The Relationship between R&D Investment, Strategic Evolution and Firm Performance in the Automotive Industry

A Case Study of Renault and BMW

Hans Brunk & Lynn Hamandi

Bachelor Thesis | BSc in International Business
Lund University School of Economics and Management

Abstract

Title: The Relationship between R&D Investment, Strategic Evolution and Firm Performance in the Automotive Industry

Course: IBUH19 Degree Project in International Business BSc

Authors: Hans Brunk and Lynn Hamandi

Supervisor: Johan Dergård

Keywords: Strategy, R&D, Firm Performance, Renault, BMW

The purpose of this study is to investigate the relationship between R&D investment and strategy on firm performance for two automotive firms—Renault and BMW. This research was selected to explore the relatively undiscovered area of R&D expenditures and strategy as crucial determinants of firm performance. A mixed-method case study with a deductive research approach was chosen. The results reveal a statistically insignificant relationship between R&D investment and strategy on firm performance. We found that strategy resulting from management decisions forms the unseen, yet vital factor that affects how a firm performs. Despite statistical insignificance, the results display unique findings; the examined firms increased their R&D investments and performance while pursuing a Product-focus strategy. It was concluded that the relationship between R&D investment and strategy on firm performance is rather complex and vulnerable to many internal and external influences. Trends identified may be used to outline how a relationship could look like if the study scope were widened.

Acknowledgments

First, we would like to thank our supervisor Johan Dergård for his guidance and support throughout writing this dissertation. His advice and feedback were constructive and of great value.

Moreover, we would like to express our gratitude for Björn Holmqvist for his invaluable statistical consultation when needed. It is with great pleasure that we thank Julienne Stewart Sandgren for her advice regarding referencing.

Furthermore, we would like to thank Martin Blom and Madeleine Forsberg for guiding us as students in the International Business BSc program.

Last, and most important, we thank our families and friends for their constant encouragement and support along the way.

Hans Brunk

Lynn Hamandi

Table of Contents:

1. Introduction 5
1.1 Background and Problematization 5
1.2 Research Purpose 8
1.3 Outline 9

2. Theoretical Framework 11
2.1 Strategy and Firm Performance 11
2.1.1 Three Generic Strategies (1980) 11
2.1.2 Porter adds a fourth Generic Strategy (1985) 14
2.1.3 Porter Defines Strategy (1996) 15
2.1.4 Critiques and Support of the Generic Strategies 18
2.1.5 An Integrated Framework (2014) 22
2.2 R&D and Firm Performance 28
2.2.1 R&D Expenditures Positively Correlate to Firm Performance 29
2.2.2 R&D Expenditures Negatively Correlate to Firm Performance 29
2.3 Relationship between Strategy, R&D, and Firm Performance 30

3. Methodology 32
3.1 Research Approach 32
3.2 Research Design 33
3.2.1 Part One 33
3.2.2 Part Two 34
3.2.3 Part Three 34
3.3 Data Collection Method 35
3.4 Data Analysis Method 35
3.5 Variables 36
3.5.1 Independent Variable 37
3.5.2 Dependent Variables 37
3.5.3 Control Variables 38
3.6 Validity, Reliability, and Generalizability 39
3.7 Limitations 41

4. Results and Analysis 43
4.1 Automotive Industry Background 43
4.2 Renault's Strategy 44
4.2.1 Renault's Strategic Characteristics 44
4.2.2 Renault's Strategic Position 48

4.2.3 Renault's Strategic Evolution 48
4.3 Renault's R&D 50
4.3.1 Correlations 51
4.3.2 Scatter Plots - Dependent Variables 51
4.3.3 Scatter Plots - Control Variables 53
4.4 Renault's Strategy, R&D, and Firm Performance 54
4.4.1 Strategy and R&D 55
4.4.2 Strategy and Firm Performance 56
4.5 Summary of Renault 58
4.6 BMW's Strategy 59
4.6.1 BMW's Strategic Characteristics 59
4.6.2 BMW's Strategic Position 61
4.6.3 BMW's Strategic Evolution 62
4.7 BMW's R&D 65
4.7.1 Correlations 65
4.7.2 Scatter Plots- Dependent Variables 66
4.7.3 Scatter Plots- Control Variables 67
4.8 BMW's Strategy, R&D, and Firm Performance 68
4.8.1 Strategy and R&D 69
4.8.2 Strategy and Firm Performance 70
4.9 Summary of BMW 72

5. Case Comparison 73
5.1 Strategy 73
5.2 R&D and Firm Performance 74
5.3 Strategy, R&D, and Firm Performance 75

6. Discussion and Conclusion 77
6.1 Main Findings and Discussion 77
6.1.1 The Product Relationship of Strategy, R&D, and Firm Performance 77
6.1.2 The Strategic Iceberg 80
6.2 Conclusion 82

References 84

Appendix A – Renault 96

Appendix B – BMW 98

1. Introduction

1.1 Background and Problematization

In a rapidly escalating technological and globalized world, strategic and innovation management has become of paramount importance both in academia and in practice (Christensen, Raynor, & McDonald, 2015). Due to this increasingly volatile business environment, many traditional models and theories have become inapplicable (Pisano & Wheelwright, 1995). Technology has blurred the lines between industries, leaving many firms needing to evolve their strategies and adapt to new markets (Pisano & Wheelwright, 1995). This chase for a sustainable competitive advantage has left managers searching for innovative opportunities outside of usual operations to protect and extend strategic positions (Pisano & Wheelwright, 1995). Since barriers between industries are falling and technology is evolving at a heightened pace, it is more important than ever for firms to enhance and preserve their performance.

Firm performance is a term of multiple definitions and implications (Selvam, Gayathri, Vinayagamoorthi, Kasilingam, & Sigo, 2016). In this dissertation, we define it as the firm's functioning, organizational performance, and outcome of its different activities. Various factors may affect how a firm performs, in which some of the most studied and reviewed in academia is strategic positioning and R&D expenditure (Fryxell, 1990; Porter, 1996; Guo, Wang, & Wei, 2018). Firms are steadily increasing their R&D investments, implying a positive impact on firm performance (Grilishes, 1979; Erickson & Jacobson,1992; Ettlie, 1998; Erickson & Jacobson, 1992; Chen & Ibhagui, 2019). At the same time, firms are continuously striving to attain a competitive advantage by owning a unique strategic position—emphasizing the importance of strategy on performance (Moon, Yin, Helm, & Hur, 2014). Further, R&D expenditures and firm strategy are also connected since the range of operations a firm undertakes, including R&D, is assumed to stem from its strategy (Guo, Wang, & Wei, 2018). All of which has begged the question, where should management focus their efforts to enhance performance? Should they focus on guiding the entire organization

towards strategic objectives, or focus on a particular area, such as increased R&D? Further, what is the interplay between these elements? To decipher these questions, we must first clarify the firm's strategy and its technological investment, i.e., Research and Development.

What is strategy? According to most dictionaries, a strategy is “a careful plan or method” (Merriam Webster, n.d.). With language roots attached to military and conquest (Merriam Webster, n.d.), it is no wonder why the competitive business environment has widely adopted the term to describe a plan of action. Nonetheless, what does strategic purpose mean in the business environment? Acclaimed researcher Michael Porter (1996) has a compound definition for strategy. He argues that strategy is the creation of a unique and valuable position that involves different sets of activities, is about making trade-offs while competing, and is creating adequate fit among a company’s operations (Porter, 1996). This focus on strategic positioning has gained a lot of attention for its impact on firm performance (Fryxell, 1990; Guo, Wang, & Wei, 2018). Strategic positioning reflects the set of decisions a company has undertaken to create value and how it will differentiate itself from its rivals (Harvard Business School, n.d.). However, the problem with most definitions of strategy and strategic positioning is that they paint a mostly static picture (Flower, 2004; Magretta, 2012; Belton, 2017). Research often fails to mention that strategy is an ever-changing process of firm adaption to the business environment (Flower, 2004; Magretta, 2012; Belton, 2017), implying that firms evolve their strategies over time. An effective strategy drives competitive advantage and, ultimately, firm success (Grant, 2016). It helps a firm identify critical strengths and key weaknesses, both internally and within the industry environment (Grant, 2016). Moreover, an effective strategy aligns stakeholder interests, company resources, and firm positioning in order to realize success (Grant, 2016). Since strategy is about matching the internal environment with the external, it is distinctive to a particular firm (Grant, 2016). Therefore, finding a universal framework for categorizing business strategy is innately difficult, if not impossible.

Another driving force of the last twenty years has been the more prominent use of technological innovations by firms to enhance performance and preserve continuity (Guo, Wang, & Wei, 2018). New technology can be developed using various methods, in which the

most important one is an investment in Research and Development—R&D (Guo, Wang, & Wei, 2018). R&D is defined as investments in intangible assets for innovation, generally leading to positive outcomes in terms of value creation, wealth, and economic returns (Chen & Ibhagui, 2019). However, this pattern is not uniform across all sectors. High-technology sectors generally place more emphasis on R&D expenditures compared to medium- and low-technology sectors (Kumbhakar, Ortega-Argiles, Potters, Vivarelli & Voigt, 2012). The reason owes itself to the fact that high-tech products attach immense importance to technological innovations to earn a competitive edge on the market (Kumbhakar et al., 2012). Despite R&D becoming an essential activity for most high-tech firms, it bears apparent risks and costs that may diminish potential benefits (Fryxell, 1990; Guo, Wang, & Wei, 2018). Therefore, identifying the optimal R&D level has been a concern to many researchers (Fryxell, 1990; Guo, Wang, & Wei, 2018). It is a complicated task given that the optimal level of R&D may be influenced by individual firm characteristics, such as firm size, debt structure, and marketing intensity (Guo, Wang, & Wei, 2018; Chen, & Ibhagui, 2019) and may differ across various periods.

There are several industries classified as high-tech, and the automotive industry is a prominent one (Kumbhakar et al., 2012). The industry can be classified as high-tech for various reasons and meets the most common research-based criteria for the classification (Cregger, Hill, Menk, & Swiecki, 2014). Factors such as applying technical knowledge in the design or production of goods or services, routinely designing or developing new products, and concentrating skills and talents that encourage new technologies to multiply satisfy these criteria (Cregger et al. 2014). Further, areas such as the growing complexity of electronic integration, energy functionality, and increased safety features result in an ongoing necessity to innovate (Cregger et al. 2014). Some of the reasons for selecting this industry include our interests, the global and economic importance, and the foreseeable potential in the ability to build a foundation for our dissertation.

Firms pursuing different strategies have reached varying levels of success, implying that management decisions may affect firm performance (Wyman, 2015). R&D results in technology that brings advanced products or services to the market and is deemed as a

needed expenditure to push the boundaries of innovation (Grilishes, 1979; Erickson & Jacobson,1992; Ettlie, 1998; Erickson & Jacobson,1992; Chen & Ibhagui, 2019). This returns to our question of where to concentrate management efforts to enhance performance. Is it on strategy since the range of expenditures firms conduct—including R&D—generally stems from a firm's strategy (Guo, Wang, & Wei, 2018)? Or is it on R&D investment given that firms often need to search outside of ongoing operations for innovation (Pisano & Wheelwright, 1995)? In order to discern the relationship between R&D investment and strategy on firm performance, it is first crucial to understand a firm's underlying strategy and then examine its R&D expenditures and subsequent firm performance.

Previous research has generally emphasized studying two of the three elements: strategic positioning and firm performance (Porter, 1980; 1985; 1996; Moon et al., 2014) , or R&D investment and firm performance (Grilishes, 1979; Erickson & Jacobson,1992; Ettlie, 1998; Erickson & Jacobson, 1992; Chen & Ibhagui, 2019) . Studies on the relationship between all three components are relatively scarce. Further, studies that focus on all three often apply outdated theories in strategic management and apply a somewhat broad perspective (Fryxell, 1990; Guo, Wang, & Wei, 2018). Given that the field of management science has experienced a drastic evolution over the past years (Porter, 1996; Moon et al., 2014), we assume that novel theories in strategic management may provide a better lens when analyzing the relationship between R&D investment and firm performance. We therefore believe that research on the interplay between all three elements of strategy, R&D investment, and firm performance using recent theories of strategy through singular case studies will fill a considerable gap in existing research and academia.

