The MCDA framework can be comprehended as a novel OR branch dealing with complex decision issues. The model follows a constructivist approach recognizing the limitations of the mathematical optimum (Ferreira *et al.*, 2011). Indeed, Bana e Costa *et al.* (1997) emphasize the advantage of the MCDA approach, in contrast to the classical OR framework, as allowing individuals to think about their own values and preferences from different viewpoints. Keeney (1992) also stresses the importance of values, which are subjective but a fully-fledged part of decision-making processes. Trade-off is allowed between objective and subjective decision criteria, which is inherent to the decision-making process. Bana e Costa *et al.* (1997) associate MCDA with an open theoretical field, which differs from a closed mathematical theory solving only specific class of decision problems. Belton and Stewart (2002) also maintain that the MCDA framework aims to combine objective evaluation with value judgement, providing simplicity while managing subjectivity with transparency. Bana e Costa *et al.* (1999), Belton and Stewart (2002), Dutra (2005), Amine *et al.* (2014) and Ferreira *et al.* (2015) present three main phases in decision-making processes, namely: (1) *structuring*; (2) *evaluation*; and (3) *recommendations*. According to the authors, the first phase is the most important one, as it deals with the problem formulation through data collection. The decision criteria are identified at this step, after panel definition of individuals involved (Ferreira *et al.*, 2015). By these means, the problem framing allows for the identification of opportunities for decision makers, with associated alternatives and the acknowledgement of assessment actions (Bana e Costa *et al*.,

1997). The second step is dealing with the trade-offs among appraisal criteria (Ferreira *et al.*, 2015). This assessment is composed by three sub-phases: (1) *elaboration of the preference value functions*, assigning value to each alternative in analysis; (2) *identification and assessment of the compensation rates*, weight of each criterion; and (3) *application and analysis of the actions impact on each criterion* (Bana e Costa *et al*., 1999). Finally, the third step arises when the combination of outcomes obtained previously is made by decision makers. This will allow for the identification of the best alternative by performing an interactive analysis that allows answering to "what if" questions (*cf*. Bana e Costa *et al*., 1999). Consequently, the validation of multiple criteria within the model is possible.

Zionts (1979) stresses the importance of four elements in multiple criteria decision analysis: (1) a set of alternatives; (2) a set of decision criteria; (3) the outcome of each choice; and (4) the preference structures of the decision maker. Yu *et al.* (1985) propose for each step associated formulas such as: (1) X = set of alternatives; (2) $f(x) = (f_{1, \ldots,} f_q)$, denoting a set of decision criteria, which contains the criteria that are important to reach a good decision; and (3) $V(x) = (v_1(x), \ldots, v_q(x))$, representing the outcome of each choice and supporting preference structures. Nevertheless, the main difficulty is choosing the best alternatives in the multiple criteria approach (Mousseau and Slowinski, 1998). According to Roy (1990), who defends the existence of four elements in a multiple criteria approach (*i.e.*, (1) *definition level of the subject and the participation scope of the decision maker*; (2) *outlining criteria and assessment of decision*; (3) *modelling global preferences of a DM*; and, finally, (4) *selecting research procedures*), a set of criteria needs to be: complete, operational, decomposable, non-redundant, and minimal (see also Malczewski and Rinner (2015)). Moreover, according to Hobbs and Meier (1994), Hobbs and Horn (1997) and Loken (2007), a few methods have been proposed over the years, which differ in several areas: theoretical background, type of questions, and results given (Hobbs and Meier, 1994). The fundamental goal is to elaborate a more formalized and better-informed decision-making process (Loken, 2007). Also, the authors emphasize the number of criteria to consider when making a decision such as: (1) *validity of the criteria*; (2) *user's true values reflection* should be chosen in the methodology; (3) *appropriateness of data* to provide the decision makers with all information they need; and (4) *ease of understanding* of the method (Loken, 2007). Research conducted by Roy (1990), Belton and Stewart (2010) and Ferreira *et al*. (2011) refer to other important elements to consider, namely uncertainty and complexity, that are associated with strategic decisions. Montibeller and Franco (2010) emphasize that strategic decisions involve a higher degree of uncertainty compared with

other easier decisions with high stakes, major resource implications and long-term consequences. To overcome this, fundamental convictions need to be provided to deepen the MCDA framework. Indeed, hard and soft approaches had been introduced associating these convictions with OR paradigms. Although the soft paradigm originates from the constant development of the hard paradigm, properties vary from one to the other (Roy, 1990). Mendoza and Martins (2006) maintain that the main properties of the soft paradigm are: uncertainty acceptance; looking for non-optimal solutions; reduction of data demand; simplicity and transparency; human factor inclusion; and bottom-up planning.

The soft paradigm is a useful tool because the methods used by the analyst/facilitator allow decision makers to find their fundamental strategic objectives according to their values (Montibeller and Franco, 2010). Mendoza and Martins (2006) stress the difference between both paradigms regarding decision makers who follow the soft approach, which contributes to the identification of model components necessary to the modeling process. Furthermore, the advantages of the MCDA need to be solidified to complete this approach. The fundamental convictions of the MCDA are: (1) *constructivism*, since the approach brings necessary tools to support the decision-making process (Ferreira (2013) emphasizes that these tools facilitate decision makers in validating their own perspectives and thoughts. Consequently, the aim is to construct guiding principles without pre-conditions); (2) *interrelationship among objective and subjective elements*, meaning *"to build a more-or-less formal representation integrating the objective environmental components of the decision context, with the subjective and context-dependent points of view, concerns or objectives, in such a way that the value-systems of actors or stakeholders are made explicit"* (Bana e Costa *et al.*, 1997: 35) (also, as subjectivity is inherent in every decision-making process, preferences and opinions have to be explicit in order to ensure transparency (Ferreira, 2013)); and (3) *learning through collaborative participation*, which will lead to one only solution preferred by all decision makers (Mendoza and Martins, 2006).

Dutra (2005) summarizes the fundamental convictions of the MCDA approach in four critical abilities: (1) to provide different types of information (*i.e.*, quantitative, qualitative, verbal or non-verbal); (2) to capture the objectives of decision makers in an explicit way; (3) to allow decision makers to consider their priorities, goals, and preferences; and (4) to provide a set of conditions to inform decisions that rely on what decision makers judge to be most appropriate. Overall, these fundamental convictions allow for improved structuring of decision-making processes. Consequently, it is important to understand and clarify the potential contribution of the MCDA approach to the VRIO framework.

2.2. MCDA and VRIO: Is the Combination Possible?

Refreshing a short definition of the VRIO framework is required to elaborate on the possible combination between MCDA and VRIO. The VRIO framework is a business-analysis tool that forms a part of the broader strategic plan of the company. This approach was developed by Barney (1991) in order to analyze different resources and capabilities, and what they award to the organization which owns them. Lin *et al.* (2012) also argue that a company which identifies its potential bundle of valuable, rare, inimitable and organizational-oriented resources will allow for successful strategic management of its organization. The aim of this framework is to perceive and sustain any competitive advantages the firm might have (Barney, 1991). Every company's fundamental strategic method starts with a vision statement and continues through goals, inner and external analysis, strategic decisions (both business and corporate) and strategic implementation. The company hopes that this process will lead to a competitive advantage in the marketplace (Barney, 1991). Bearing this in mind, it seems evident that the MCDA can be a useful tool to select the best resources and the best capabilities of an organization to obtain a competitive advantage. Indeed, the assessment of the firm's resources and capabilities encounter different decision criteria to determine which resource and/or which capability will be the most valuable, the rarest, the most inimitable and the most organization-oriented. Consequently, the MCDA framework will simplify the assessment of these numerous criteria and integrate indicators in the model, which might be quantitative or qualitative (Malczewski and Rinner, 2015).

Fortemps *et al.* (2004) describe four elements that need to be analyzed during the adoption of the MCDA approach, namely: (1) *definition of the decision subject*; (2) *analysis of implementation consequences of selected alternatives*; (3) *global preferences modelling*; and (4) *procedure selection and analysis*. The function of each component is essential to the decision-making process. However, the selection of suitable analytical procedures is especially important due to the fact that it is a preliminary operation of the process. It will determine the course of study of the decision situation, which is often difficult to replicate. Giove *et al.* (2009) stress the advantage of the MCDA framework to potentially reach a competitive advantage. Indeed, to properly assess resources and capabilities, it is of great importance to obtain a public opinion and to have feedback about external feelings regarding various factors (Mendoza and Martins, 2006). The model allows qualitative and quantitative data to be combined, including benefits, costs, risks and stakeholder views (Giove *et al.*, 2009). MCDA methods are elaborated to synthetize a wide possibility of information and

raise awareness of trade-offs that must be made between competing elements. Nevertheless, uncertainty also plays a critical role in the decision-making process since individuals feel unconscious preferences (Mendoza and Martins, 2006). Systematically, MCDA integrates risk level assessment, uncertainty and technical valuations in its process (Giove *et al.*, 2009). Finally, the purpose of resources and capabilities assessment is to provide decision makers with useful tools to facilitate their decision-making process (Mendoza and Martins, 2006). Consequently, it is possible to conclude that the MCDA is a useful approach to reach competitive advantage.

Moreover, the MCDA approach can be considered as a holistic tool to reach a competitive advantage in the strategic management decision-making process. For instance, stakeholders are considered a key part in firm projects. To this extent, they should be integrated in decision-making processes to make the best decision and benefit the whole company (Giove *et al.*, 2009). As Linkov *et al.* (2006) state, stakeholders' opinions might conflict. Consequently, by means of the MCDA, consensus leading to competitive advantage can be reached. Marttunen *et al.* (2013) emphasize the usefulness of the MCDA approach to engage stakeholders and integrate their knowledge and values into several phases of the planning process. This framework is a quality model taking multiple stakeholders into consideration in decision-making processes (Giove *et al.*, 2009). This might be intensified by the incorporation of group decision making. The framework is a flexible and adaptive way for others to participate in decision-making processes. Linkov *et al.* (2006) draw attention to the advantage of MCDA as it can highlight similarities or possible conflicting areas between stakeholders, allowing values held by others to be condensed. Using MCDA as a tool, in which stakeholders take part, involves several questions to determine the objectives of each interested party and thus obtain the best common decision choice (Munda, 2008; Salgado *et al.*, 2009). The integration of stakeholders' opinions in decision-making processes is important, as it will lead to successful deliberation among group members.