1.2 Research Purpose

The purpose of our dissertation is to examine the relationship between R&D investment and strategy on firm performance for two automotive firms: Renault and BMW. Since structure follows strategy (Mintzberg, 1987), we must first classify firm strategic positions, and then strategic evolution. This will be done using a theoretical framework derived from recently published research in the field of strategic management (Moon et al. , 2014). After identifying and classifying firms according to their strategies, we analyze the impact of R&D

intensity on firm performance for the individual cases and link it back to their respective strategic positions. In sum, we examine the interplay between strategy, R&D investment, and firm performance over a designated time frame. Rather than focus on external circumstances in the industry environment, we emphasize management's role in guiding firm strategic evolution, and subsequently investment decisions. Therefore, we treat strategy as something management may influence. We aim to contribute to the field of strategic management by understanding the underlying factors of firm performance. This may give academia and management a better sense of how firms sustain competitive advantages through forward-thinking processes such as R&D.

1.3 Outline

The dissertation is formulated in the following outline.

Chapter 2 – Theoretical Framework

In this chapter, the theoretical framework is presented in two major sections. Within the first section, Micheal Porter is introduced, where we analyze three of his most popularized works: "Techniques for Analyzing Industries and Competitors" (1980), "Competitive Strategy: Techniques for Analyzing Industries and Competitors" (1985), and "What is Strategy?" (1996). Our selected theories are complemented by critiques, supports, and an integrated framework (Moon et al., 2014) of which we apply in this dissertation. Within the second section, we review past research on R&D and firm performance. Within the last section, we discussed past research on R&D investments, firm performance, and strategy.

Chapter 3 – Methodology

Our empirical method is described in this chapter. Our method is divided into three major parts. The first part is an observational case analysis of the strategic evolution of our two selected firms—Renault and BMW. The second part is a descriptive case analysis on the relationship between R&D investment, firm performance, and strategy for each of the case studies. The last part integrates findings from the two previous sections to decipher the relationship between R&D investment and strategy on firm performance. We end this chapter by discussing the validity, reliability, generalizability, and limitations of our dissertation.

Chapter 4 – Results and Analysis

First, the observational case analysis is presented and analyzed. Based on the findings, we allocated different strategies for our selected cases, analyzed various strategic periods' evolution. Second, results from the descriptive case analysis are presented and examined through the use of figures and tables to strengthen the analysis.

Chapter 5 – Case Comparison

Our findings from the previous section titled "Results and Analysis" are revisited, compared, and contrasted in three parts. First, we compare the strategies of Renault and BMW. Second, we examine the impact of R&D intensity on firm performance for Renault and BMW. Based on the above, we integrated our findings to explain the relationship between R&D investment and strategy on firm performance.

Chapter 6 – Discussion and Conclusion

Based on our findings from the previous section titled "Case Comparison", we derived two main findings from our study. We supplemented the findings with explanatory figures, named: Strategic Evolution, R&D intensity, and Firm Performance of Renault and BMW (Figure 5.1) and The Strategic Iceberg (Figure 5.2). Our conclusions, practical implications, and suggestions for future research are then extrapolated based on previous discussions.

2. Theoretical Framework

In the following chapter, we first reviewed the literature on strategic management (Porter, 1980; 1985; 1996) in a chronological order to portray the evolution of strategy since theories on strategy have drastically evolved since the 1980s. Our literature review on strategic management builds to an extended framework developed by Moon et al. (2014) that is later used to categorize the strategic evolution of our selected cases—Renault and BMW. In order to adequately describe the Moon et. al. (2014) framework, we needed to first review research that the framework is based on (Porter, 1980; 1985; 1996). Secondly, we discussed prior research on R&D investment and firm performance, as there have been contradicting outlooks on R&D's effectiveness. Despite the relatively scarce research, we looked into previous studies that have incorporated these three elements—R&D investment, firm performance, and strategic positioning—in the last section of the theoretical framework. We have identified clear streams of unified metrics to measure R&D's effect on firm performance. However, the research environment's view of strategy's effect on firm performance is much more fragmented (Rizova, 2006). Identifying a firm's underlying strategy requires the substantial usage of credible data (Guo, Wang, & Wei, 2018). Therefore, we focus the majority of this chapter clarifying how previous research has analyzed strategy and its effect on firm performance.

2.1 Strategy and Firm Performance

2.1.1 Three Generic Strategies (1980)

In order to briefly elaborate on why Porter is the subject of this framework, we will present a short overview of his work. Micheal Porter is a Harvard Business professor, an economist, theorist, author, researcher, and, most notably, an influential figure in strategic management. In economics and business, he is the most cited scholar and has gained extensive global recognition from corporations, governments, and academics (Harvard Business School, n.d.). There are other business strategies and positioning theories, but Porter provides the academic

foundation (Mekić & Mekić, 2014). We concentrated on Porter's research publications in relation to how the generic strategies have developed from three to a total of seven.

Porter first introduced the generic strategies along with other theories, such as competitive forces and competitors analysis, in his revolutionary book "Competitive Strategy: Techniques for Analyzing Industries and Competitors" in 1980. The motivation behind it is the need for firms to develop a competitive strategy to obtain a favorable and defendable position compared to the one competitors hold in the industry to balance the five forces of competition and earn a consistently higher rate of profits (Porter, 1980). These five forces being: the threat of new entrants, bargaining power of buyers, bargaining power of suppliers, threat of substitute products or services, and rivalry among existing firms, all of which affect the competition within an industry, depending on their collective strength. In light of these forces, Porter (1980) identifies three competitive strategies — overall cost leadership, differentiation, and focus, which he jointly refers to as generic attributing to their broadness (Figure 2.1).

Overall cost leadership strategy aims at minimizing costs within a firm through a set of functional practices. Some of these practices include efficient scale manufacturing, exploitation of scale economies and economies of learning, and tight cost controls in operational areas, such as advertising, R&D, and sales force (Porter, 1980). Despite strong competitive forces, a firm pursuing a low-cost strategy can preserve a defendable position in the market while maintaining above-average returns (Porter, 1980). Porter (1980) identifies several companies with a cost-leadership position, such as Texas Instruments, Du Pont, and Emerson Electric, all of which are still in business.

A **Differentiation** strategy seeks to create valuable offerings to develop an industry-wide perception of being unique and differentiated (Porter, 1980). Porter (1980) presents several approaches in which a firm can differentiate itself from its rivals: brand image, technology, design, strong supplier/buyer network, and enhanced customer service. A firm that can create a configuration of unique offerings can charge buyers a differentiation premium—thereby allowing the firm to enjoy above-average returns (Porter, 1980). Porter (1980) classifies

several firms as differentiation, some of which are Mercedes, Caterpillar, and Hyster, all of which continue to operate today.

Focus is the last generic strategy presented by Porter (1980). It refers to focusing on a specific product line segment, geographical market, or purchasing group. In contrast to the broad cost leadership and differentiation strategies, a focus strategy aims at serving a particularly narrow target very well (Porter, 1980). The motivation behind it is that a firm can serve a specific group more effectively and adequately than rivals who compete within several industries or markets (Porter, 1980). As a result, a firm pursuing a focus strategy has the potential to earn above-average returns (Porter, 1980). Within the selected segment, a firm can pursue a differentiation strategy, a cost leadership strategy, or both (Porter, 1980). In return, the focused firm can shield itself from the competitive forces in the same way a differentiated or cost leadership firm does. Porter (1980) sets three examples of focus firms, those being, Illinois Tool Works, Fort Howard Paper, and Porter Paint.

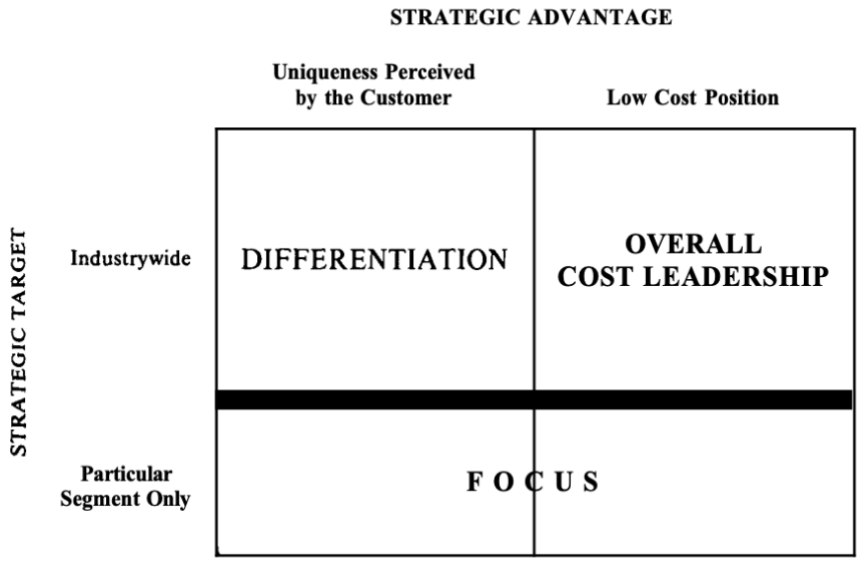

Figure 2.1 Three Generic Strategies (Porter, 1980, p.39)

Stuck in the Middle was a significant contribution to management science (Porter, 1980 at the time it was introduced. A firm that is “stuck in the middle” is one that is incapable of developing at least one of the three generic strategies—overall cost leadership, differentiation, or focus. He characterizes these firms as occupying a weak position in the industry, leading to low market share, capital investment, and profitability (Porter, 1980). Further outcomes include inconsistencies in corporate culture—thereby reducing internal motivation and organizational systems (Porter, 1980). Thus, Porter (1980) highlights the importance of developing one of the three above mentioned strategies. He also emphasizes the need to develop a strategy that is consistent with the firm’s resources, values, goals, and strengths to obtain a defendable position in an industry compared to the one rivals hold.

2.1.2 Porter adds a fourth Generic Strategy (1985)

Porter's book "Competitive Strategy: Techniques for Analyzing Industries and Competitors" in 1985 made another great contribution to the literature in strategic management. In his book, he presented a refined version of the aforementioned generic strategies, namely expanding the generic strategies from three to four, which are very similar to his original proposal in 1980. Overall, cost leadership and differentiation remained unchanged. However, he divided the third strategy, focus, into two sub-variants based upon the other two. Porter's (1985) four generic strategies were now **cost leadership**, **differentiation**, **cost focus**, and **differentiation focus** (Figure 2.2). Regardless of the sub-variant, the focus is on balancing the tradeoffs mentioned above between costs and differentiation (Porter, 1985). Therefore, his new addition to the generic strategies was emphasizing the distinction between scope—industry-wide, or single-segment focus (Porter, 1985). Both sub-variants of focus strategy rest on the differences between a focus segment and other segments within a specific industry (Porter, 1985). When choosing a cost-focus instead of cost-leadership, a firm concentrates on cost competition within a specific segment instead of the industry as a whole (Porter, 1985). Hence, a segment's specific buyers must have particular needs, or the production and delivery methods have the potential to be improved in order to realize cost efficiency (Porter, 1985).

Further, a vital distinction from Porter's 1980 book is the introduction of the importance of *competitive advantage.* In 1980, Porter presented the generic strategies in relation to

developing a competitive strategy. While in 1985, he identified the generic strategies to achieve a competitive advantage. The book's theme revolves around actions to sustain a competitive advantage in the industry (Porter, 1985). Other scholars were also writing about the same topic, emphasizing the role of competitive advantage (Welch, 2005; Barney, 1991, cited in Mekić & Mekić, 2014). Competitive advantage can be defined as all factors which contribute to making a firm's offering superior to those of rivals (Amadeo, 2019). Porter (1985) discusses the generic strategies (Figure 2.2) as a channel for achieving competitive advantage.

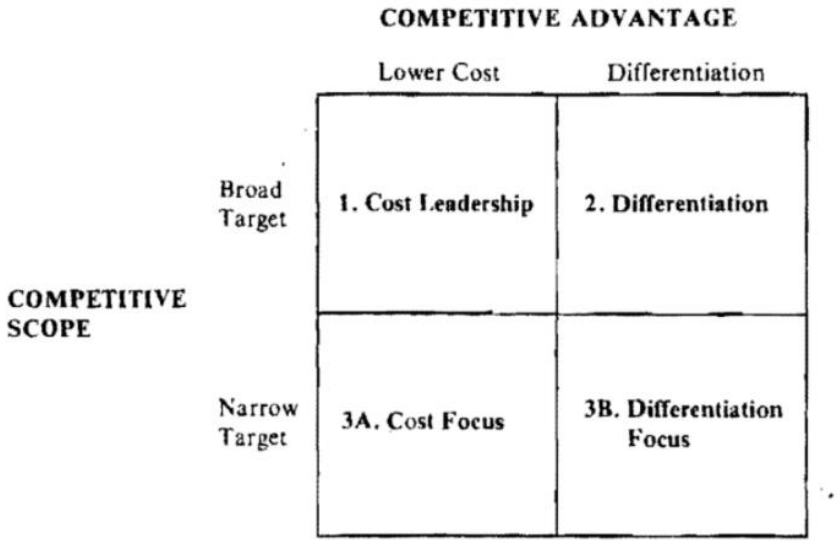

Figure 2.2 Generic Strategies (Porter, 1985, p.12)

2.1.3 Porter Defines Strategy (1996)

In 1996 Porter presented three more strategies for firm positioning: variety-based, needs-based, and access-based. Even though he did not explicitly state they were an evolution of previously discussed generic strategies, he explains the link in a box titled: “The Connection with Generic Strategies,” in which he clarifies that generic strategies are still useful for broad categorization, but more specific research for positioning is needed (Porter, 1996, p.8). He

claims that "the bases for positioning—varieties, needs, and access—carry the understanding of those generic strategies to a greater level of specificity" (Porter, 1996, p.8). Highlighted examples are IKEA and Southwest since both companies are cost-focused, but have drastically different focuses of either product or customer (Porter, 1996). Therefore, even though Porter (1996) does not directly claim that his three new strategies—variety-based, needs-based, and access-based—are an evolution from his previous research, we may consider them an extension. Moreover, Porter (1996) identifies several factors that are unrelated to strategy but may be perceived as a strategy by the greater research field (Harvard Business School, n.d.). For example, Porter (1996) highlights that operational effectiveness, known as efficiency gains, is not a strategic choice.

Porter's Three Strategic Positions

Porter (1996) clarifies that a company may create a unique and valuable position by serving a few specific needs of many customers, broad needs of a few customers, or broad needs of many customers in a protected market segment. He identifies three positions, which are not mutually exclusive, that a firm may pursue: *variety-based*, *needs-based*, and *access-based*.

1. *Variety-based Positioning*

Variety-based positioning is serving a wide variety of customers, but only focusing on a small subset of their needs (Porter,1996). This type of positioning is based on product or service assortment choice instead of a particular customer segment (Porter,1996). Porter (1996) claims that this position makes economic sense when a firm can produce a narrow range of unique and valuable products or services by using a distinctive set of activities. Also stated, a firm is a specialist in producing one particular product or service (Porter,1996). Porter (1996) uses the example of Jiffy Lube International as a firm that successfully pursues a variety-based position in the market. Jiffy Lube specializes in providing automobile lubricants to car owners and does not offer any additional products or services (Porter,1996). They focus on a specific product/service, oil changes, and as a result, are able to capture a subset of the market successfully (Porter,1996). Since the firm limits its choice of activity, it may provide a product or service faster or cheaper than the competition (Porter,1996).

2. *Needs-based positioning*

Needs-based positioning is serving a wide variety of customer needs with a collection of related products, but only focusing on a particular market segment (Porter, 1996). This type of positioning is based on the customer segment's choice instead of a specific product or service (Porter, 1996). It arises when clusters of similar customers have differing needs on different occasions (Porter, 1996). These customers may have separate levels of price sensitivity, demand alternative product features, or need varying amounts of information and support (Porter, 1996). Porter (1996) states this position is viable when a firm can produce a simple set of activities that solves the needs of a broad customer segment. In short, this type of firm has a strong relationship with a particular customer group and is able to serve their needs through an assortment of products and services (Porter, 1996). Porter (1996) uses the example of Ikea, a global furniture retailer, as a successful firm pursuing a needs-based strategy. Ikea seeks to meet the home furnishing needs of all its customers by offering a variety of products (Porter, 1996). They successfully recognized young furniture buyers as a customer group that has been underserved by the industry or overlooked by established competitors (Porter, 1996). By targeting young professionals that want a style for low cost and are happy to trade service help for cost savings, Ikea was able to perform distinctive activities—e.g., self-service model, modular manufacturing, product showrooms—to fulfill the needs of a specific customer segment (Porter, 1996). Since the firm limits their choice of customer group, they are able to provide a collection of products or services that are better at serving a specific market segment (Porter, 1996).

3. *Access-based positioning*

Access-based positioning is serving a wide variety of customers with a variety of needs, but focusing on the best way to access this market (Porter,1996). This type of positioning is based on the choice of resource configuration, and the market differences may be a function of geography or customer scale (Porter,1996). Porter (1996) claims this strategy is applicable when the market requires a specific combination of the two previous positioning strategies. Moreover, Porter (1996) states that this final strategy is less frequent and less understood than the other two. In other words, this strategy is focused on serving customers through a segment or channel that is difficult to access (Porter,1996). Porter (1996) uses the example of

Carmike Cinemas to clarify access-based positioning. The theatre chain only operated in places with a population of less than 200,000 and performed a unique set of activities to keep costs relatively low, while still providing a needed service (Porter,1996). Carmike offered standardized theatres with fewer screenings and less advanced projection technology to realize this lean cost structure (Porter,1996). This format would never have worked in larger cities where customers demanded better technology and more diversification (Porter,1996). Carmike is only one example of a firm pursuing an access-based strategy (Porter,1996). Porter (1996) describes driving differences may vary due to customer urbanization, size, and density. So long as a firm is able to identify, access, and serve a unique market, they are able to protect itself from industry competition and sustain a competitive advantage (Porter,1996).

Operational Effectiveness

Porter (1996) clarifies that operational effectiveness (OE), or efficiency gains, are not enough to sustain a competitive advantage. In order to succeed, firms need to choose a competitive strategy—position in the market that differentiates from the competition in a valuable way. Moreover, Porter (1996) states that a position is only sustainable if it requires trade-offs stemming from activity functions, firm image/reputation, or coordination and control mechanisms. A trade-off is defined by factors that are not attainable at the same time in which more of one thing leads to less of another (Merriam Webster, n.d.). Stated, a firm must choose and stick to a specific strategy.

2.1.4 Critiques and Support of the Generic Strategies

Porter made profound contributions and set new foundations to the literature in management science (Mekić & Mekić, 2014). Due to their wide popularity, his theories are extensively commented, appraised, debated, and, most notably, criticized (Mekić & Mekić, 2014). Several researchers and scholars have criticized the work of Porter. In return, we have identified four main attributes related to generic strategies, which have often received criticism by researchers and scholars—competitive scope, applicability, stuck in the middle hypothesis, and strategic evolution.

Competitive Scope

Porter is often criticized for failing to distinguish the product's competitive scope from the customer segment (Moon et al., 2014). Competitive scope relates to the number of industries, market segments, or geographical regions a firm targets (Monash University, n.d.). It can be broad, with a cost leadership or differentiation strategy or narrow, through a focus strategy (Porter, 1985). Moon et al. (2014) claim that Porter does not offer a distinguishable difference between the product's scope and that of the customer group. Porter (1990, cited in Moon et al., 2014) emphasized each segment's distinctiveness in terms of customers, requirements, and available distribution channels. Hence, serving multiple segments may require different capabilities and strategies tailored to each segment's needs; thus, sources of competitive advantage will be different in each segment (Moon et al., 2014). In 1996, Porter proposed variety-based and needs-based positioning, distinguishing between the focus on product and customers' requirements, respectively. Nevertheless, Porter (1996) does not make the linkage between the generic strategies and the proposed positions clear, minimizing its applicability as an integrated framework (Moon et al., 2014). Moreover, Mintzberg (1988) challenges the application of Porter's generic strategies in a dynamic environment due to their simplicity in combining competitive positioning with scope. Mintzberg (1988) questions Porter's use of scope by separating *the focus* from both *cost-leadership* and *differentiation*. He argues that focus defines the scope of a market, stemming from the resource-based view of the firm (Kotha & Vadlamani, 1995), whereas the other two aspects consider competitive positions. Mintzberg (1988) also argues that strategic positioning only has two dimensions—differentiation and scope—and that cost-leadership is a type of differentiation. Therefore, if we separate scope as a result of a firm's resources, differentiation is the only form of competitive positioning where pricing may be used for 'price differentiation' (Mintzberg, 1988).

Applicability

The applicability of Porter’s generic strategies is one of the main drawbacks assigned to Porter’s work. Wright (1987) argues that Porter presents his generic strategies like firms have options to select any of the three. However, factors that bound the choice of strategy are manifold, some of which are firm size, resources, and capability, the industry, and

competition (Wright, 1987). For instance, Porter (1998, p. 36 cited in Moon et al., 2014) states that “low overall cost position often requires a high relative market share or other advantages, such as favorable access to raw materials.” Nevertheless, small firms and new startups generally lack market share and other possible advantages (Wright, 1987; Moon et al., 2014); are they able to have a cost-leadership strategy then? Further, Porter (1980) overlooks the inability of small firms and new startups to engage in costly activities to develop a differentiated strategy—a preferred activity to become differentiated. Hence, Wright (1987) argues that small firms and new startups have only one strategic choice available if they want to succeed, according to Porter, namely, a focus strategy.

Henry Mintzberg (1987) debates whether the general application of strategy is even possible. Porter (1996) views strategy selection as a deliberate and applicable process, whereas Mintzberg (1987) emphasizes emergent strategy—i.e., that strategy evolves as expectations and plans clash with a changing actuality (Grant, 2016). Mintzberg (1987) highlights that strategy is an organic process that developments over time and has periods of stability occasionally interrupted by periods of innovative transformation. Therefore, Mintzberg (1987) doesn’t view strategy as separate from operations—e.g., sales, marketing, production—and instead claims that strategy grows out of continued experimenting with new and innovative ideas. This view results in the application of Porter’s generic strategies being irrelevant for firm success since Mintzberg (1987) believes strategy cannot be steered by management.

Stuck in the middle

"Stuck in the middle" hypothesis portrays generic strategies as mutually exclusive, in which efforts to combine more than one strategy will lead to a weak position in the industry (Porter, 1980). This dilemma has received a lot of attention and gave ground to many debates on whether a single strategy is sustainable in a fast-changing business environment (Moon et al., 2014). An example set by Moon et al. (2014) describes firms in the airline industry. A cost-leader firm might face increased competition from other firms adopting similar cost cuts in response to customers' demands for lower-priced travel services. Thus, a firm is no longer distinct from its competitors and is likely to experience lower profits if it does not combat

this change (Moon et al., 2014). Moreover, Murray (1998, cited in Moon et al., 2014) has proved that preconditions necessary to achieve a cost leadership strategy stem from the industry's characteristics, while those of a differentiation strategy relate to customer preferences. Hence, factors fueling the two strategies are independent—allowing a shared strategy.

Strategic Evolution

A common critique of Porter's generic strategies is that they are too static for the current dynamic business environment (Flower, 2004; Magretta, 2012; Belton, 2017). New technologies, globalization, and greater transparency have resulted in an unstable and rapidly changing business environment (Reeves & Deimler, 2011). The modern industry environment may, therefore, be characterized as hypercompetitive. As a result, positioning strategies that take an image of a firm at a specific time may not be viable (Grant, 2016). Moreover, since technology advancements are blurring the lines between industries, it is becoming increasingly difficult for firms to measure strategic positions (Reeves & Deimler, 2011). Porter acknowledges some of these critiques in an updated edition of his book *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (2008, p.4), stating that: "nothing static was ever intended. Each part of the framework—industry analysis, competitor analysis, competitive positioning—stresses conditions that are subject to change." Despite this admission, the generic strategies do not show how a firm may initially choose a strategy, and then successfully alter their position (Moon,1993 cited in Moon et al., 2014). Thus, the model doesn't take into account firm evolution

In Support of Porter

On the contrary, various scholars have found empirical support for the practicality of Porter's theories and work. First, Hambrick (1983, cited in Kotha & Vadlamani, 1995) found empirical evidence for Porter's three generic strategies (Figure 2.1)—overall cost leadership, differentiation, and focus. In addition, a number of researchers undertook similar studies and reported identical results (Dess & Davis,1984; Robinson & Pearce, 1988; Miller & Friesen, 1986, cited in Kotha & Vadlamani, 1995). Further, Helms & Allen (2006) conducted a study to examine the linkage between organizational performance and Porter's generic strategies.