Providing an environment that fosters discussions, questions and reflections will allow for success in decision-making processes, leading organizations to reach a competitive advantage (Gregory *et al.*, 2012). Also, the method should be designed in such a way that all members can fully grasp the reasoning and findings. Thanks to this process, stakeholders will be able to make better decisions for the company (Giove *et al.*, 2009). Consequently, MCDA can assist the achievement of a competitive advantage through stakeholder inclusion. One should bear in mind, however, that the MCDA approach includes a wide-range of different techniques and methods. In this regard, DEcision-MAking Trial and Evaluation

Laboratory (DEMATEL) also presents incentives to complete VRIO. The DEMATEL technique will be presented in the next section.

2.3. The DEMATEL Technique

DEMATEL is acknowledged as an efficient approach to identify the principles of causality in the chain components of a complex system (Gigović *et al.*, 2016). It deals with the assessment of interdependent relationships between factors and the identification of those most important through a visual structural model (Si *et al.*, 2018). Gabus and Fontela (1972) developed the DEMATEL method in the 1970s with the aim to solve complex issues through the identification of cause-and-effect relationships.

The DEMATEL framework was first presented by the Geneva Research Centre of the Battelle Memorial Institute to envision the structure of complicated causal relationships through diagrams or matrices (Gabus and Fontela, 1972). As a kind of structural modelling technique, it is particularly helpful in examining the relationship of causes and effects between the components of a system. DEMATEL can reveal existing interdependence among factors. Also, it will help with map development to reflect relative relationships within them and investigate and solve complex decision problems. Some authors argue about the use of DEMATEL to ascertain the significance of decision criteria (*e.g.*, Shieh *et al.*, 2010; Wu and Tsai, 2011; Hsu *et al.*, 2013). Hsu *et al.* (2013) determined the DEMATEL framework as an approach to emphasize influential criteria of management in supply chain to improve suppliers' performance. This method not only converts the interdependency relationships into a cause-and-effect group through matrices, but it also identifies criteria of a complicated structure system, with the assistance of an impact relation diagram (Si *et al.*, 2018). Furthermore, DEMATEL has been extended for better decision making under several environments since many real-world systems deal with uncertain information.

Huang *et al.* (2007) developed the classical DEMATEL to be able to convert the interrelations between factors into a comprehensive structural model, dividing them into a cause group and an effect group. The DEMATEL method ranks criteria for the long-term decision-making process and also indicates the scope of improvement (Huang *et al.*, 2007; Tzeng *et al.*, 2007; Li and Tzeng, 2009). The main use of the DEMATEL method is to produce knowledge structures for complex decision problems (Gabus and Fontela, 1972; Tamura, 1990). With this useful tool, organizations can proceed with quantitative extraction

among different factors from the problem under study (Gharakhani, 2012). Both direct and indirect influences between criteria are taken into consideration. In addition, Gharakhani (2012) emphasize the importance of considering dispatching factors, as these factors are more likely to impact the other criteria. The DEMATEL is an extended method used to elaborate and assess a structural model to analyze the influence relationship between complex factors. According to Gharakhani (2012) and Si *et al.* (2018), the formulating steps of the classical DEMATEL can be summarized as follows: (1) *Step 1: generate the group direct influence matrix* (*i.e.*, the aim is to indicate the influence that factor F_i has on factor F_j, using an integer scale of "no influence (0)", "low influence (1)", "medium influence (2)", "high influence (3)" and "very high influence (4)"); (2) *Step 2: establish the normalized direct-influence matrix X*; (3) *Step 3: construct the total-influence matrix T*; and (4) *Step 4: produce the influential relation map (IRM).* In other words, to model decision problems, DEMATEL theory performs a direct-influence graph, which represents the mutual influence of the analyzed objects in terms of cause-and-effect relationships (Gabus and Fontela, 1972; Tzeng and Huang, 2011). Kobryń (2017: 155) argues that *"each node of the graph represents an analysed object, whereas an arc between two nodes indicates the direction and intensity of influence relations: To express the influence of the i-th object on the j-th object, an N-degree scale is used, where: 0 – no influence, 1 – medium influence, ..., N – maximum influence. Gabus and Fontela (1972) adopted a 4-degree scale. Currently, the most frequently used* [is] *the original 4-degree scale"*.

The DEMATEL framework assumes that the system will be composed of a component set such as $C = \{C_1, C_2, \ldots C_n\}$, with pairwise relations that can be evaluated. Sumrit and Anuntavoranich (2013) apply the procedure of DEMATEL as follow: (1) *gathering experts' opinion and calculate the matrix Z*: $Z_{ij} = \frac{1}{m}\sum_{i=1}^{m} x_{ij}^{k}$; (2) *calculate the normalized initial direct-relation matrix D*: $D = \lambda * Z$, *where* $\lambda = Min\left[\frac{1}{max\ 1\le i\le n \sum_{j=1}^{n}[z_{ij}]}, \frac{1}{max\ 1\le i\le n \sum_{i=1}^{n}[z_{ij}]}\right]$; (3) *derive the total relation T*: $T = \lim_{m\to\infty}(D + D^2 + \ldots + D^m) = \sum_{m=1}^{\infty} D^i$ *where* $\sum_{m=1}^{\infty} D^i = D^1 + \ldots + D^m$, $T = D(I - D)^{-1}$; (4) *calculate the sums of rows and columns of matrix T represented by r and c such as*: $r = [r_i]_{nxl} = \left(\sum_{j=1}^{n} t_{ij}\right)_{nxl}$ and $c = [c_i]'_{lnx} = \left(\sum_{j=1}^{n} t_{ij}\right)'_{lxn}$; (5) *set a threshold value (α)*: $\alpha = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}[tij]}{N}$; and (6) *build a cause-and-effect relationship diagram* which allows the visualization of complex interrelationships and provides information to judge which are the most important factors and how they influence the affected factors. As Gharakhani (2012:

3217) note, *"the methodology, according to the properties of objective affairs, can confirm the interdependence among the variables/attributes and restrict the relation that reflects the properties with an essential system and development trend"*. The result of the DEMATEL process is a visual representation from which decision makers can organize their own course of actions (Kamaike, 2001; Yuzawa, 2002). Consequently, the DEMATEL technique has been improved to be used as an MCDA method (Chen and Tzeng, 2011). According to the distinct use of the DEMATEL technique, classical DEMATEL research can be classified into three types. The first type is simply used to clarify the interrelationships between criteria. The second type is useful to identify key factors based on the causal relationships and degree of interrelationship among them. The third type deals with determining the weight of criteria by assessing interrelationships and criteria impacts.

Several studies combine other methods with the DEMATEL approach in order to solve management decision-making conflicts efficiently (see Si *et al.*, 2018). The most frequently associated method is the Analytic Hierarchy Process (AHP). The AHP considers a hierarchy in the distribution of a goal among components and studies which component has a greater influence on that goal (Kou and Lin, 2014; Kou *et al.*, 2016). Through DEMATEL, the relationships of decision criteria are evaluated by sharp values to establish a structural model (Si *et al.*, 2008). Nonetheless, in many real-world applications, human judgments are often ambiguous and precise numerical values are insufficient to measure uncertain interdependence between factors (Lin and Wu, 2008). Thus, an extended version of the original DEMATEL has been developed, named fuzzy DEMATEL. With the aim of dealing with the vagueness and imprecision of the influence degree measurement, the fuzzy DEMATEL analysis is performed and the resulting fuzzy numbers are ultimately converted into numerical values in decision-making support (Hsu *et al.*, 2007).

In summary, the clarification of the basic concepts underlying the DEMATEL approach enables improved structuring of decision-making processes. As a consequence, it is of the utmost importance to comprehend and identify the potential contribution of the DEMATEL approach to the quantification of the VRIO framework.

2.4. Potential Contributions of DEMATEL to VRIO Quantification

The DEMATEL technique can be combined with other approaches (Kou *et al.*, 2016). Indeed, DEMATEL is a useful tool to solve management decision problems effectively.

Consequently, its combination with the VRIO framework seems to hold great potential for resource appraisal. The VRIO framework aims to reach a competitive advantage through the resources and capabilities of an organization (Barney, 1991). Once again, as already argued, reaching competitive advantage is subject to several decision criteria, which have to be chosen. In order to help decision makers in this choice, tools can be applied such the DEMATEL method (Gabus and Fontela, 1972).

In the literature, many MCDA methods were developed to deal with group decision-making conflict (Zavadskas *et al.*, 2014; Mardani *et al.*, 2015). DEMATEL presents advantages, for example by: (1) effectively analyzing mutual influences (*i.e.*, direct and indirect effects) among different factors and assessing complex cause-and-effect relationships in decision-making processes; (2) revealing interrelationships among factors via an influential relation map (IRM), allowing the decision maker to comprehend which factors influence one another; and (3) determining the ranking of alternatives and identifying critical evaluation criteria by assessing their weights. In other words, it can be used to determine the interrelationships between perspectives or dimensions (Shaik and Abdul-Kader, 2014) and, for instance, reveal implicit interdependency of consumer requirements (Wu *et al.*, 2017). The DEMATEL method can also be applied to select the most important sustainable criteria (Ahmed *et al.*, 2016).

In recent decades, the DEMATEL framework attracted attention from both researchers and practitioners (Si *et al.*, 2018), due to its ability to adapt and handle complex cause-and-effect relationships between factors of a system. For example, selection decisions of suppliers have been an essential part of production and logistics management for a long time (Gharakhani, 2012). According to Askarany *et al.* (2010), the supply chain management is a key component of competitive strategic advantage to enhance organizational performance, productivity and profitability. As a matter of fact, lots of companies established commercial strategic partnerships in order to collaborate with suppliers from different companies or from different countries and involve them in the early stages of research and product development (Araz and Ozkarahan, 2007). Experts thus admit that supplier selection is an essential function of a purchasing department, allowing businesses to save material cost and, thereby, increase competitive advantage (Saen, 2007). Indeed, purchases from external suppliers might represent a huge proportion of product costs. In this respect, suppliers should be carefully analyzed and compared with each other to assess their relative strengths and weaknesses. Today, many supplier selection decisions are made in increasingly complicated environments, where the DEMATEL framework can be of

significant benefit. As argued by Gharakhani (2012), this method can be used in many other decision situations.

The use of DEMATEL is currently growing due to its adaptability and utility. Combined with VRIO, the results can be very fruitful, resulting in distinguished power for organizations and the ability to deal with complex decision-making conflicts (Si *et al.* 2018). Also, decision makers must bear in mind that employees, in practical situations, come from different specialty areas. Each expert has unique characteristics with regards to knowledge, skills, experience and personality, which will result in different judgements regarding what could provide a competitive advantage. This means that different decision criteria are involved in decision-making processes. Consequently, to face uncertainty and vagueness within appraisals of resources and capabilities, DEMATEL could be combined with VRIO to better inform resource allocation in competitive environments.

SYNOPSIS OF CHAPTER 2

The main purpose of this second chapter was to investigate the underlying concepts of the multiple criteria decision analysis (MCDA) and DEcision-MAking Trial and Evaluation Laboratory (DEMATEL) approaches. In the first instance, the MCDA framework was analyzed through its origins and essential convictions. Then, the possibility of combining both MCDA and VRIO approaches was discussed. Finally, the DEMATEL framework was presented, including a discussion of its potential contributions to the quantification of the VRIO framework. In this context, the fundamentals of the MCDA approach were established through Operational Research (OR), which was developed as a tool to support decision-making processes. Over the years, it has evolved from a hard paradigm to a soft paradigm. Besides, two evolutionary branches arose, namely: (1) MCDM, which aims to reach optimal solutions; and (2) MCDA, which is linked to a constructivist approach, allowing decision makers to reflect, readjust and/or validate their own perspectives. Three phases of the MCDA approach complete the process: *structuring*, *evaluation*, and *recommendations*. The second point of this chapter discussed the potential combination of MCDA and VRIO. On the one hand, the VRIO framework points out the importance of uniqueness and rarity of specific resources and capabilities. On the other hand, is a useful tool to select the best resources and capabilities, among the options presented, to reach a competitive advantage. Through its ability for simplification, MCDA takes a holistic approach that benefits and differentiates decision-making processes. The third topic of this chapter presented DEMATEL. This approach identifies the principle of causality on the chain components of a complex system through diagrams or matrices. It was developed in the 1970s to convert the interrelations between factors into a comprehensive structural model, dividing them into a cause group and an effect group. DEMATEL ranks the decision criteria for long-term decision-making processes and also indicates scopes for improvement. Finally, the last point of this chapter intended to observe the potential contributions of the DEMATEL approach to the quantification of the VRIO framework. DEMATEL revealed itself as a necessary tool to solve management decision issues efficiently. Combined with VRIO, the results can be fruitful, leading to distinguished power for organizations and providing the ability to deal with complex decision-making conflicts. The combination of both frameworks will allow organizations to better face uncertainty and vagueness within decision-making processes and to better answer to the current competitive environment. In the next chapter, the DEMATEL framework will be combined with VRIO and associated results will be discussed.

PART II

THE EMPIRICAL APPLICATION

CHAPTER 3

APPLICATION AND RESULTS

The combination of RBV and DEMATEL is an new and innovative framework, able to quantify VRIO results and enhance strategic management. The present chapter aims to introduce the Yves Rocher company, providing insights on its resources and capabilities, while the company's critical factors of success (CFS) are achieved using a VRIO matrix. This chapter will therefore focus on: (1) the VRIO-DEMATEL framework and its application to the Yves Rocher Company; (2) the analysis of results; and (3) the formulation of recommendations according to the final outcomes.

3.1. Framework and Application

RBV is a managerial framework used to determine the strategic resources a firm can exploit to achieve sustainable competitive advantage. According to Barney (1991), an organization gains a sustainable competitive advantage over competitors when it implements a value creation strategy that competitors would not be able to imitate and implement in the same way. The RBV framework will focus on the efficient use of exploitable internal resources, which are valuable to support internal and external strategies. It considers internal resources, split into two decisive categories (*i.e.*, tangible and intangible), as the determining factors for obtaining sustainable competitive advantage. Tangible resources deal with visible and physical attributes, while intangible resources refer to non-physical attributes. The categories can be subdivided into four types of resource categories: (1) *physical assets*; (2) *financial resources*; (3) *human capital*; and (4) *organizational culture* (Tran *et al.*, 2020).

Physical assets refer to tangible goods such as buildings, equipment, plant and installations. They may offer commercial or exchange value that has material existence, associated with benefits in terms of economic, social and environmental improvements. *Financial resources* are defined as capital and financial instruments able to conceive and implement strategies. The organization must guarantee the capital holding from shareholders or earn enough profits to reinvest them. *Human capital* includes education, training and experience, which has led to some level of knowledge, useful for future group and board

meetings, useful for the day to day running of the business too. Also, human capital is characterized as a dynamic capability that ensures the convergence of strategies and business methods common to the same company, with the aim of sustaining its competitive advantage. *Organizational culture* is defined as a mix of knowledge, values and expectations which will determine the corporation's goals and plans for success. A strong structure within the company, heavily supported by employees, will significantly enhance the chances of success and strengthen missions and objectives (Tran *et al.*, 2020).

As mentioned earlier, VRIO is an operational extension of the RBV approach, which was developed with the aim of aiding the evaluation of the resources and capabilities, leading to the achievement of a sustainable competitive advantage. Specifically, if resources and capabilities are valuable, rare, inimitable and organization-oriented, sustained competitive advantage will be reached. Furthermore, critical factors of success (CFS) would also be applied to strengthen the understanding of a company's objectives and strategies, which prove difficult to implement or imitate for competitors, leading to a competitive advantage. Despite the popularity gained, some shortcomings of the use of VRIO must be considered, such as causal ambiguity in the determination of resources and capabilities and the lack of empirical evidence behind the model.

The MCDA approach enables the understanding of complex decision situations and promotes information sharing among stakeholders. This approach was developed as a supporting tool for the decision-making processes. The framework proposes a ranking system to differentiate acceptable outcomes from unacceptable outcomes. MCDA turned out to be a useful tool to select the best resources and capabilities, subject to several evaluation criteria. Indeed, criteria are ranked according to their importance and assessments are combined to support final decisions. MCDA is concentrated on avoiding gaps, which could emerge when analyzing qualitative and quantitative decision criteria. In this context, DEMATEL also presents incentives to complete VRIO. It allows cause-and-effect relationship between decision alternatives and/or decision criteria to be identified through diagrams or matrices. Aiming to convert the interrelations between factors into a comprehensive structural model, DEMATEL divides them into a cause group and effect group and analyzes the influence of relationships among complex factors. It also determines the decision criteria for the longer-term decision-making process and describes enhanced scopes. This method is useful in solving management decision issues efficiently. When combined with VRIO, results can be very useful. This combination could result in a differentiating tool for organizations through the capability to deal with complex decision

situations. To guarantee the enhancement of strategic management and obtain a quantified VRIO, *Figure 2* proposes a conceptual diagram detailing the methodological procedures followed in this study.

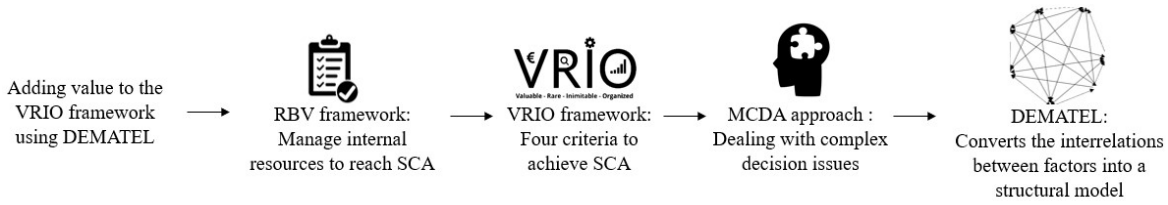

Figure 2: Methodological Procedures Followed

The company which has been chosen to apply DEMATEL to add value and quantify the VRIO framework is Yves Rocher. France-based Yves Rocher SA is a producer and retailer of high-quality botanic-positioned beauty and personal care (BPC) products, which sells at a mass-market price platform via its network of own brand stores, catalogue sales and direct selling. Established in 1959, it is market leader in the cosmetic industry in France, promoting plant-based cosmetics renowned worldwide. The company is involved in different categories such as skin care, bath & shower, hair care, fragrances, body care and make-up. The brand is present in Western and Eastern Europe, North and Latin America, the Middle-East, Africa and Asia. The company's eponymous brand has historically been its principal earner, to which it has added several other brands including Petit Bateau, Dr. Pierre Ricaud, Daniel Jouvance, Stanhome, Flormar, Sabon, Arbonne International, Kiotis and ID-Parfum, most of which are marketed via brand stores, direct selling and catalogues. Its headquarters are based in La Gacilly, Brittany. In 2019, the organization recorded 18,000 employees worldwide, more than 1,700 stores in the world. The organization's turnover is of €2.7 billion. The CEO is Bris Rocher since 2010, and more than 97% of the company is controlled by the founder's family members.

The information gathered for the application of the VRIO-DEMATEL framework was provided by Vasiliki Markopoulou, category manager and head of the international assortment department (hereafter "decision maker"). This process involved six steps: (1) *listing Yves Rocher's resources and capabilities*; (2) *identification of a resource categorization system*; (3) *categorization of the company's resources and capabilities*; (4) *checking the postulates of VRIO applicability*; (5) *VRIO application*; and (6) *identification of CFS*.

Step 1: List of Yves Rocher's Resources and Capabilities

According to the decision maker, the most significant aspect of resources and capabilities found is brand identity. Yves Rocher is a unique cosmetic brand which promotes the use of biological ingredients in products, manifesting a deep commitment to and appreciation for the natural world. One of the company's core values is to make beauty accessible to all women, with high quality cosmetic products based on plant extracts. Another core value is the well-being of women. The strong brand identity of Yves Rocher is built around this message, with a story told for each product, providing the company with the number one position on the French cosmetic market. Furthermore, the group obtained the status of "Company with Mission" allowing commercial companies to officially pursue one or more social and environmental objectives as part of their activity. Regarding immaterial aspects, services offered by Yves Rocher are at the heart of the brand strategy, as they create strong brand loyalty underpinned by promotional offers and gifts. Indeed, the brand counts 30 million clients over the world. Yves Rocher is positioned to add value to what they offer with products that are regularly updated, an emphasis on botanicals and its French provenance.