They used Porter's four generic strategies (Figure 2.2): product differentiation, cost leadership, focus-product leadership, and focus-cost differentiation, as factor scales. The correlation analysis indicated a strong significance between each factor scale and organizational performance (Helms & Allen, 2006).

It can be concluded that Porter's work has undoubtedly made a notable contribution to management science, especially at the time they were introduced. However, the world has changed a lot since then. We see a more significant trend towards globalization, transparency, a faster-moving world, and a more than ever rise in the competition (Kotha & Vadlamani, 1995; Reeves & Deimler, 2011). Some theorists argue that these themes make Porter's theories irrelevant (Mekić & Mekić, 2014). According to TED in Micheal Porter: Why can business be good at solving social problems? The current business environment does not always have to adapt to Porter's theories, and his theories can be tailored to current economic circumstances. Competitiveness has always been a central theme to Porter's research, and his definition of strategy (Porter,1996), has highlighted the importance of sustaining a competitive advantage. In a recent presentation, Porter outlines how the private sector may solve some of the world's most pressing issues—climate change, access to clean water—with help from some of his theories if the problem is adequately framed (TED, 2013). This shows that even though the world is changing, there may still only be a couple of ways of competing: cost leadership and differentiation (Martin, 2015).

2.1.5 An Integrated Framework (2014)

As previously mentioned, Porter never integrated his seven generic strategies into one model, nor explained firm evolution—how a firm may initially choose one strategy and then adjust it over time (Moon,1993 cited in Moon et al., 2014). By extending Porter's strategies from seven to eight, researchers Moon et al. (2014) are able to differentiate between similarly positioned firms that have distinct strategies systematically. The researchers integrate Porter's seven strategies into a new consolidated framework by adding an eighth criterion: competitive target. Those are some of the reasons for selecting this framework to apply as a means to detect the strategic positions of our two case studies, Renault and BMW. At the

core of this proposed framework is the idea that firms may have similar strategic positions, but different strategies and that firm strategy may evolve (Moon et al., 2014).

Moon et al. (2014) provides specific examples of how Porter's strategies are not appropriate in explaining significant strategic differences. As previously described, Porter (1996) characterizes Ikea and Jiffy Lube as both employing a cost-focused strategy, but company focus differs whether it is customer- or product-based focus. Even after identifying these distinct differences, Porter (1996) never plots these firms into his previous four strategy framework (Figure 2.2). All of this leaves the reader wondering whether Porter's three strategic positions may be used in congruence with his original work (Moon et al., 2014).

Moon et al. (2014) bridge Porter's theories on strategy by proposing an eight-category framework based on three criteria formatted in a 2 x 2 x 2 matrix. The authors distinguish strategy along the dimensions of competitive source, competitive scope, and competitive target (Moon et al., 2014). Competitive source and competitive scope are highlighted in Porter's second framework (Figure 2.2) as distinguishing between cost or differentiation, and cost-focus or differentiation focus (Porter, 1985). Competitive target considers Porter's three positions by separating strategy as either product- or customer-focused (Porter, 1996). Through this three-step process, the extended model (Moon et al., 2014) clarifies how to compete—sources of competitive advantage; what to compete in—broad or narrow product ranges; and whom to sell to—product or customer (Figure 2.3). With this eight-category framework, the authors are able to analyze and clearly separate complex international strategies (Moon et al., 2014). Following is a brief description of each of the eight possible strategies (Figure 2.3).

Broad Strategies

The objective of a broad strategy is to meet broad customer needs (through a wide variety of product or service offerings), and target a broad scope of customers (Moon et al., 2014). A broad strategy may focus on differentiation or cost leadership (Moon et al., 2014).

1. *Broad Differentiation*

A Broad Differentiation Strategy appeals to a large customer base through a wide variety of high-quality and highly priced product offerings (Moon et al., 2014). Also stated, anyone that can afford to purchase one of the many high-quality products is considered a potential customer (Moon et al., 2014).

2. *Broad Cost Leadership*

A Broad Cost Leadership Strategy appeals to a broad set of market segments through a wide variety of low-cost and affordable products (Moon et al., 2014). The focus of Broad Cost Leadership strategies is on controlling costs and realizing scale economies through standardization of large product offerings (Moon et al., 2014).

Product Based Strategies

The objective of a Product Based Strategy is to meet specific customer needs (through a limited range of product or service offerings), and target a broad scope of customers (Moon et al., 2014). A Product-Based strategy may either focus on differentiation or cost leadership (Moon et al., 2014).

3. *Product-Based Differentiation*

A Product-Based Differentiation Strategy targets a large number of customers through a relatively small high-quality and highly priced product offering (Moon et al., 2014). Anyone that can afford the product offering is a potential customer (Moon et al., 2014). However, Product Based Differentiation only offers a limited product selection targeting specific customer needs (Moon et al., 2014).

4. *Product-Based Cost Leadership*

Product-Based Cost Leadership Strategy targets a large number of customers through a limited number of low-cost and affordable products (Moon et al., 2014). The focus of a Product Based Cost Leadership strategy is to emphasize the lower prices and good value of a limited range of products appealing to the specific needs of a large market segment (Moon et al., 2014).

Customer Based Strategies

The objective of a customer-based strategy is to meet a large variety of customer needs (by offering a broad range of products or services), and target a narrow group of customers (Moon et al., 2014). A customer-based strategy may either focus on differentiation or cost leadership (Moon et al., 2014).

5. *Customer Based Differentiation*

A Customer-Based Differentiation strategy focuses on meeting many needs of a particular customer segment by offering a diverse, high-quality, and highly priced product offering (Moon et al., 2014). The offering may be relatively more expensive than comparable ones, but the strategy still appeals to a specific customer segment due to limiting search costs (Moon et al., 2014).

6. *Customer Based Cost Leadership*

A Customer-Based Cost Leadership strategy focuses on meeting many needs of a particular segment by offering a wide array of low-cost and affordable products (Moon et al., 2014). The focus of this strategy is on limiting both product costs and search costs for a customer group, thereby providing adequate value for money (Moon et al., 2014).

Narrow Strategies

The objective of a narrowly based strategy is to satisfy the specific needs of a particular market segment by offering a limited range of products or services (Moon et al., 2014). A narrowly based strategy may either focus on differentiation or cost leadership (Moon et al., 2014).

7. *Narrow Differentiation*

A Narrow-Based Differentiation strategy targets a specific customer segment through a finite offering of high-quality and highly-priced products (Moon et al., 2014). The focus of Narrow Differentiation is to provide highly specialized top-shelf products to a select customer group (Moon et al., 2014).

8. *Narrow Cost Leadership*

A Narrow-Based Cost Leadership strategy focuses on a specific customer segment by offering a limited selection of low-cost and affordable products (Moon et al., 2014). In practice, it is difficult to find pure examples of the application of a Narrow Cost Leadership strategy since firms require a degree of economies of scale and scope to realize low costs (Moon et al., 2014).

		CUSTOMER-BASED STRATEGY	
		Broad	Narrow
PRODUCT-BASED STRATEGY	Broad	**Broad** Differentiation	**Customer-based** Differentiation
		Broad Cost Leadership	**Customer-based** Cost Leadership
	Narrow	**Product-based** Differentiation	**Narrow** Differentiation
		Product-based Cost Leadership	**Narrow** Cost Leadership

Figure 2.3 Eight Comprehensive Generic Strategies (Moon et al., 2014, p.213)

Firms evolve, and so do their strategies. As discussed by Moon et al. (2014), most firms have a generalized evolutionary path beginning narrow and evolving to a broad strategy. This is due to the difficulty of becoming a cost or differentiation leader without first developing a unique source of advantage (Moon et al., 2014). As a result, most companies focus on serving a particular customer group with a limited variety and then expanding (Moon et al., 2014).

The authors also address how a firm may even mix strategies by introducing the concepts of *capturing the core* and *broadening without diluting* (Moon et al., 2014). These concepts may reconcile Porter's (1980) warning of being *stuck-in-the-middle*, and Porter's critiques of the strategies being *too static* (Flower, 2004; Magretta, 2012; Belton, 2017). The authors claim that broadening competitive scope may not necessarily result in competitive advantage dilution, so long as a firm's competitive advantage is sufficiently entrenched—i.e., capturing the core (Moon et al., 2014). They highlight the historical trajectories of both Mercedez and Hyundai in a case study and plot both companies in a dynamic model (Figure 2.4) to prove this point. The authors demonstrate that both Mercedes and Hyundai were able to expand from narrow to broad focused strategies while pursuing both cost reduction and technology development. In this way, both companies have pursued cost and differentiation strategies over time relative to their competitors, and without disregarding their sources of competitive advantage (Moon et al., 2014).

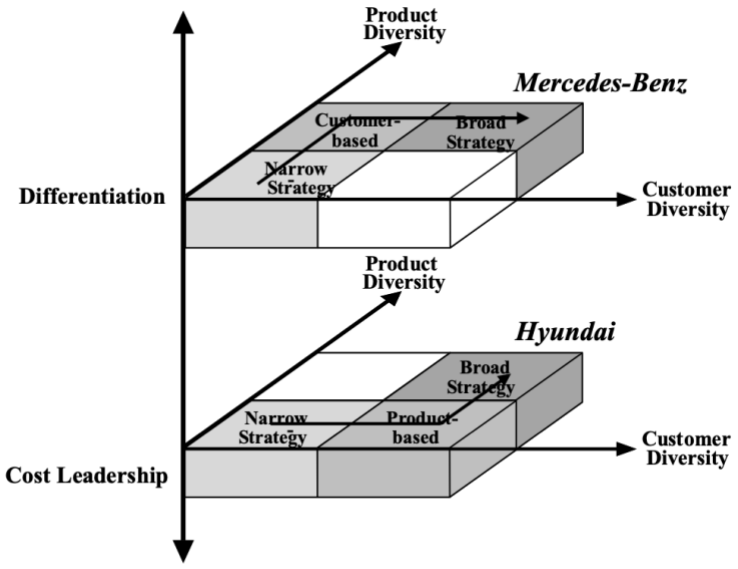

Figure 2.4 Expansion dynamics of Mercedes-Benz and Hyundai (Moon et al., 2014, p.221)

This extended framework (Figure 2.3 and Figure 2.4) provides the foundation for our classification of firm strategy and subsequent evolution with respect to our chosen firms but is nonetheless not without its faults. First, we believe that the framework relies on the

subjective analysis of historical data for firm classification. Therefore, we argue that authors are granted a large amount of subjective interpretation of management decisions in regards to strategic evolution. In light of this, authors are able to highlight specific events deemed relevant and ignore others. Further, even though the framework adequately categorizes overarching strategy and subsequent evolution, we think that it neglects the analysis of underlying influences of performance (e.g., R&D expenditures). With these faults considered, we are able to analyze underlying factors that may also influence performance in addition to strategic decision-making by using and extending Moon et al.'s (2014) framework.

2.2 R&D and Firm Performance

Research and Development may be defined as "tests done to design new or improved products" (Merriam Webster, n.d.). However, this definition neglects an emphasis on knowledge returns. One of the most widely accepted definitions comes from the Frascati Manual, which was written as a reference for collecting statistics about research and Development for the Organisation for Economic Co-operation and Development (OECD) (OECD, 2015). Throughout this dissertation, we use the following definition of R&D:

> "Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture, and society – and to devise new applications of available knowledge." (OECD, 2015, p. 44)

The term has evolved over the years to both include informal and formal occasions and may be thought of as a combination of basic research, applied research, and experimental development (Reyes, 2013). As such, R&D is used to acquire new knowledge, organize investigations to acquire new knowledge, and use it to develop new products, processes, or systems (Reyes, 2013). Therefore, R&D is essential for innovation and provides a foundation for organizational improvements (Reyes, 2013). Investment in R&D is vital for firms to develop a sustainable competitive advantage, which has led to a myriad of research on the impact of R&D on firm performance. Consequently, studies on R&D can be divided into two

main streams: R&D expenditures are positively correlated to firm performance, and R&D expenditures are negatively correlated, or insignificant to firm performance.