Product development, innovations and launches are rapid, and promotional activity is intense. Yves Rocher's marketing position is very clear, differentiating itself with its natural-themed product range. Based on extensive scientific Research & Development (R&D), its products are made with ethically-sourced natural ingredients and the company emphasizes a high level of product functionality. The Yves Rocher's portfolio is wide with different categories including segments responding to different problems. The way the organization develops these services is possible thanks to its employees: more than 18,000 employees worldwide, allowing Yves Rocher to increase its international position. They work for the brand from harvesting, through manufacturing processes to selling the end products. Every stage of the Yves Rocher's value chain is internalized. Employees who are hired have strong background experience and are qualified in their field. The well-being of employees is at the heart of human resources within the group. The company is one of the best companies to work for in France, offering several benefits to its employees and opportunity for career progression within the organization.

Yves Rocher is a private company and does not release financial information. However, its most recent press statement reported that 2019 turnover was €2.7 billion, indicating increased growth from the previous year. The group also has very little debt.

Regarding tangible assets, the firm's infrastructure is a significant resource. Headquarters are located in La Gacilly in Brittany, and 1,700 botanical beauty stores are present in Western and Eastern Europe, North and Latin America, Middle-East, Africa and Asia. Furthermore, the company owns botanical gardens with 1,100 species of rare plants, 125 acres of organic fields, three factories in Brittany, one in Ireland, a green hotel and spa, and a nature foundation. *Table 1* presents Yves Rocher's essential resources and capabilities.

Yves Rocher's Resources and Capabilities
Strong brand image and value conveyed; Commitment in nature source of growth; Socially responsible brand; Company with mission.
18,000 employees spread worldwide; Qualified and experienced team members; Value chain internalized; Good working atmosphere caring of the well-being of employees with job promotion.
Strong Brand Strategy; Diversified product range; Quality of service; Competitive price; Customer relationship; Strong R&D.
Firm infrastructure: 1 Headquarters (HQ); 4 factories; 125 acres of organic fields; 1,700 Stores over the world; A green hotel; Nature Foundation; Global reach.
€2.7 billion of turnover; Family and private company.

Table 1: Yves Rocher List of Resources and Capabilities

Step 2: Identification of a Resource Categorization System

According to Tran *et al*. (2020), RBV focuses on internal resources within a company to manage a sustainable competitive advantage. It is critical that the organization elaborate on inter-firm relationships to create inter-firm resources that are inimitable by competitors (Dyer *et al.*, 2018). Resources that are defined as stocks of firm-specific assets cannot be easily duplicated and cannot be easily acquired in well-functioning markets. In addition, resources contribute directly or indirectly to value creation. These resources will eventually be converted into final products or services. Resources must be tangible or intangible and must be heterogeneous and immobile. Barney (1991) introduced the concept of RBV and attempted to provide a link between the heterogenous resources controlled by a corporation, resource mobility within the firm and the competitive advantage gained by the organization.

The resources of the company are used to develop strategies to increase the overall productivity and performance of the enterprise, and these might be relatively wide ranging. Barney (1991) classifies these resources into four categories: (1) *physical assets*; (2)

financial resources; (3) *human capital*; and (4) *organizational culture*. According to the decision maker, the resources described previously in *step 1* can be classified according the four categories presented by Barney (1991). This will be explained in the next step.

Step 3: Categorization of the Yves Rocher's Resources and Capabilities

For the categorization of the *Yves Rocher*'s resources and capabilities, the four categories listed above are considered, namely: organizational culture; human capital; physical assets; and financial capital.

Considering *organizational culture*, Yves Rocher embraces a friendly environment, providing products with natural origin ingredients. This aligns it with global trends for "organic" and "botanic" products. This has helped underpin its strength on global market, where demand for natural cosmetics is growing significantly. The brand innovates with unique natural products, promoting their natural features. Furthermore, with its 100% natural plant-based products, Yves Rocher is enrolling itself in the fashion trend, benefiting from its leader position. Also, investing in the ideology of the company culture, the organization developed a nature foundation (*i.e.*, Yves Rocher Foundation) with a mission to protect biodiversity.

Regarding *human capital*, the company hires more than 18,000 employees worldwide, offering a large choice of job positions which it is able to do as the whole value chain is internalized (*i.e.*, from harvesting to finished products in stores to be sold). All employees are qualified, passionate and experienced in their field, providing their best skills to contribute to the performance of the organization. The company is directed by the Rocher family, with Bris Rocher as CEO since 2010. The well-being of employees is at the heart of the human resources department, offering employees good benefits. Brand growth, company internationalization and group innovations are made possible through successful teams and a dynamic and respectful management approach. The HR department takes care of the employees' professional and personal well-being through support, training, career management, mobility and accessibility. Moreover, the human capital of Yves Rocher is made by the employees' knowledge and intelligence. Through this brand strategy, deployed by employees, Yves Rocher offers its customers a diversified portfolio with a wide range of product categories and specific treatments, aiming to satisfy every client. The key to its strategy is competitive price for great quality products, which leads to brand loyalty maintained by promotional offers and gifts. Yves Rocher builds a strong customer

relationship, making it renowned in France and across the world, as well as differentiated from competitors.

With regard to *physical assets*, Yves Rocher counts more than 680 stores in France and around 1,700 spread worldwide. The firm's infrastructure is also composed of headquarters in La Gacilly, three manufacturing factories in Brittany and one in Ireland (*i.e.*, eco-friendly plant to respect the brand concept and ideology), one hundred and twenty-five acres of organic fields, one green hotel and spa and one nature foundation where the group in undertaken mission for the earth.

Finally, regarding the *financial assets* of the company, Yves Rocher is a private company and does not release financial information. The 2019 turnover was of €2.7 billion. Bris Rocher has consolidated the business, buying back 19% of Yves Rocher from French pharmaceutical giant Sanofi in July 2012. This transaction valued the company at more than US$1.8 billion, based on Sanofi's financial disclosures. Currently, the Rocher family owns 100% of stocks of each brand of its portfolio of the business. *Table 2* introduces the allocation of Yves Rocher's resources and capabilities according to the four categories identified in *step 2*.

CATEGORIES	Yves Rocher resources and capabilities
Organization Culture	Strong brand image and value conveyed; Commitment to nature source of growth; Socially responsible brand; Company with mission.
Human Capital	18,000 employees spread worldwide; Qualified and experienced team members; Value chain internalized; Good working atmosphere, caring for the well-being of employees with job promotion opportunities. Strong Brand Strategy: Diversified product range; Quality service, Competitive price; Customer relationship; Strong R&D.
Physical Assets	Firm infrastructure: 1 HQ, 4 factories, 125 acres of organic fields, 1,700 Stores over the world, A green hotel; Nature Foundation; Global reach.
Financial Assets	€2.7 billion of turnover; Family and private company.

Table 2: Yves Rocher's Resources and Capabilities Classified into RBV's Categories

Step 4: Postulates of VRIO Applicability

Once internal resources and capabilities are identified and categorized according to the RBV theory, they must fulfill the four postulates of VRIO applicability.

The first VRIO postulate of applicability is the tangibility of resources, which includes physical assets, financial assets and human capital. These items can be liquidated easily and have a set value. Tangible assets are the main type of asset that companies use to produce their product and service. According to the Yves Rocher's resources, *physical assets* such as the firm's infrastructure are tangible, dealing with plants, building, lands and machinery. Indeed, with its 1,700 stores over the world, four manufacturing plants, 125 acres of organic fields, green hotel, nature foundation and headquarters, the company possesses many tangible resources.

The second VRIO postulate of applicability is the intangibility of resources, which are embedded in the organizational practices and routines (Barney, 1991). Yves Rocher strongly relies upon their intangible resources, particularly regarding brand strategy spread over the market through the employees' know-how, skills and intelligence. Indeed, the group deploys a specific business strategy which greatly differentiates itself from its competitors. Through this business strategy, the organization's reputation is shared, asserting Yves Rocher as the leader of botanical cosmetics in France. This strategy has also made Yves Rocher famous worldwide for its quality products and competitive prices, enrolling itself in an ecological approach. Brand loyalty, underpinned by promotional offers and gifts, sustains a customer relationship which has earned the company 30 million clients across the world.

Tangible and intangible resources are then divided in two critical assumptions: immobility and heterogeneity. Owning these assumptions will improve the efficiency and effectiveness of the company. Yves Rocher guarantees the immobility of its resources and capabilities thanks to its unique organizational culture. Indeed, organizational culture includes the values and ideologies of the brand; it is not mobile and is not transferable to other companies. Yves Rocher has managed to build a powerful structure through its brand image integrating environmental values and commitment to ecology. The organization is undertaking concrete actions through products sold with eco and recycled/recyclable packaging, clean, natural and organic formulas and also with its nature foundation taking part in biodiversity protection. Furthermore, the group obtained the status of "Company with Mission", allowing commercial companies to officially pursue one or more social and environmental objective as part of their activity.

As far as heterogeneity is concerned, it assumes that each company has different skills, capabilities, structure and resources, and that makes each company different. Yves Rocher distinguishes itself in terms of heterogeneity by the combination of its multiple tangible and intangible resources, allowing the organization to differ from its competitors in

the cosmetic sector. Indeed, thanks to its infrastructure, the company is able to manufacture high quality products at competitive prices, while maintaining environmental and ecological values with organic formulas from its own biological fields. Also, through its strong organizational culture, the firm has developed values around biodiversity, spreading its strong brand image involved in planet protection. Based on this organizational culture, the corporation developed a specific business strategy which differentiates itself from competitors, allowing it to reach first position in the market. Yves Rocher is a "first mover" thanks to all its resources and capabilities and its unique business model, as it produces and sells botanical cosmetics and also undertakes a mission for the planet. The following step will present the VRIO matrix associated to the Yves Rocher's resources and capabilities.

Step 5: VRIO Matrix

When the four postulates of VRIO applicability are fulfilled, the framework can be developed according to its four pillars. VRIO stands for valuable, rare, inimitable and organization-oriented. The following VRIO matrix proposes a visual tool to further understand how these four attributes can be applied to resources and capabilities and lead to sustained competitive advantage. According to Barney (1991), a resource must be valuable, providing opportunities or neutralizing threats to the corporation's environment. A resource must be rare among a company's competitors and imperfectly imitable, meaning it would be costly or impossible to recreate. Finally, the resource must be non-substitutable, meaning that there cannot be a strategic equivalent substitute. The four following questions should be answered positively to reach the potential of sustainable competitive advantage: (1) *Is the resource/capability valuable?*; (2) *Is it rare?*; (3) *Is it difficult to imitate?*; and (4) *Is the company organized to take advantage of the resource/capability in question?*. *Table 3* introduces the VRIO matrix on the Yves Rocher's resources and capabilities.

Categories	Yves Rocher's Resources and Capabilities	V	R	I	O	Type of Competitive Advantage
Financial Assets	€2.7 billion of turnover; Family and private company.	YES	NO	--	--	Competitive Parity
Physical Assets	Firm infrastructure: 1 HQ, 4 factories, 125 acres of organic fields, 1,700 stores over the world, a green hotel; a nature foundation; global reach.	YES	YES	NO	--	Temporary
Human Capital	18,000 employees spread worldwide; qualified and experienced team members; value chain internalized; good working atmosphere caring of the well-being of employees with job promotion.	YES	YES	NO	--	Temporary
	Strong brand strategy: diversified product range; quality of service, competitive price; customer relationship; strong R&D.	YES	YES	YES	YES	Sustainable
Organizational Culture	Strong brand image and value conveyed; commitment to nature, source of growth; socially responsible brand	YES	YES	YES	YES	Sustainable
	"Company with Mission"	YES	YES	NO	--	Temporary

Table 3: VRIO Matrix with Yves Rocher's Resources and Capabilities

Financial assets are mainly composed of financial capital (*i.e.*, inventory, cash and trademarks) and turnover of the company. As the organization is a family business, and consequently a private firm, it does not release financial information. This is a decision made by the Chief Executive Officer (CEO) and their family. Furthermore, considering the VRIO matrix, these resources and capabilities can be seen as valuable, but do not fulfil the other three pillars.

Regarding physical assets that report the firm infrastructure, organic harvesting, production, distribution and logistics are still carried out in La Gacilly, in France, by a workforce of around 7,000 employees. This adds to the idea of an almost cottage industry and supports the quasi-ethical positioning of the brand. The firm infrastructure is unique and,

therefore, valuable. However, they might be imitated by competitors who have the means and create rivalry.

Human capital resources and capabilities are mostly formed from the workforce of Yves Rocher and the employees' intelligence contributing to business strategy. The company's staff members are spread across every country in which the organization operates, representing 18,000 employees. These employees are skilled and experienced, adding value for the performance of the firm. Human resources management insures a good atmosphere within the corporation combined with job evolution opportunities and employee rewards. However, competitors could imitate Yves Rocher with a strong workforce, meaning this could be only a temporary advantage for the company. Nevertheless, as of today, none of its competitors has been able to surpass the French multinational. Yves Rocher offers a diverse product range, which underpins its customer relationship with constant innovations thanks to its strong R&D. The brand promotes inclusiveness by providing products for every woman. Yves Rocher holds a sustainable competitive advantage thanks to its unique brand strategy.

Finally, the organization culture of Yves Rocher is in itself an interesting asset. Indeed, the uniqueness of the cosmetic brand, committed to the protection of biodiversity, sets the company apart from competitors. The organization conveys strong brand values of social and environmental responsibility through production of organic products in recyclable packaging, and through actions in their mission. The corporation created a nature foundation with which they developed charities for the natural environment, for the emancipation of women and for children. These resources are valuable, rare, difficult to imitate and organizational-oriented providing sources of sustained competitive advantage to the organization. As of today, no other company has equivalent assets. In addition, Yves Rocher is the only international brand to achieve the status of "Company with Mission". Mission-based company status allows commercial companies to officially pursue and be involved with one or more social and environmental objective within the framework of their activity, coupled with its economic objectives. However, mission-based company status is only considered a dynamic factor of competitiveness, and not a sustainable competitive advantage, since Yves Rocher does not hold any patent to protect this aspect of the company. This advantage is not impossible to imitate and, sooner or later, competitors will achieve the same status.

Step 6: Identification of Critical Factor of Success

CFS are identified only when the resources and capabilities meet the four pillars of the VRIO matrix. They refer to skills and assets which provide profitability in a particular market and sustain competitive advantage. The combination of these four attributes allows for the reduction in cost or increase in price of a product or service, relative to competitors.

By offering diverse ranges of products committed be eco-friendly without compromising quality or competitive pricing, Yves Rocher differentiated itself from competitors. This business model is valuable, guaranteeing excellent performance for the organization. It is also unique and based on rare features, difficult to imitate and substitute. By standing out, Yves Rocher was able to succeed in a challenging sector and proved its efficiency of management and that its products meet the customers' needs.

Furthermore, the organizational culture of Yves Rocher can be demonstrated as another CFS, as the company developed a deep and rare brand image, recognizable among other brands. What the corporation conveys through its values and engagement is imperfectly imitable. This organizational culture affords a competitive advantage to the organization, which is imperfectly imitable and non-substitutable. According to the decision maker, the brand concept of Yves Rocher, enrolling in ecology, is difficult to imitate as they differentiate themselves with distinct features and services, such as: the promotion of nature; the protection of biodiversity; and solidarity. This is non-imitable and non-substitutable. The following topic will introduce the application of DEMATEL and focus on its analysis, results and recommendations.

3.2. DEMATEL Application

The DEMATEL approach was developed to identify the principles of causality in the chain components of a complex system. The methodology aims to design a visual structured model, dealing with the assessment of interdependent relationships between factors and the identification of the most important ones. This allows for the structure of complicated cause-and-effect relationships to be visualised through diagrams or matrices. It emphasizes influential criteria in strategic management converting the interrelations between factors into a comprehensive structural model, dividing them into a cause group and an effect group.

The DEMATEL method ranks criteria for the long-term decision-making process and also indicates the scope of improvement. In the previous section, the criteria selection was conducted among the resources and capabilities of the chosen company (*i.e.*, Yves Rocher, following the VRIO framework). In this section, the DEMATEL method will be applied to discern the influence between the four previously identified categories namely: *Financial Assets*; *Physical Assets*; *Human Capital*; and *Organizational Culture*.

DEMATEL focuses on the following fundamental conditions: (1) the normalized direct-influence matrix X is established from identified factors with indicated pairwise relations using an integer scale from 0 to 4 to assess influence among these factors; (2) it results in the construction of a total-influence matrix T; and (3) influential relation maps are produced, which represent the mutual influence of the analyzed objects in terms of cause-and-effect relationships. *Table 4* introduces the 0–4 scale on which the decision maker scored Yves Rocher's resources and capabilities.

SCALE	DESCRIPTION
0	No influence
1	Low influence
2	Medium influence
3	High Influence
4	Very high influence

Table 4: DEMATEL 0–4 Influence Scale

The decision maker was asked to pairwise compare the four categories of resources and capabilities of the chosen company according to a 0-4 scale (*i.e.*, *Financial Assets*; *Physical Assets*; *Human Capital*; and *Organizational Culture*). *Table 5* presents the scores provided by the decision maker to each combination analyzed, where C_i stands for category i.

	C1	C2	C3	C4	SUM
C1	0.0	4.0	3.0	1.0	8.0
C2	3.0	0.0	4.0	2.0	9.0
C3	4.0	2.0	0.0	4.0	10.0
C4	2.0	3.0	1.0	0.0	6.0
SUM	9.0	9.0	8.0	7.0	

Table 5: Scores Obtained for the Pairwise Comparisons of Categories

As shown in *Table 5*, C1 – *Financial Assets* – has a very high influence on C2 – *Physical Assets*. C1 has also a high influence on C3 – *Human Capital*. Finally, C1 has a low influence on C4 – *Organizational Culture* – as it is not impacted by finance. Indeed, the organizational culture of Yves Rocher is settled among the company core business and value, and the financial assets do not affect it.

Considering the threshold value of α (*i.e.*, 1.2388 following *section 2.3*), it can be said that C1 causes C2 and C3. This is just an example of the analyses carried out for the remaining combinations, which allow for the application of the DEMATEL technique. *Table 6* presents the results obtained for vectors *(r+c)* and *(r-c)*.

Categories	(r+c)	(r-c)
Fiancial Assets	10.3409	-0.2955
Physical Assets	10.7017	0.1108
Human Capital	10.5455	0.6648
Organizational Culture	8.0540	-0.4801

Table 6: Direct and Indirect Effects of the Categories

(r+c) values determine the importance of the categories. Based on *Table 6*, *Physical Assets* (C2) was considered the most important category of resources and capabilities, with the largest *(r+c)* value (*i.e.*, 10.7017), whereas *Organizational Culture* (C4) was the least important category with the smallest *(r+c)* value (*i.e.*, 8.0540). According to *(r+c)* values, the prioritization of the importance of the four categories of resources and capabilities was *C2 > C3 > C1 > C4*.

Based on the *(r-c)* values, the four categories were divided into: (1) cause group; and (2) effect group. If the *(r-c)* value of a category was positive, or net cause, it was allocated to the cause group, meaning it directly affected the others. The highest *(r-c)* factors also had the greatest direct impact on the other factors. In this study, *Human Capital* (C3) and *Physical Assets* (C2) were classified in the cause group, having *(r-c)* values of 0.6648 and 0.1108, respectively. It also indicated that *Human Capital* (C3) was the most critical impact factor, with the largest effect on the others. If the *(r-c)* value was negative, or net effect, the category was allocated to the effect group, meaning it was largely influenced by the others. In this study, *Financial Assets* (C1) and *Organizational Culture* (C4) were classified in the effect group, with *(r-c)* values of -0.2955 and -0.4801, respectively. C4 was the most affected

by the other factors (C2 and C3). According to *Figure 3*, C3 has direct effect on C4 and mutual effect regarding C1 and C2. C1 has mutual effect regarding C2 and C3, and C2 mutually effects C1, C2 and C3. C3 (*Human Capital*) is the most critical category because it directly influences all the other three categories.