2.2.1 R&D Expenditures Positively Correlate to Firm Performance

The first stream of literature contends that R&D expenditures are positively correlated to firm performance (Grilishes, 1979; Erickson & Jacobson,1992; Ettlie, 1998; Erickson & Jacobson, 1992). However, the optimal level of R&D is generally unknown and vague. Chen & Ibhagui (2019) investigate the relationship between R&D investment and firm performance for multiple NASDAQ listed firms. They estimate a threshold of which R&D has a positive impact on firm performance, and if the estimated threshold value is exceeded, the effect becomes insignificant or negative. Chen & Ibhagui (2019) also found that the estimated threshold value has changed since the global financial crisis of 2008 and that the level of R&D investment required to improve firm performance has increased. Moreover, studies have identified various individual firm characteristics that may exert an impact on the linkage between R&D and firm performance. Some of these characteristics include firm size (Gou, Wang, & Shou, 2004; Chen, & Ibhagui, 2019), marketing intensity (Erickson and Jacobson, 1992; Gou et al., 2004; Lin, Lee, & Hung, 2006; Chen, & Ibhagui, 2019) and debt structure (Long and Ravenscraft, 1993; Chen, & Ibhagui, 2019). The discussed research suggests that the interplay between R&D investment and firm performance is generally positive and might depend upon other variables.

2.2.2 R&D Expenditures Negatively Correlate to Firm Performance

Within the second stream of literature, researchers reported conflicting results to those discussed in the first stream. Morbey (1988) posits that the correlation between R&D intensity and profitability is insignificant. He explores this relationship further in his next study to find support for his initial empirical result. Morbey (1989) states that the R&D intensity of industries is not conducive to profit growth. Monte & Papagani (2003) do not find any significant effect of R&D expenditures on profitability either. Nevertheless, they report a particularly interesting result – R&D intensity is positively correlated to firm growth. They elaborate to find that the effect of R&D intensity on firm growth is weaker in high-tech industries than in low- to medium-tech industries, which contradict what is usually believed

(Kumbhakar et al. 2012). Moreover, Ayad, Dufrene, & Obi (1996) and Gou, Wang & Shou (2004) extend the parameters to find that profitability and productivity of firms are negatively affected by investments in R&D, to a certain extent. The overarching limitation to the research mentioned above is the fixation around the profitability effects of R&D overlooking other key performance indicators, which might be deemed important in defining this linkage.

It can be observed that studies on R&D and firm performance are manifold. Different researchers have noted mixed, sometimes contradicting findings. This divergence signifies that the relationship between R&D and firm performance is rather complicated. Besides R&D, a multitude of factors contributes to a firm's performance, continuity, and competitive advantage. As mentioned, some of these determining factors might include firm size, marketing intensity, and financial leverage.

2.3 Relationship between Strategy, R&D, and Firm Performance

Few researchers have analyzed the linkage between strategic positioning, R&D investment, and firm performance, of which some will be discussed. Fryxell (1990) explored the impact of product R&D intensity on return on investment conditional on two strategies: cost leadership and differentiation. He proposed three potential outcomes from R&D investment—accounting, disruptive, and investment outcomes. Accounting outcomes are a result of profits/expenses realized within the same fiscal year. Disruptive outcomes stem from costly adjustments that might depress short-term profitability but have a positive long-term effect. Lastly, investment outcomes form the observable impact of product R&D on firm performance over time. Fryxell (1990) found that firms pursuing a differentiation strategy possessed longer investment outcomes and a more consistent R&D intensity level. Conversely, firms adopting a cost-leadership strategy retained more substantial disruptive and investment outcomes. In the former case, the relationship between R&D investment and firm performance is positively linear; in the latter, the effect of R&D spending on firm performance is short-term but strong. Hence, return on investment, as a measure of firm performance, is found to differ by strategy.

In a more recent study on 1506 Chinese manufacturing firms, Guo, Wang, & Wei (2018), divided firms based on their generic strategies—cost leadership or differentiation. The impact of R&D investment on firm performance is determined using several financial indicators such as ROA, ROE, and TOBIN Q. Results have shown that companies classified as differentiated experienced an elongated positive financial return; R&D has a positive linear effect on firm performance, which is in line with Fryxell (1990). On the other hand, the relationship between R&D and firm performance for firms pursuing a cost leadership strategy is an inverted U-shaped (Guo, Wang, & Wei, 2018). This suggests an unknown threshold for optimal level of R&D exists for cost leadership firms. The notion of an inverted U-shaped was introduced in another study by Kumbhakar et al. (2012). They argue that there is an optimal R&D level for each firm in which a further increase is beyond this level can lead to diminishing returns and negative performance.

Fryxell (1990) and Guo, Wang, & Wei (2018) both consent that the relationship between R&D investment and firm performance differs by strategy. Further, both studies use Porter's generic strategies as a determinant of firm strategy, reinforcing their credibility as models. Nevertheless, Porter (1985; 1996) developed his generic strategies to incorporate more strategic positioning alternatives, highlighting that the field has immensely evolved. New theories such as Moon et al. (2014) might be deemed more relevant today.

3. Methodology

3.1 Research Approach

We chose two large Western European automotive firms to test findings that emerged from data collected using two preliminary research methods, both qualitative and quantitative. We used a mixed-method case study to overcome the practical restraints associated with only analyzing a large quantitative dataset—i.e., annual reports (Bryman & Bell, 2011). Rather than a traditional mixed-method study that selectively chooses different approaches to data analysis, we chose a mixed-method case study as it offers a more structural approach, thereby leading to a more holistic and descriptive result (Bryman & Bell, 2011). We intended to combine the specificity and accuracy of quantitative data with the ability to interpret complex idiosyncrasies provided from qualitative analysis (Bryman & Bell, 2011). By performing a mixed-method case study, we are able to combine a variety of analysis options, thereby avoiding too great a reliance on a single approach to analysis (Bryman & Bell, 2011).

Empirical observations are presented to visualize the results with the help of figures and tables. An extensive analysis pertaining to each case follows a short historical introduction to the automotive industry in chapter 4, titled 'Results and Analysis.' Primary and secondary data were used in conjunction with a theoretical framework (Moon et al., 2014) developed from previous research in the field of strategic management. After applying the framework, an analysis of strategic evaluation is conducted to see how each case arrived at their current strategic position. Finally, a statistical analysis was conducted to see how R&D correlated to both firm performance and strategic evolution for each of the described cases. The authors revised the text and loosely followed a chronological timeline to ensure coherence throughout the text.

3.2 Research Design

This study may be characterized as having a comparative research design (Bryman & Bell, 2011). A comparative research design was used to analyze relationships between different cases after the events have occurred (Bryman & Bell, 2011). We are thus able to both analyze each case separately and compare events that transpire across both cases. We have chosen to limit our selected sample to two automotive firms: Renault and BMW. The cases were chosen since both companies originate from a similar geographic market, western Europe, are of relatively similar size, and utilize clear and possess comparatively different strategies. The chosen period for this study is from 2000 - 2019. This timeline was chosen with reference to the availability and accessibility of desired information for Renault and BMW. The research design is divided into two sequential steps to facilitate understanding of the underlying methodology structure.

3.2.1 Part One

First, we performed an observational case study entailing a detailed analysis of each organization being a single case (Bryman & Bell, 2011). We, therefore, conducted a multiple case study of the selected sample concerning two firms, studying the strategic evolution of each firm over time. Since we are concerned with the relationships over time, this study may be deemed a longitudinal case study (Bryman & Bell, 2011). The focus of a bounded entity within a specific timeframe limits variables associated with analyzing an entire industry (Bryman & Bell, 2011). Findings from each of the cases are compared and contrasted in the discussion section. This, in turn, has allowed us to consider what is unique and shared across all cases, promoting theoretical reflection.

We chose to perform a multiple case study, which provides an idiographic approach since the individual cases in question are each confined to specific and situational timeframes, and each has variables circumstantial to each firm (Bryman & Bell, 2011). This approach is conducive to previous studies and may highlight weaknesses or abnormalities of more generalized previous research (Bryman & Bell, 2011). Moreover, the qualitative research method described may be explained as an inductive method, in which data is collected and

analyzed in order to build upon the discussed theories instead of testing them (Bryman & Bell, 2011). We have used company reports, industry books, and historical articles to analyze the development of the cases over time and explain the different strategies used.

As mentioned previously, Porter's evolution from generic strategies to strategic positions is unclear, and an integrated framework does not exist. Hence, we employed the work of Moon et al. (2014), which was presented in the literature review. The reasoning for including an eight-category framework, instead of Porter's (1985) four, is to apply a more comprehensive model for diverse strategies, which may better explain the differences between each strategy and subsequent evolution of the chosen firms. Moreover, we created original figures (Figure 4.1, & Figure 4.4) based on Moon et al. (2014) research to describe the evolution pathway of the subsequent firms. After plotting the cases into the eight strategies mentioned above framework (Figure 2.3), we analyzed how the strategies have evolved based on previous research from Moon et al. (2014).

3.2.2 Part Two

A descriptive analysis was used to examine the relationship between R&D intensity and chosen performance and control variables (Table 3.1) of our two selected samples: Renault and BMW. First, correlations were computed to determine the strength of the relationship between two variables in a single value varying between -1 and 1. This value is termed *a correlation coefficient* and is commonly displayed in the form of the letter *r* (Statistics Solutions, 2020). Secondly, we employed a simple Scatter Analysis to examine whether a relationship exists between R&D intensity and each of the performance and control variables. Just as in bivariate correlations, the linkage between the variables in a scatter plot analysis is assumed to be linear and can be either positive, negative, or insignificant (Bryman & Bell, 2011; Taei, 2018). We also added the coefficient of determination to the scatter plots along with a trendline to provide more interpretation tools.

3.2.3 Part Three

Based on outcomes from part one, we estimated and grouped different strategic periods of Renault and BMW, respectively. Second, R&D intensity in those periods was plotted against

the identified strategic periods to discern the relationship between those two elements. Firm performance in terms of ROA and ROE was also plotted against the identified strategic periods to understand the linkage between firm performance and various strategies.

3.3 Data Collection Method

For part one, we collected secondary data through industry books and historical articles. The primary method for accumulating this data was by performing literature reviews. Michael Freyssent's book *The Second Automobile Revolution–Trajectories of the World Carmakers in the 21st Century* (2009) was used as a key information source for historical data to clarify both Renault and BMW's strategic evolutions. Further, we supplemented this source with industry articles (Lamarsaude 2015), annual company reports (Group Renault, 2000 - 2019 and BMW Group 2000-2019), and company marketing channels (Group Renault, n.d. ; BMW Group, 2019). Data stemming directly from company channels were used to complement the gathered literature (Group Renault, n.d. ; BMW Group, 2019).

For part two, we collected data mainly from firm annual reports. In our statistical analysis, they were used as the main source for essential performance and expenditure metrics (Group Renault, 2000 - 2019 and BMW Group 2000-2019). Some secondary data benefits are that it is time-saving, cost-effective to find, and may have already been used in previous research (Bryman & Bell, 2011). However, secondary data bears the risks of possibly being outdated, not accurate, or inconsistent (Bryman & Bell, 2011).

3.4 Data Analysis Method

For part one, we were able to identify trends of management decisions that aligned with different strategic options clarified by previous research (Porter 1985; Porter, 1996; Moon et al. 2014). We interpreted historical decisions made by management as the foundation for the strategic analysis. As such, our data analysis is a result of subjective judgment and is a subject relative. The disadvantages of this analysis mainly stem from the possibility of researcher bias with case histories and interpretations (Bryman & Bell, 2011). Since the specific dates of management decisions are not recorded in the literature review, there may

be errors in aligning management decisions with periods. To report ample depth, we analyzed a period slightly longer than that concerning our annual reports, i.e., from the 1990s to the present. Nonetheless, a large dataset was collected in order to give an ample historical account of firm strategic decision making.

In part two, we used bivariate correlations and scatter plots to analyze the data. Bivariate correlations or Pearson's r is a form of correlation coefficient that expresses the linkage between two continuous-level variables (Statistics Solutions, 2020). The limitation of this type of correlation is the assumption of linearity between the sets of variables. A non-linear relationship might exist, even if *the r* value is equal to zero (Statistics Solutions, 2020). However, for our dissertation, we assumed a linear relationship between R&D intensity and each of the dependent and control variables. Second, scatter plots possess the advantage of facilitating comparison between the sets of data, clarifying and identifying trends better than tables, and detecting peculiar or key values instantly (Taei, 2018). Disadvantages lie in the requirement to explain in a written format the data and the potential of misinterpretation (Taei, 2018). For interpreting the scatter plot, the coefficient of determination was used to statistically measure how fluctuations in one variable are dependent on its relationship with another variable (Bloomenthal, 2020). R2 value generally falls into a range from 0.0 to 1.0, where 1.0 signifies the perfect fit. Further, we detected measurable trends in the scatter plots to discern the relationship between selected variables more closely. Scatter plots were also created in part three. Nevertheless, they were not analyzed using the coefficient of determination. Instead, we visually identified trends in the relationship between various strategic periods and R&D intensity and firm performance. We based our interpretations on measurable and apparent trends that can be easily identified.

3.5 Variables

We would like to highlight that the selection of variables was not arbitrary; the following indicators are widely adopted in the literature on R&D and firm performance (Guo, Wang, & Wei, 2018; Chen & Ibhagui, 2019).

3.5.1 Independent Variable

The main explanatory variable being measured in this analysis is R&D investment, determined as:

$$R\&D\ intensity = \frac{Total\ R\&D\ expense}{Total\ Revenue}$$

R&D intensity is a more favorable measure of firm-level expenditures that create innovation in comparison to other indicators, such as capitalized R&D to sales ratio and the absolute R&D investment (Ayaydin & Karaaslan, 2014 cited in Chen & Ibhagui, 2019). Hall & Bagchi-Sen (2007) identified two issues with the absolute R&D investment amount. The first is that absolute R&D is solely associated with firm size and may give an unclear connection between R&D investment and firm performance. Second, absolute R&D, as well as capitalized R&D to sales ratio, fails to distinguish the amount of R&D investment of different scale firms. Hence, we adopted R&D intensity as a measure of R&D investment.

3.5.2 Dependent Variables

In this study, firm performance and firm strategy are the dependent variables. The firm strategy is determined through an observational case study of each firm as described previously. Second, firm performance can be measured in two ways: market-based indicators and accounting-based indicators. With respect to previous research reviewed in this dissertation, we measure firm performance in terms of accounting-based indicators (Al-Matari, Al-Swidi, & Hanim, 2014). Chen & Ibhagui (2019) describes firm performance through two dimensions, of which one is studied, namely the efficiency dimension. Efficiency is measured using accounting indicators: ROA and ROE. Hence, our selected performance indicators are ROA and ROE described below.

Return on Assets (ROA)

ROA assesses firm profitability relative to total assets. It displays information about the company's management efficiency in utilizing its assets to generate income and is presented as a percentage (Hargrave, 2020).

$$ROA = \frac{Net\ Income}{Total\ Assets} \times 100$$

Return on Equity (ROE)

ROE measures firm profitability in relation to shareholder's equity. It determines how efficient the management was at handling shareholder's money (Fuhrmann, 2019).

$$ROE = \frac{Net\ Income}{Total\ Equity} \times 100$$

3.5.3 Control Variables

Along with R&D investment, other factors may also impact firm performance, some of which are: Firm Size, Marketing Intensity, Capital Structure, and Operation Capability. First, larger firms generally possess advantages over smaller firms with regard to resources—financial and economic—as well as market size (Wang, & Wei, 2018; Chen & Ibhagui, 2019; Alam, Atif, Chien-Chi, & Soytas, 2019). Hence, measuring the firm size is vital to explain this difference in resources, and is estimated as the natural logarithms of assets. Furthermore, companies vary in their resource allocation to marketing activities. The second control variable is thus marketing intensity and is measured as total sales costs divided by total revenue (Wang, & Wei, 2018; Chen & Ibhagui, 2019; Alam et al., 2019). A firm's capital structure exerts a particularly interesting impact on R&D intensity. Larger firmers possess more financial capabilities and are generally able to invest more in R&D. Thus, short-term operating costs for a firm can be minimized with an efficient debt ratio, which enhances firm performance (Wang, & Wei, 2018; Chen & Ibhagui, 2019). This impact is controlled for using the debt-to-equity ratio as the third control variable and is equal to total liabilities divided by total shareholder's equity. The last control variable is operation capability, which refers to the management's role in enhancing the firm's value (Wang, & Wei, 2018; Chen &

Ibhagui, 2019). It is estimated using an asset-turnover ratio that is equal to total revenues divided by average assets (Wang & Wei, 2018; Chen & Ibhagui, 2019). An overview of the variables is found in Table 3.1 below.

Table 3.1 – Variable Definition

Variable Type	Variable Name	Variable Explanation
Dependent Variables	ROA	Return on Assets
	ROE	Return on Equity
	STR	Firm Strategy
Independent Variables	R&D	R&D intensity
Control Variables	Size	Firm Size
	Lev	Capital Structure
	MI	Marketing Intensity
	OC	Operation Capability

3.6 Validity, Reliability, and Generalizability

External validity, reliability, and generalizability are central concerns to all case study research (Bryman & Bell, 2011). Validity refers to the issue of whether or not a measurement that is devised to measure a specific concept actually measures that particular concept (Bryman & Bell, 2011). Investment in R&D is a long-term process, from initial research to new ideas to product development, production and launch, to sales and marketing. Consequently, various studies have confirmed the existence of a time lag between R&D intensity and its full effect (Ito & Pucik, 1993). Moreover, Campbell & Shirley (2018) state an estimate of this time lag, varying between 1-10 years to start an impact and 10-20 years to realize the full effect. The difference in time lag will depend on the industry, type of firm, and the individual expenditure. Further, a fixed lag period to apply is not available (Chen &

Ibhagui, 2019). Hence, despite trying to account for this time lag by widening our sample years to 20 years, the validity of findings may be lessened.

It must be noted that the global financial crisis of 2008 occurred during our selected timeframe. This ‘black swan event’ may alter the validity of our findings, as this was an unusual year by most financial accounts (Runde, 2009). A ‘black swan event’ refers to a highly unlikely event that lies so far outside of normal expectations that it may be deemed random (Taleb, 2010). In financial markets, these significant and random events result in extreme price variations that may drastically alter the economic environment. We have chosen to retain data from the year 2008, despite the possibility of greater variance in our findings.

Reliability entails the consistency of a measure, and as described by Bryman and Bell (2011), three factors determine reliability: stability, internal reliability, and inter-observer consistency. Stability refers to the capacity to repeat the analysis and gain similar results (Bryman & Bell, 2011). In order to ensure stability, the authors used secondary data and information that is widely available and may be repeatedly analyzed. In relation to the case observations, we used our own interpretation of historical data to interpret our findings. Therefore, other parties may see and interpret this data differently, thereby questioning the stability of the findings. Regarding the descriptive case analysis, we collected our data from annual reports (Groupe Renault, 2000 - 2019 & BMW Group 2000-2019), and if repeated, there will be similar results. Hence, the total stability of our research may be deemed somewhat moderate. In the context of our dissertation, internal reliability entails the interdependencies between the dependent and control variables selected (Table 3.1). It can be interpreted that the variables are not interrelated. Further, each variable is examined in relation to the dependent variable, R&D intensity, which makes this study internally reliable. Since more than one researcher is conducting this study, there may be concerns related to inter-observer consistency (Bryman & Bell, 2011). Even though both co-authors thoroughly discussed the secondary data, our interpretations may vary from each other. This stems from frequent concerns relating to the interpretation of qualitative data (Bryman & Bell, 2011) in the observational case analysis. However, since we collected secondary data from annual

reports, there is a limited chance of mis-observation in the descriptive case analysis. As a result, the inter-observer consistency of this study may be of moderate concern. Hence, the total risk of reliability in this report may be deemed of moderate concern.

Generalizability refers to the external validity of research findings, indicating whether or not research may be applied to greater contexts (Bryman & Bell, 2011). This study cannot represent the industry standard, whether by describing strategic evolution or the relationship between R&D investment and firm performance. However, although this study lacks generalizability for an entire industry, it may explain general concepts and abstract propositions, which may further be tested at scale for greater generalizability. In this way, we are seeking a form of theoretical generalization based on the uniqueness and complexity of three specific cases that may apply in different circumstances. Therefore, the generalizability of this study is low, but findings may be applied to further research.

3.7 Limitations

Several limitations emerged from conducting this research stemming from research design, secondary data sources, and industry characteristics. Limitations may be defined as restrictive factors out of author control (Bryman & Bell, 2011). Since this study is longitudinal research, it is difficult to establish change as a result of our desired factors over the specific time frames, or the result of other factors such as different ownership of the firms, different management within the organization, or various economic events. All of these examples can significantly influence the study results (Bryman & Bell, 2011).

One of the most prominent limitations of this research was data collection using secondary resources, namely annual reports. The car industry's leading players routinely change ownership, which may alter financial metrics and firm performance (Freyssenet, 2009). One of the two firms in our case study, (Renault in 2000), was a part of either a large M&A or alliance during the studied case years. Automotive brands continuously change ownership, and depending on their new parent company, the accounting standards and release of annual reports may be changed. We were restricted in our choice of companies because most of the brands are owned by conglomerates such as Volkswagen, which releases only one annual

report per annum, combining the sales and expenditures from its 12 brands. Hence, our selection was limited to companies that have had a consistent release of annual reports over 20 years and display the variables of interest, namely R&D expenditure, total revenue, total assets, and more. Furthermore, we have identified some inconsistencies in annual reports of the same company between different years. For example, year X's total revenue will be slightly adjusted in the annual report of year Y compared to that in the annual report of year X. We combatted this limitation by selecting the latest released number. More inconsistencies were found throughout the annual reports in regards to stating different amounts for the same variable. For example, in BMW's 2019 annual report, they state that "in 2019 alone, [BMW] invested 6.4 billion euros in research and development," (BMW annual report, 2019, p.20). They later state in their income statements that the actual number was 5.952 billion euros (BMW annual report, 2019, p.30). In light of these frequent contradictions, we chose to use the income statement values and disregarded in-text statements for annual report data.

A widely accepted and employed measure of firm performance is Tobin's Q (Guo, Wang, & Wei, 2018; Chen & Ibhagui, 2019). It is expressed as the total market value of a firm divided by the total asset value of a firm (Hayes, 2019). It estimates the firm's intrinsic value in comparison to its market value (Hayes, 2019). Total market value is derived using equity market values of assets and liabilities, which we were unable to acquire due to the unavailability of required information for the desired time frame for all cases. Hence, we were limited in our selection of performance variables to ROA and ROE.

4. Results and Analysis

4.1 Automotive Industry Background

To analyze each individual case, we must first discuss a few unique characteristics of the automotive industry. Most notably, the industry is extremely concentrated within a small number of large companies residing in western Europe, Japan, or the USA, despite supply chains being globally dispersed (Sturgeon, Gereffi, Memedovic, & Biesebroeck, 2009). Moreover, there are very few standardized parts in the automotive industry, with specialized components being created for each vehicle model. As a result, most of these large companies consist of many brands that share similar manufacturing foundations (Sturgeon et al., 2009). Industry leaders have been designing shared vehicle platforms across various models (Sturgeon et al., 2009). Platforms make up the frame of a car and generally include the suspension, transmission, rolling chassis, engine compartment, and braking system (Sturgeon et al. 2009). Companies usually only share between brands under the same umbrella of ownership (Sturgeon et al., 2009). E.g., some Audi and Lamborghini models share the same basic platform because the VW group owns both (Sturgeon et al., 2009). However, with platform sharing, only the foundation of each model is the same, and there may be varying costs associated with developing the rest of a specific model (Sturgeon et al., 2009). The visible design and sensual characteristics such as noise, vibration, and handling, are all areas for increased vehicle differentiation and added costs (Sturgeon et al., 2009).

Over the past 20 years, the price of a new car in developed countries has, on average, risen by 50% more than the average income (Dannenberg, Burgard, & Wyman, 2015). This gap between car prices and consumer income continues to grow since cars are becoming more technologically complex (Dannenberg, Burgard, & Wyman, 2015). In order to keep cars affordable for the general public, cost innovations through efficient R&D are needed for future firm growth (Dannenberg, Burgard, & Wyman, 2015).

Despite the industry trend of becoming more reliant on suppliers and Original Equipment Manufacturers (OEMs) for innovation and R&D, large automotive companies are still among the world leaders in R&D investment. Six automakers—Volkswagen, Daimler, Toyota, Ford, BMW, and GM—are among the top 20 companies in the world for R&D investment, with both being located in western Europe (Hector, Nicola, Alexander, Sara, Zoltan, & Petros, 2019). Moreover, the automotive industry is the EU's number one investor in R&D, and that investment is over 50 billion euros annually (European Automobile Manufacturers Association, n.d.). It can be seen that firms in the automotive industry are increasingly spending on R&D in order to realize competitive advantages. These may be adding new high-tech components to their vehicles, sourcing affordable materials, or improving the manufacturing processes in order to lower costs and provide greater differentiation.