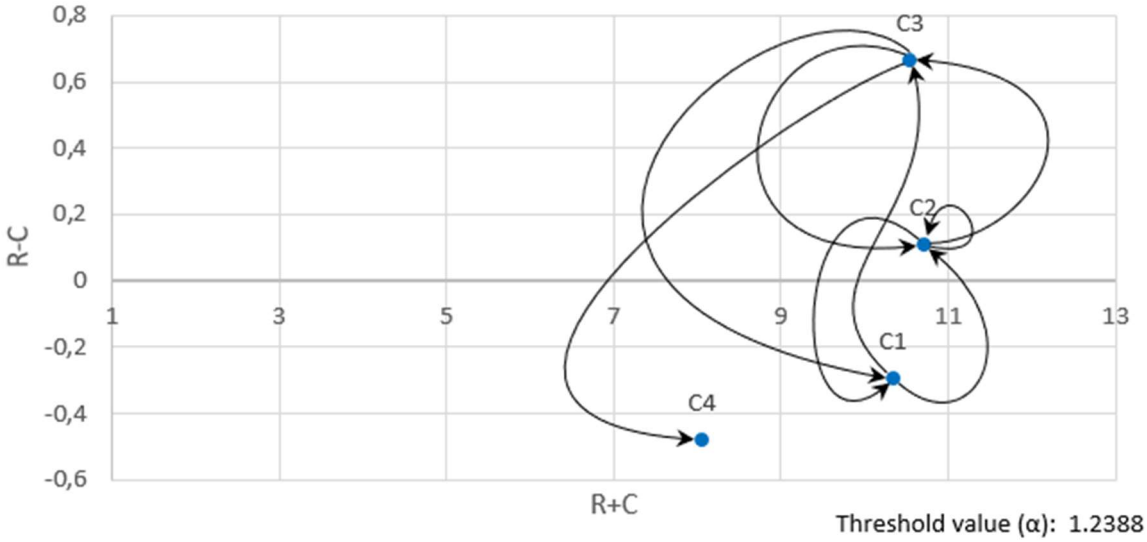

Figure 3: DEMATEL Diagram on the Categories of the VRIO Matrix

The decision maker was quite surprised with the results of the DEMATEL application. Although she initially rated the *Organizational Culture* (C4) as the most influent category, she agreed with the results projected by the DEMATEL diagram. The same type of analysis was carried out for each category of resources and capabilities, projecting an intra-category analysis. *Table 7* introduces the direct and indirect effects of the resources and capabilities identified in each category.

Criteria	(r+c)	(r-c)
Financial Assets (FAR)		
€2.7 Billion of Turnover	16.0000	0.0000
Family and Private Company	16.0000	0.0000
Physical Assets (PAR)		
1 HQ	4.4189	-0.1516
4 Factories	2.6369	-0.0203
125 Acres of Organic Fields	2.4493	-0.0195
1.700 Stores Over the World	2.8771	-0.0206
Green Hotel	1.9186	0.1132
Nature Foundation	2.3463	0.1122
Global Reach	3.3464	-0.0133
Human Capital (HCR)		
18.000 Employees	6.8047	0.6333
Qualified and Experienced Team Members	8.4606	0.1368
Value Chain Internalized	7.0122	-0.1579
Good Working Atmosphere	3.7115	0.2171
Quality of Service	7.9901	-0.2117
Customer Relationship	6.4064	-0.4084
Strong R&D	7.3393	-0.2091
Organizational Culture (OCR)		
Strong Brand Image and Value Conveyed	91.0000	-3.0000
Commitment in Nature Source of Growth	91.0000	3.0000
Socially Responsible Brand	94.0000	0.0000
"Company with Mission"	94.0000	0.0000

Table 7: Direct and Indirect Effects of the Criteria under Each Category

The decision maker ranked, according to the 0–4 scale, all potential combinations for the *Financial Assets* category. FAR1 stands for "Financial Asset | Resource 1". The Financial Assets include FAR1 – *€2.7 Billion of Turnover* and FAR2 – *Family and Private Company*. *Table 8* introduces the different potential combinations, and the score provided by the decision maker for each combination assessed.

	FAR1	FAR2	SUM
FAR1	0.0	4.0	4.0
FAR2	3.0	0.0	3.0
SUM	3.0	4.0	

Table 8: Scores Obtained for the Different Combinations of Financial Assets Category

FAR1 – *€2.7 Billion of Turnover* – has a very high influence on FAR2 – *Family and Private Company*; and FAR2 has also a high influence on FAR1 as the performance of the company was based on this unique business model. This unique business model allowed Yves Rocher to gain high turnover, differentiating the company from others.

Considering the threshold value of α (4.00), FAR1 causes effect on FAR2. By the same logic, FAR2 causes effect on FAR1. *Table 7* shows that FAR1 and FAR2 have the same level of importance when quantified with *(r+c)* values: 16.000. Furthermore, based on the *(r-c)* value of 0.000, FAR1 and FAR2 have mutual effects on each other, as presented in *Figure 4*. The decision maker agreed on the cause-and-effect relationships observed.

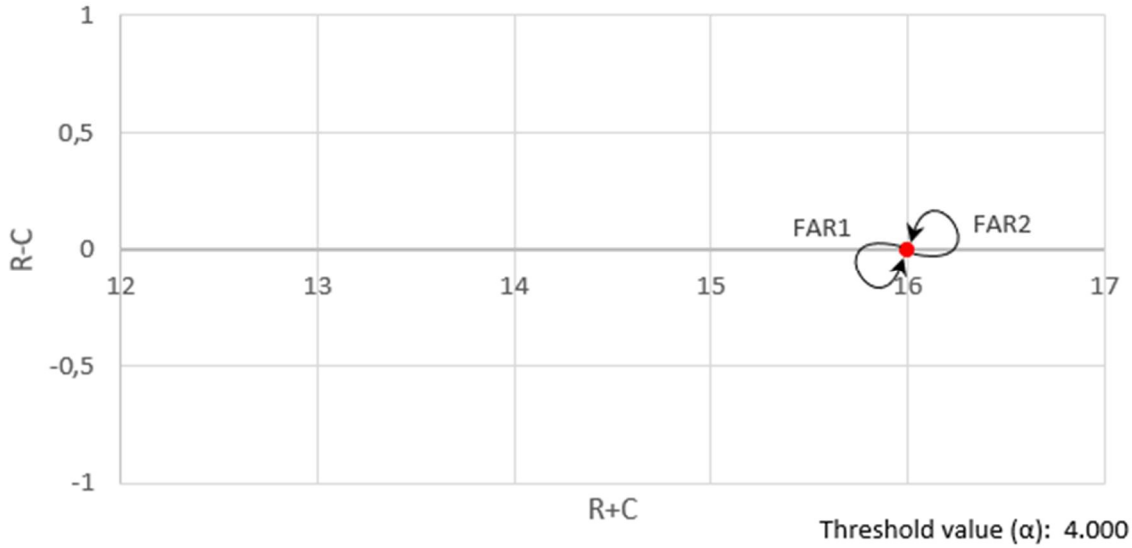

Figure 4: DEMATEL Diagram on the Financial Assets Category

The decision maker ranked, according to the 0–4 scale, all potential combinations for the *Physical Assets* category. PAR1 stands for "Physical Asset | Recourse 1". The physical assets are composed of PAR1 – *1 HQ*, PAR2 – *4 Factories*, PAR3 – *125 Acres of Organic Fields*, PAR4 – *1.700 Stores Over the World*, PAR5 – *Green Hotel*, PAR6 – *Nature Foundation* and PAR7 – *Global Reach*. *Table 9* shows the score provided by the decision maker for each combination evaluated.

	PAR1	PAR2	PAR3	PAR4	PAR5	PAR6	PAR7	SUM
PAR1	0.0	4.0	4.0	4.0	3.0	3.0	4.0	22.0
PAR2	4.0	0.0	2.0	2.0	1.0	1.0	2.0	12.0
PAR3	4.0	2.0	0.0	1.0	1.0	1.0	2.0	11.0
PAR4	4.0	2.0	1.0	0.0	1.0	1.0	4.0	13.0
PAR5	4.0	1.0	1.0	1.0	0.0	1.0	1.0	9.0
PAR6	4.0	1.0	1.0	1.0	1.0	0.0	3.0	11.0
PAR7	4.0	2.0	2.0	4.0	1.0	3.0	0.0	16.0
SUM	24.0	12.0	11.0	13.0	8.0	10.0	16.0	

Table 9: Scores Obtained for the Different Combinations of Physical Assets Category

PAR1 – *1 HQ* has very high influence on PAR2 – *4 Factories*, PAR3 – *125 Acres of Organic Fields*, PAR4 – *1,700 Stores Over the World* and PAR7 – *Global Reach*, because the HQ is where the main decisions are made in order to develop the infrastructure required for production and to reach a global reputation. Also, PAR1 has high influence on PAR5 and PAR6 as it is still where decisions are made to develop such infrastructure, but these choices were mainly lead by the organizational culture of Yves Rocher. The example of analysis conducted previously can be applied to the other resources in the *Physical Assets* category.

Considering the threshold value of α (*i.e.*, 0.2040), it can be said PAR1 causes effect on PAR1, PAR2, PAR3, PAR4, PAR5, PAR6 and PAR7. This is just an example of the analyses carried out for the remaining combinations, which allowed for the application of the DEMATEL technique and the *(r+c)* and *(r-c)* results presented in *Table 7*. According to *Table 7*, under the *Physical Assets* category (C2), this analysis found that PAR1 – *1 HQ* and PAR7 – *Global Reach* were the two most important criteria because they scored first and second highest (*r+c*) values of 4.4189 and 3.3464, respectively. However, both PAR1 – *1 HQ* and PAR7 – *Global Reach* were in the effect group based on their negative *(r-c)* values of -0.1516 and -0.0133, respectively. The two highest positive *(r-c)* values were FAR5 – *Green Hotel* and FAR6 – *Nature Foundation*, with values of 0.1132 and 0.1122, respectively, being allocated to the cause group. These causes are identified in *Figure 5*.

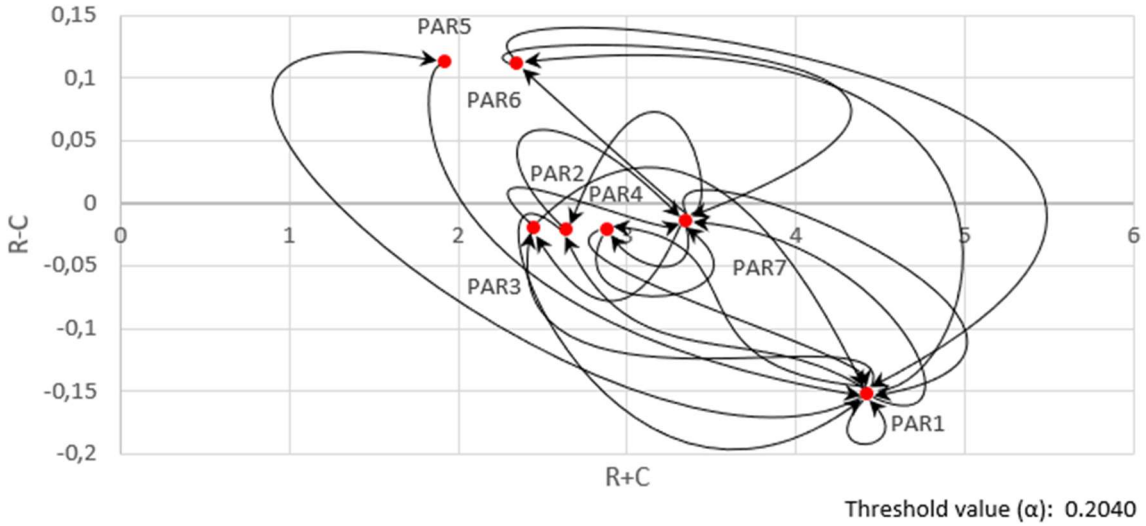

Figure 5: DEMATEL Diagram on the Physical Assets Category

As can be seen in *Figure 5*, PAR1 – *1 HQ* is the most important criteria because it presents the highest value in the *(r+c)* axis. The decision maker agreed with the results, adding that it is at HQ that all decisions are made, nothing could come out without decisions previously made at the HQ.

All potential combinations for the *Human Capital* category were also ranked by the decision maker according to the same 0–4 scale. HCR1 stands for "Human Capital | Recourse 1". Human capital is formed by HCR1 – *18,000 Employees*, HCR2 – *Qualified and Experienced Team Members*, HCR3 – *Value Chain Internalized*, HCR4 – *Good Working Atmosphere*, HCR5 – *Quality of Service*, HCR6 – *Customer Relationship* and HCR7 – *Strong R&D*. *Table 10* shows the different combinations and the score assigned by the decision maker to each combination studied.

	HCR1	HCR2	HCR3	HCR4	HCR5	HCR6	HCR7	SUM
HCR1	0.0	3.0	4.0	1.0	4.0	3.0	3.0	18.0
HCR2	3.0	0.0	4.0	3.0	4.0	4.0	4.0	22.0
HCR3	4.0	4.0	0.0	1.0	3.0	1.0	3.0	16.0
HCR4	2.0	3.0	1.0	0.0	1.0	1.0	1.0	9.0
HCR5	2.0	4.0	4.0	1.0	0.0	4.0	4.0	19.0
HCR6	2.0	3.0	1.0	1.0	4.0	0.0	3.0	14.0
HCR7	2.0	4.0	3.0	1.0	4.0	3.0	0.0	17.0
SUM	15.0	21.0	17.0	8.0	20.0	16.0	18.0	

Table 10: Scores Obtained for the Different Combinations of Human Capital Category

HCR1 – *18,000 Employees* – has a very high influence on HCR3 – *Value Chain Internalized* – and HCR5 – *Quality of Service*. Indeed, the great number of employees allow the organization to internalize its activities and, thus, its whole value chain. Also, in gathering such a significant number of employees, the services provided become more diverse and of higher quality. HCR1 is highly influential over HCR2 – *Qualified and Experienced Team Members*, as the more employees a company owns, the more training is required to provide the best performance. Moreover, it is highly influential over HCR6 – *Customer Relationship* – because the more engrained the employees are within the corporation, the easier it will be to take care and satisfy its consumers. It also influences HCR7 – *Strong R&D* – since the more employees are hired, the better R&D will be developed. HCR1 has a low influence on HCR4 – *Good Working Atmosphere*, because the atmosphere within a company does not depend on the number of employees. The analysis previously performed can be applied on other resources in the *Human Capital* category.

Considering the threshold value of 0.4870, HCR1 effects HCR2, HCR3, HCR5, HCR6 and HCR7. This is just an example of the analyses carried out for the remaining combinations, which allowed for the application of the DEMATEL technique. The *(r+c)* and *(r-c)* results are presented in *Table 7*. Based on higher *(r+c)* values of 8.4606 and 7.3393, respectively, HCR2 – *Qualified and Experienced Team* – and HCR7 – *Strong R&D* – are the two most important criteria. HCR2 was found to be in the cause group with a positive *(r-c)* value of 0.1368. The highest positive *(r-c)* value of 0.6333 was presented by HCR1. HCR7fell within the effect group with *(r-c)* value of -0.2091. These causes are illustrated in *Figure 6*.

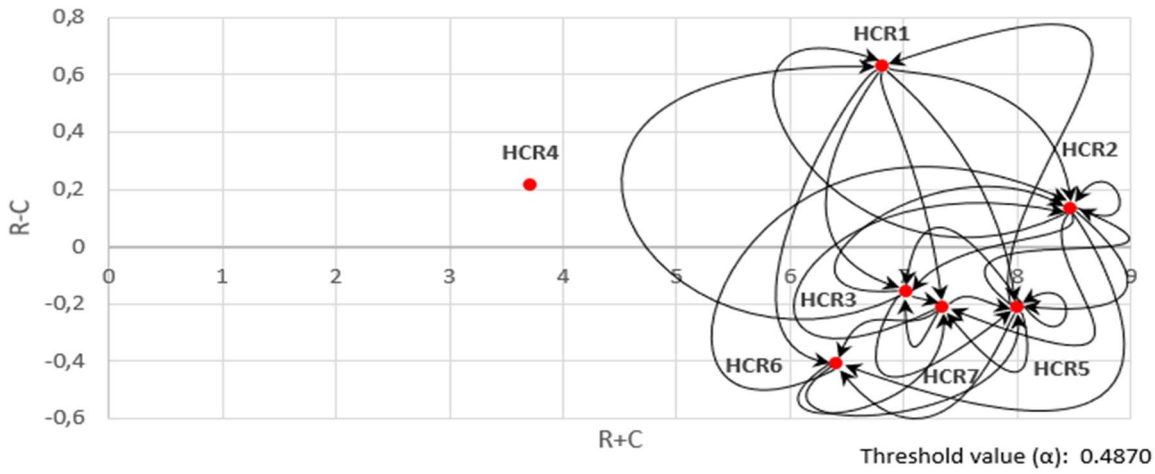

Figure 6: DEMATEL Diagram on the Human Capital Category

As can be seen in *Figure 6*, HCR2 – *Qualified and Experienced Team* – is represented as the most significant criteria, given its impact on the other six criteria. The decision maker agreed with the results obtained. From her point of view, HCR2 is an important asset, which will influence other criteria and, thus, the performance of the brand.

Last but not least, the decision maker was asked to rank all potential combinations, according to the 0–4 scale, for the *Organization Culture* category. OCR1 stands for "Organizational Culture | Resource 1". Organization culture includes OCR1 – *Strong Brand Image and Value Conveyed*, OCR2 – *Commitment in Nature Source of Growth*, OCR3 – *Socially Responsible Brand* and OCR4 – *"Company with Mission"*. *Table 11* identifies the different combinations, and the score provided by the decision maker to each combination analyzed.

	OCR1	OCR2	OCR3	OCR4	SUM
OCR1	0.0	3.0	4.0	4.0	11.0
OCR2	4.0	0.0	4.0	4.0	12.0
OCR3	4.0	4.0	0.0	4.0	12.0
OCR4	4.0	4.0	4.0	0.0	12.0
SUM	12.0	11.0	12.0	12.0	

Table 11: Scores Obtained for the Different Combinations of Organizational Culture Category

OCR1 – *Strong Brand Image and Value Conveyed* – is highly influential over OCR3 – *Socially Responsible Brand* – and OCR4 – *"Company with Mission"*, as both resources are embedded in the powerful Yves Roacher brand image. OCR1 has high influence over OCR2 – *Commitment in Nature Source of Growth*, as the Yves Rocher brand image influences the growth of the company. Consumers buy their products because of the message brand is conveying. Our previous analysis can be applied to the other resources of the *Organizational Culture* category.

Considering the threshold value of 11.5625, OCR1 has no cause and is just an effect, whereas OCR2 effects OCR1, OCR3 and OCR4. This is just an example of the analyses carried out for the remaining combinations, which allowed for the application of the DEMATEL technique and the *(r+c)* and *(r-c)* results presented *Table 7*. For the *Organizational Culture* category (C4), both criteria OCR3 – *Socially Responsible Brand* – and OCR4 – *"Company with Mission"* – have the same level of *(r+c)*, which is equal to 94.000. Moreover, OCR3 – *Socially Responsible Brand* – and OCR4 – *"Company with*

Mission" were net cause with *(r-c)* value of 0.000. However, OCR2 – *Commitment in Nature Source of Growth* – has the highest positive *(r-c)* value of 3.000. These causes are identified in *Figure 7*.

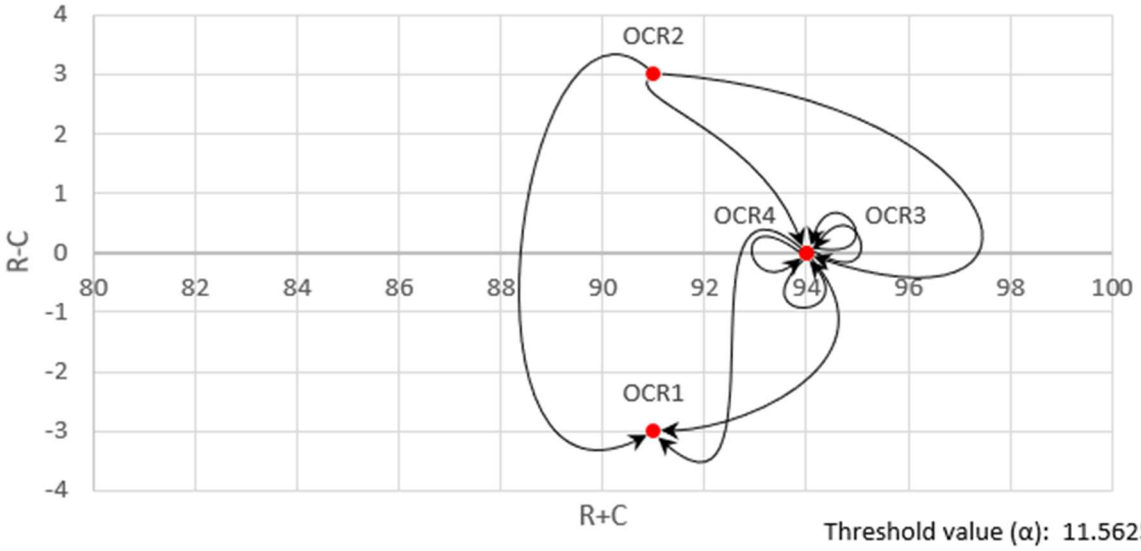

Figure 7: DEMATEL Diagram on the Organizational Culture Category

Considering *Figure 7*, OCR2 – *Commitment in Nature Source of Growth* – is the most critical criteria because it directly influences the other three criteria. Here, before formal analysis, the decision maker identified OCR1 – *Strong Brand Image and Value Conveyed* – as a the most critical factor. However, after studying the DEMATEL application, she understood and agreed with the results, identifying the OCR1 such as an effect and OCR2 as the main cause with the most influence over the other criteria. The next topic will offer a deeper insight into the results obtained using the DEMATEL approach, as well as future recommendations.