As previously mentioned, we have chosen to concentrate on the two large European companies—Renault and BMW. In order to classify the strategy of these firms accordingly, we must first understand their history. The historical account is grouped thematically and loosely follows each case's chronological timeline. Some specifics, such as additional development models, were left out to keep the historical accounts relevant and concise. A historical analysis of each case's strategic characteristics is followed by applying a generic strategy and descriptive case analysis. In this report, we deem generic strategies a dimension of the competitive environment perceived by management. Therefore, we treat the generic strategies as something management is able to influence through firm positioning.

4.2 Renault's Strategy

4.2.1 Renault's Strategic Characteristics

Renault S.A. is a French multinational automobile manufacturer established in 1899 (Group Renault, n.d.). Throughout their history, they have produced a broad range of cars, commercial vehicles, and trucks (Group Renault, n.d.). In 2017, Renault was one of the top 10 largest automakers in the world, and if counting their alliance of Renault—Nissan—Mitsubishi was the top three in the world in production (Wagner, 2020; Richter, 2019). The Renault group produces vehicles in 16 countries and has R&D centers in 23 countries. They

employ almost 180,000 people and have captured over 4% of the world's automobile market share (Group Renault, n.d.). This success was not always the case, as Renault has had a rather tumultuous journey over the last 20 years (Freyssent, 2009). Nonetheless, the firm has managed a few spectacular recoveries to looming disasters (Freyssent, 2009). The French multinational has been able to realize success thanks to a refinement of competitive strategy, pursuing beneficial alliances, and successful internationalization acquisitions (Freyssent, 2009).

After a failed merger with Volvo in the mid-'90s, Renault's declining quality strategy and a looming French economic crisis resulted in runaway costs (Freyssent, 2009). Despite the weak market conditions, carmakers were waging price wars, and the industry's cost competition increased (Freyssent, 2009). As a result, Renault's management deemed their vehicles too expensive and made a leadership change to oversee a competitive realignment (Freyssenet, 2009). Carlos Ghosn was hired with the ambition of immediately cutting costs. He closed multiple plants around Europe and correspondingly, triggered the first-ever 'Euro-strike'(Freyssenet, 2009). Despite the poor publicity associated with large restructuring projects, management was determined to see through this strategic shift and focused on standardizing their factories with single-assembly lines (Freyssenet, 2009). This cost-cutting 'shock-treatment' involving many plants closing, massive layoffs, and multiple divestments, helped Renault turn the corner and realize success (Lamarsaude, 2015).

Thanks to the surprise success of a new minivan model—the Scenic—Renault was able to stay afloat in the European marketplace, and focus on international opportunities around the turn of the century (Freyssenet, 2009). The so-called 'Asian crisis' of the late-1990's, which saw investors lose faith in Southeast Asia and Japan, resulted in a new wave of expansion for Renault (Freyssenet, 2009). The crisis allowed French Renault to create an alliance with the Japanese Nissan (Lamarsaude, 2015). In order to fund these acquisitions, Renault sold its truck subsidiaries to Volvo trucks for voting rights and capital gains. With a global network of differing brands, Renault now needed to effectively manage the almost bankrupt Nissan (Freyssenet, 2009). Motives for Renault's pursuit of Nissan are many, but management identified a few key areas such as improved global competitiveness in quality, cost, and

delivery; reputation gains; and continued momentum as a renewed and energized organization (Lamarsaude, 2015). Nissan Motor was Japan's second-largest automotive manufacturer, and the internationally oriented firm produced cars in over 20 countries with sales in almost 200 (Lamarsaude, 2015). As a result, the Nissan Motor group had much more net sales than Renault at the time of the alliance (Lamarsaude, 2015). Despite these high sales and a beneficial global position, Nissan was riddled with debt, and its sales were slowing (Lamarsaude, 2015). This did not stop Carlos Ghosn and Renault from almost immediately reviving the struggling Japanese carmaker (Freyssenet, 2009). The objectives of a three-year revival plan for the Japanese Nissan were reached a year ahead of schedule. That was partly due to the suitability of the measures, as well as a favorable industry environment—a revival of Nissan in the American market combined with a positive local context was conducive to firm success (Freyssenet, 2009).

Most importantly, Renault decided to share a strategic vision with Nissan, but let the Japanese brand maintain its own identity (Freyssenet, 2009). Renault benefitted from Nissan's expertise in quality process management and logistics, while Nissan benefitted from Renault's cost control, design, and finance strategy (Freyssenet, 2009). Moreover, the two firms were able to equally pressure suppliers into lowering prices and share mechanical systems—platforms, gearboxes, and transmissions—to reduce costs (Freyssenet, 2009). Thus, the two automakers were able to complement each other while adapting and then integrating competitive advantages from one another.

In addition to the new alliance with Nissan, Renault developed into a multi-brand group through its internationalization strategy (Freyssenet, 2009). The French firm pursued opportunities in Brazil and Russia that later became disappointments, but was able to find success in Romania with the acquisition of Dacia (Freyssenet, 2009). The brand targeted emerging countries intending to produce truly low-cost cars (Freyssenet, 2009). At first, Renault helped improve Dacia's current models while covering its previous losses (Freyssenet, 2009). Existing models began to grow in popularity, and the brand's reputation improved (Freyssenet, 2009). They were able to recapture the domestic market and build a

growing sales network (Freyssenet, 2009). Dacia then launched the Solenzia, which was not only an affordable car but also cheap and easy to maintain (Freyssenet, 2009). It was a prevalent model that later became the immensely successful Logan (Freyssenet, 2009). Launched in 2004, the Logan model lacked any novelty and was targeted towards people who could not afford traditional car models (Freyssenet, 2009). Thanks to platform innovation, lean manufacturing, and just-in-time delivery methods, Dacia was able to create a reliable vehicle priced at only 5,000 euros (Freyssenet, 2009). The Logan model soon expanded to neighboring markets, and in subsequent years evolved into more diverse versions to accommodate these differing markets (Freyssenet, 2009). Looking back at the Romania acquisition, it can be said that Dacia and Logan greatly exceeded Renault's expectations (Freyssenet, 2009).

In the last ten years, Renault has increasingly been pursuing a focus on electric vehicles. Building on the previous and successful plan called ‘Drive the Change,’ Renault is seeking a new plan called ‘Drive the Future’ to be completed by 2022 (Group Renault, 2017). They intend to increase their R&D spending, EV model range, and sales volume significantly (Group Renault, 2017). The plan will leverage the scale economies of the Renault—Nissan—Mitsubishi alliance while maintaining cost efficiency and financial responsibility (Group Renault, 2017). It appears as though the plan has been a tentative success, with Renault so-far achieving its objectives (Group Renault, 2017).

Over the last 25 years, Renault was able to successfully refine its competitive strategy by increasing cost-cutting, optimizing its processes through a mutually beneficial alliance, and expanding its global presence through strategic acquisitions (Freyssenet, 2009). With the help of Carlos Ghosn’s restructuring, Nissan’s quality control and delivery, and Dacia’s innovative design abilities, Renault was able to realize success despite poor performance in the 1980s (Freyssenet, 2009). Furthermore, a financially stable sustainability strategy has positioned Renault for continued success through the late 2010s and into the early 2020s (Group Renault, 2017).

4.2.2 Renault's Strategic Position

By employing the extended framework (Figure 2.3) of Moon et al. (2014), we plotted Renault's generic strategy. As previously explained, there are eight total comprehensive generic strategies (Figure 2.3), and Renault may be categorized as employing a *broad cost leadership* strategy—they appeal to a broad market segment with a large variety of affordable products. We dissected this placement with help from Moon et al.'s (2014) three criteria: competitive source, competitive scope, and competitive target.

Not including their alliance with Nissan, Renault produces over 20 different models ranging from small to large cars and even some trucks (Group Renault, n.d.). All of these models are still in production, and some also began being produced over 20 years ago (Group Renault, n.d.). Therefore, Renault's competitive target may be deemed a *broad product-based strategy*. They aim their product offering towards a wide selection of market segments and different customer groups. There are many types of Renault customers, and thus their competitive scope may be considered a *broad customer-based strategy*. As noted in the aforementioned historical analysis, Renault's primary focus is on controlling costs rather than developing high-margin luxury models. This is not to say that Renault does not offer any premium options nor sacrifice process improvements to achieve cost reduction. Instead, Renault concentrates the majority of its product offering on being relatively low-cost compared to industry standards. Hence, Renault's primary competitive source is *cost leadership* rather than differentiation within the segments of the automotive industry. By combining all three criteria, we arrive at the strategic position of *broad cost leadership*.

4.2.3 Renault's Strategic Evolution

Renault has obtained a broad strategy over the last 30 years by first evolving from a narrow strategy to a product-based strategy, and then from a product-based strategy to a broad cost leadership strategy. Figure 4.1 displays a visual representation of strategic evolution. Over this timeframe, Renault expanded its competitive scope both in terms of product offering and target market without modifying its core competitive advantage of cost-leadership. This came as a result of strong management leadership, timely strategic partnerships, and innovative acquisitions, which have positioned Renault as a market-leading company.

Renault initially evolved from a narrow cost focus to a product-based strategy. The French multinational was struggling at the end of the 1980s while pursuing an increased quality strategy (Freyssenet, 2009). However, after hiring Carlos Ghosn in the mid-1990s, Renault decided to reduce their costs significantly, thus re-establishing their standing as an affordable car manufacturer (Freyssenet, 2009). This strategic placement can be seen in Figure 4.1 as starting at number 1, with a narrow cost strategy. Reorganizing around a narrow cost focus proved to be a success, and Renault enjoyed success in the late 1990s. Due to favorable market conditions, Renault then expanded its market through an alliance with Nissan (Lamarsaude, 2015). Renault initially lacked the necessary resources to expand its strategy and was only able to acquire Nissan due to timely divestments and effective cost management (Freyssenet, 2009). Since Nissan was already established with a reputation of offering affordable vehicles, the joint product range was relatively similar. As a result, Renault was able to expand its customer base without developing new models. This can be seen in Figure 4.1 as moving from 1. to 2 while pursuing greater customer diversity. They were able to integrate a differing firm in order to supplement their competitive strengths. Thus, Renault evolved from a narrow cost strategy to a product-based strategy by expanding its customer market from narrow to broad.

Next, Renault evolved from a product-based strategy to a broad strategy. By acquiring multiple firms in Brazil, Russia, and Romania—with the greatest success being Romanian Dacia—Renault diversified its product offering to include several new commercial and utility vehicles. This strategic move can be seen in Figure 4.1 as moving from 2 to 3 while pursuing greater product diversity. Thanks to the extremely low-priced Logan being an immediate success, Renault was able to develop several different car versions. They launched a station wagon/estate, a utility van, a five-door sedan, and a pickup truck—all designed for different global markets. Furthermore, Renault has been a recent market leader in the EV space due to strong management, conducive planning, and continued product expansion. Today, almost twenty-five percent of all new electric vehicles sold in Europe is a Renault (Group Renault, n.d.). They have routinely increased their product range and, as a result, offer the broadest offering in the EV market segment. This strategic evolution can be seen in Figure 4.1 as

finishing at number 3, with a broad cost strategy. Hence, Renault was able to evolve from a product-based strategy to a broad cost strategy by expanding its product offering from narrow to broad.