3.3. Analysis of Results and Recommendations

This study applied DEMATEL not only to analyze Yves Rocher's categories of resources and capabilities, but also to determine the cause-and-effect relationships among them. The outcome implies that the management should focus on improving the two core categories in the cause group (*i.e.*, *Physical Assets* and *Human Capital*). The two remaining categories

were identified in the effect group (*i.e.*, *Financial Assets* and *Organizational Culture*), which were also impacted by the ones in the cause group.

By prioritizing the importance of resources and capabilities and the cause-and-effect relationships among them, this analysis found that *Physical Assets* and *Human Capital* are the most critical categories of resources and capabilities for Yves Rocher. However, when applying the VRIO framework, *Physical Assets* did not meet all the VRIO postulates, only the *Human Capital* category did. Therefore, in the aim of enhancing the overall competitive advantage, Yves Rocher company should allocate more resources to this core category. The corporation should emphasize on the *Human Capital* category since it is the main critical criteria in the adjustment of corporate planning and would yield highest positive results.

Regarding the implications of this approach, it provides an innovative methodology to analyze quantitative and qualitative resources and capabilities. No prior literature has been found using the proposed methodological approach, which offers an alternative that could be implemented by experts of different areas, thereby enhancing the strategic management field. The combination of various frameworks (*i.e.*, RBV, VRIO, MCDA and DEMATEL) allowed for the creation of an innovative resource appraisal system. Nevertheless, considering that qualitative approaches and frameworks, such as RBV and VRIO, present some limitations, which have been pinpointed in terms of their incapacity for undertaking an empirical quantitative study, this study focused on the detailed analysis of qualitative and quantitative criteria, as a mean to apprehend the achievement of great performance of the Yves Rocher company in the area of natural cosmetic. To overcome these shortcomings, MCDA was introduced and presented the following benefits: (1) ability for simplification; and (2) holistic approach that benefits and differentiates decision-making processes and the participation of decision makers.

As for further recommendations, the quantification of VRIO can be used by a number of different businesses to further comprehend their tangible and intangible resources in hectic environments. The uncertainty and limitations that occurred when applying the conventional VRIO has been eliminated using MCDA and DEMATEL. This innovative framework should be considered as a deep understanding of a company's resources and capabilities and enhance improvements to reach sustained competitive advantage.

SYNOPSIS OF CHAPTER 3

The present chapter aimed to introduce the application of both VRIO and DEMATEL frameworks to the Yves Rocher company. The identification and the evaluation of resources and capabilities was conducted, resulting in recommendations for decision-making processes. Hence, the technical procedures of the DEMATEL methodology in the evaluation phase lead to the validation of the model. The first part of this chapter provides results of the application of RBV and the four postulates of VRIO applicability to Yves Rocher. Yves Rocher is a producer and retailer of high-quality botanic-positioned BPC products. To this extent, the interviewed decision maker, Vasiliki Markopoulou, followed the six steps of VRIO: *Step 1: List of Yves Rocher's Resources and Capabilities*; *Step 2: Identification of a Resource Categorization System*; *Step 3: Categorization of the Yves Rocher's Resources and Capabilities*; *Step 4: Postulates of VRIO Applicability*; *Step 5: VRIO Matrix*; and *Step 6: Identification of CFS.* As a result, the decision maker identified four categories of internal resources and capabilities participating to the great performance of the company: *Financial Assets*, *Physical Assets*, *Human Capital* and *Organizational Culture*. At this stage, the decision maker determined the *Human Capital* and *Organizational Culture* categories as the CFS of Yves Rocher. However, it was of importance to implement the cause-and-effect relationship-based decision support system to quantify the VRIO framework, thanks to DEMATEL. The approach was developed to identify the principles of causality in the chain components of a complex system. It aims to design a visual structural model, dealing with the assessment of interdependent relationships between factors and the identification of the most influent ones. To this mean, the framework followed its fundamental convictions to Yves Rocher's internal resources and capabilities: (1) establishment of the normalized direct-influence matrix X using an integer scale from 0 to 4 to assess influence among these factors; (2) construction of the total-influence matrix T; and (3) production of influential relation maps. The framework ascertained that the *Human Capital* category was the Yves Rocher's CFS, enhancing the overall competitive advantage. After the framework validation, the outcome and future recommendations became the focus of the last part of the chapter. The decision maker expressed her satisfaction with the results obtained. Naturally, updates and improvements are welcome.

CONCLUSION

A. Results and Limitations

The present dissertation confirmed the theory that, ***by following the DEMATEL approach, it is possible to develop a solid and transparent cause-and-effect relationship-based decision support system to quantify the VRIO framework.*** With this purpose in mind and having adopted a constructivist epistemological stance, the dissertation was divided in three chapters.

The first two chapters – theoretical and methodological backgrounds, respectively – covered: (1) an overview of the latest trends in strategic management; (2) the need to enable the VRIO framework to undertake an empirical quantitative study; and (3) the techniques and approaches used in the empirical component of the dissertation (*i.e.*, VRIO and DEMATEL applied to a company through the identification of resources and capabilities and respective cause-and-effect relationships). This study enabled us to infer that strategic management expertise is necessary for corporations' performance and longevity. Strategic management prey to changes in business environments that impact and influence organizational performance. However, it seems obvious that even though organizations are mostly guided by their core business, other economic and social factors influence decision-making processes and the achievement of sustainable competitive advantage. Bearing in mind these facts and the analysis made of previous evaluation models, it became clear that the subject of this study presents a complex decision problem. It was only possible to reach a resolution by resorting to the DEMATEL approach. This method allowed us to organize resources and capabilities in a very transparent, interactive and dynamic manner. With DEMATEL, determining rankings of resources and capabilities became possible within the context of VRIO quantification.

The third chapter – the empirical component – dealt with the definition, structure and evaluation of the decision support system. First, the VRIO framework was applied to the chosen company as a way to identify its resources and capabilities. Second, cause-and-effect relationships between resources and capabilities were analyzed. To this effect, it was necessary to invite a decision maker from the department of strategy development of the studied company to participate in a face-to-face interview. Once the accuracy and reliability

of the model had been tested and validated, the decision-maker agreed that the methodologies used in the analysis helped to improve the transparency and simplicity of the decision-making process, allowing recommendations to be brought together.

With respect to the drawbacks that could be overcome, the methodologies chosen for this study limited the scope. There was an intrinsic challenge in the selection of a decision maker because of limited availability and attainability. Indeed, it was difficult to find experts in the area who were accessible, with experience and available and willing to be interviewed. Some difficulties were also faced in the interview process with the decision maker. These included: (1) original uncertainty relating to the real inputs of the developed system; (2) uncertainty regarding the selection of resources and capabilities based on the interviewee's proposals, values and thoughts; (3) complexity in balancing the number of resources and capabilities, without omitting the most important ones; and (4) uncertainty in terms ranking resources and capabilities. Furthermore, the application of the DEMATEL approach revealed further restrictions, namely in the elaboration of preferences and influences between resources and capabilities.

All things considered, it is possible to recognize several inputs from the model developed. It is, in essence, a learning process as the structured system is favorable to focus on the appraisal made and to recommend adjustments. To this extent, the approach permits easier quantification of the VRIO framework and is a useful tool for strategic management. It results also in future decisions that are well thought out and more transparent. However, it is important to stress that the model suggested in this dissertation holds specific characteristics and, therefore, findings cannot be extrapolated without sufficient precaution.

B. Managerial Implications and Concluding Remarks

The present dissertation reinforced how necessary strategic management is for the development of an organization in both economic and social terms, revealing a huge potential for this field of research. To this effect, several approaches widely used to quantify the VRIO framework – a tool used to reach sustainable competitive advantage – were analyzed. Although previous methods were mostly implemented in ambiguous and/or poorly transparent ways, we can acknowledge that there is no perfect approach. Taking this into consideration, it was deemed appropriate to supplement the assessment under analysis with the introduction and application of new methods, which enabled the shortcomings of the

existing methodologies to be counterbalanced. Therefore, the present dissertation aimed to acknowledge the possibility to develop a multi-criteria system to support the quantification of the VRIO framework, through its combination with the DEMATEL approach. This analysis allowed us to add value to VRIO and its process to reach competitive advantage, by discerning those resources and capabilities with greater influence on the company's performance. This benefits decision makers in terms of the implementation of strategic management in corporations.

Accordingly, the VRIO–DEMATEL framework allowed for the identification and quantitative analysis of Yves Rocher's CFS. Furthermore, it enabled the identification of improvement lines for the organization. For instance, Yves Rocher presents a huge competitive advantage (*i.e.*, mission-based status), which would be possible to imitate as the corporation does not hold any patent to protect this status, meaning other companies can and will achieve the same status sooner or later. Factors such as this mean it is necessary to counterbalance the study according to the different resources and capabilities. Improvement measures can be implemented based on knowledge from the cause-and-effect relationships procedure that we undertook.

C. Future Research

According to the findings of the present research, there is tremendous potential in the MCDA methodologies. In particular, the integration of the decision maker's perceptions into the procedure added solidness, reality and transparency to the designed model. Furthermore, strategic management might benefit from the VRIO–DEMATEL framework, as it participated in the improvement of sustainable competitive advantage achievement of a corporation. Future study and investigation should further analyze the benefits of conducting similar research using other MCDA methodologies, including Analytic Hierarchy Process (AHP), Decision Expert (DEX), Measuring Attractiveness by a Categorical Based Evaluation Technique (MACBETH) or *TOmada de Decisão Interativa e Multicritério* (*i.e.*, Interactive and Multicriteria Decision Making) (TODIM), that can be implemented to explore further strategic management.

Another interesting future course of action would be to expand the methodological approach developed in this dissertation to other settings. Finally, research is also recommended to strengthen the mechanism developed within the context of this dissertation,

or its extension to digital platforms. This would allow any decision maker to easily take part in the project and, consequently, contribute to the improvement of strategic management expertise by bringing transparency and robustness to future research. Therefore, any recommendation would be considered progress for our proposal, to promote the development of strategic management and reach of sustainable competitive advantage, through the quantification of the VRIO framework.

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