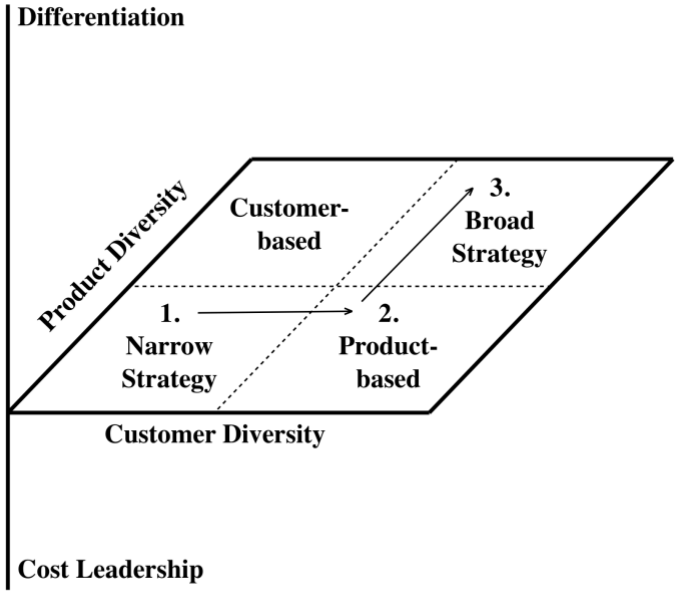

Figure 4.1 Renaut–Strategic Evolution Pathway (Moon et al., 2014)

4.3 Renault's R&D

Currently, Renault divides R & D locations between Design and Engineering Centers, with a combined 53 of these centers around the world (Group Renault, n.d.). Their main R&D hub is the Technocenter located just outside of Paris, France, that employs over 10,000 people (Group Renault, n.d.). Additionally, Renault recently launched Alliance Ventures in 2018 with alliance partners Nissan and Mitsubishi (Group Renault, n.d.). The strategic venture capital fund focuses on investing in new automotive technologies such as autonomous vehicles, connected driving, and automated vehicle ecosystems (Renault Nissan Mitsubishi, n.d.; Renault annual report, 2019).

As previously shown, it can be observed that Renault's strategic competence includes working as a lean global organization. Their strategy coincides with the idea of having a

relatively lean global R&D operation—based on firm size. This is not to say that Renault should mitigate R&D expenses, but rather analyze if they have sizable gains worthy of more significant investment.

4.3.1 Correlations

The correlation between R&D intensity and each of the performance and control variables was computed using bivariate correlations (Table 4.1). The control variables—firm size, marketing intensity, capital structure, and operation capability—are displayed in red (Table 4.1). Whereas, the dependent variables—ROA and ROE—are depicted in blue (Table 4.1). For statistical significance, the *p-value* found in the second row of Table 4.1 has to fall under 0.05 level; otherwise, the result is deemed as insignificant (Statistics Solutions, 2020). As articulated in Table 4.1, of the eight measured correlations, none were statistically significant at the *p* .05 level. This finding indicates R&D investment, as a percentage of total income, has a limited effect on the chosen firm performance ratios and controlled variables. Of the seven performance ratios, firm size had the greatest correlation to R&D investment at p = 0.065.

Table 4.1 Bivariate Correlations–Renault

Correlations

		RD_Intensity	Firm_Size	Marketing_Intensity	Capital_Structure	Operation_Capability	ROA	ROE
RD_Intensity	Pearson Correlation	1	.421	.216	.181	.127	-.357	-.319
	Sig. (2-tailed)		.065	.360	.445	.593	.123	.170
	N	20	20	20	20	20	20	20

4.3.2 Scatter Plots - Dependent Variables

We deem the relationship between our selected pool of variables as linear. Despite the bivariate correlations in Table 4.1 signifying low to no significance, we have chosen to visualize the relationship between R&D intensity and the dependent variables using scatter plots to examine the linkage more closely. The independent variable, R&D intensity, is depicted on the y-axis while the dependent variable is found on the x-axis (Figure 4.2 and Figure 4.3). Figure 4.2 presented below illustrates the relationship between R&D intensity and ROA, where R2 is equal to 12,7%, suggesting that 12,7% of ROA is explained by R&D

intensity. Moreover, Figure 4.3 demonstrates the linkage between R&D intensity and ROE, where R2 equals 10,2%, proposing that R&D intensity predicts 10,2% of ROE. Hence, ROA and ROE exert a minor impact on R&D intensity.

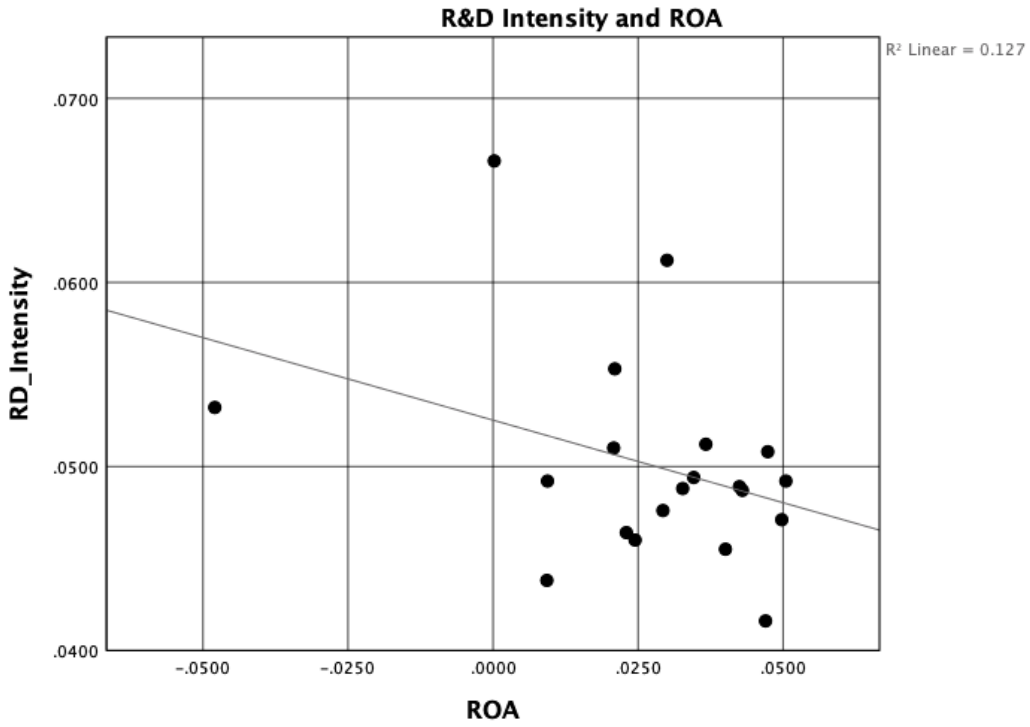

Figure 4.2 Scatter Plot of R&D Intensity and ROA–Renault

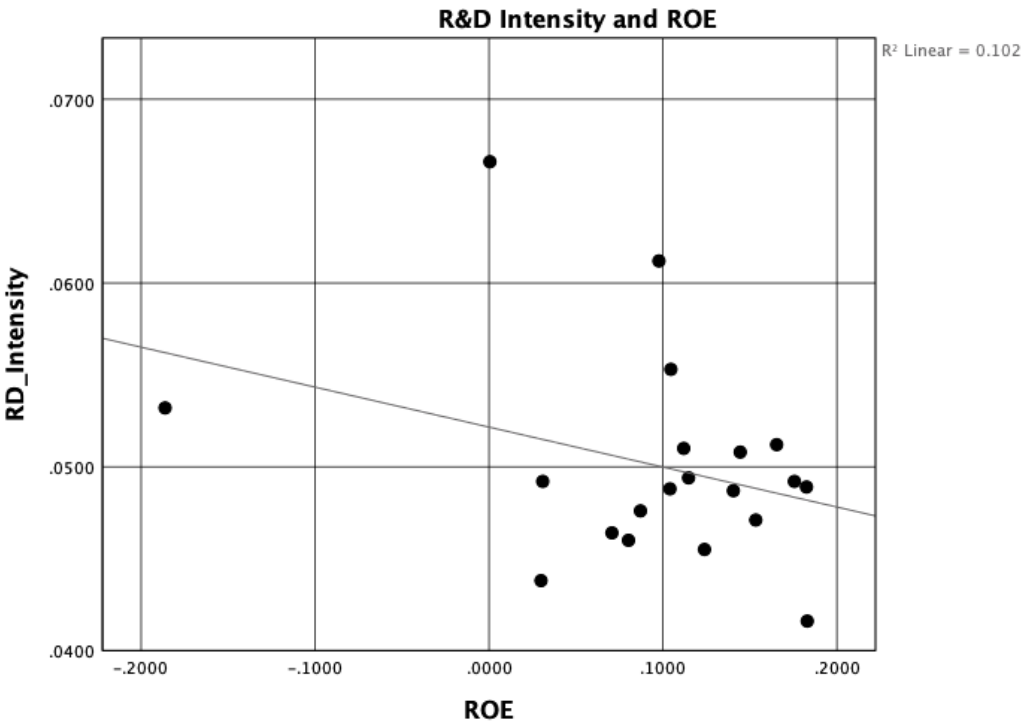

Figure 4.3 Scatter Plot of R&D Intensity and ROE–Renault

4.3.3 Scatter Plots - Control Variables

Since firm size was the single control variable close to significance at $p = 0.065$, we have chosen to look more closely at this relationship using a scatter plot (Figure 4.4). Access graphs for the remaining control variables are found in Appendix A.

The graph indicates that as Renault's size increases, so does their R&D intensity, albeit slightly. The R2 value is equal to 17,7%, concluding that firm size is 17.7% anticipated by firm size. This may be due to larger firms having fewer cost pressures since they are able to realize standardization and scale economies to the benefit of a cost leadership focus (Gou, Wang, & Shou, 2004; Chen, & Ibhagui, 2019). Larger firms may possess more financial resources and credibility amongst banks, allowing them to undertake more costly expenditures such as R&D (Grant, 2016).

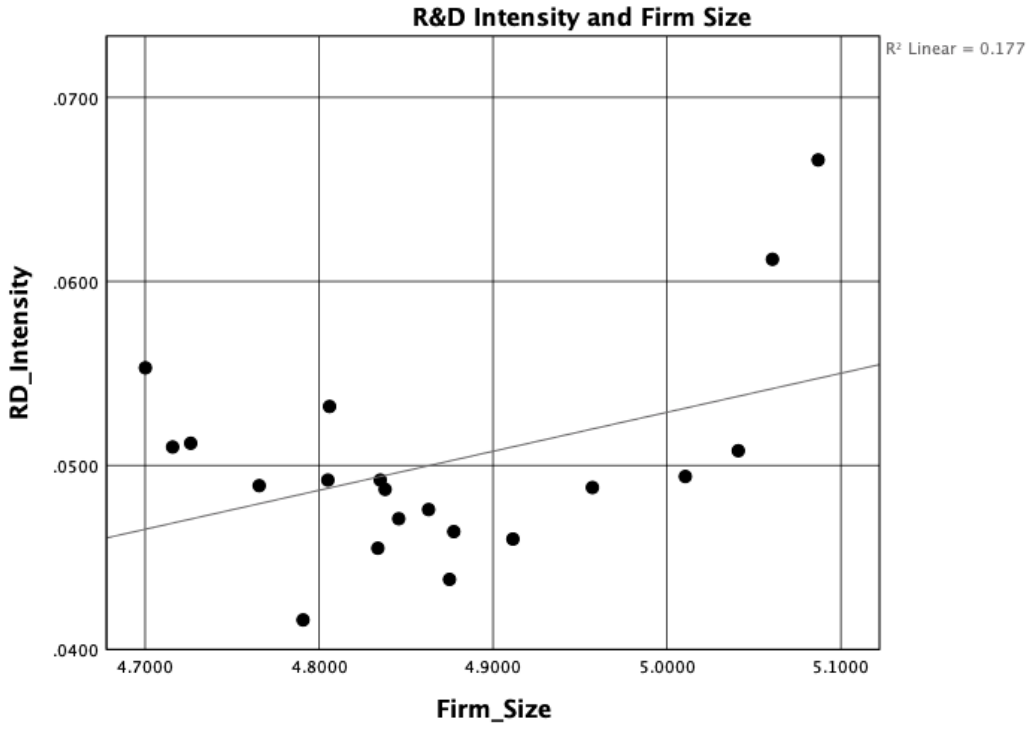

Figure 4.4 Scatter plot of R&D Intensity and Firm Size–Renault

4.4 Renault's Strategy, R&D, and Firm Performance

Over the course of the analyzed time frame from 2000 through 2019, Renault had an average R&D expenditure of total income being around 5%, with an average year-by-year increase of 0.3% (Group Renault, n.d.). ROA and ROE had relatively stable growth (Group Renault, n.d.). This gives a glimpse of Renault from the years 2000 - 2019, but to get an accurate picture of how R&D intensity and firm performance changed relative to strategy, we grouped different strategic periods. Thus, if we look at trends over the grouped periods in the historical analysis, we can see how Renault's R&D expenditure has evolved. The historical analysis and evolution of strategy did not have specific periods. Therefore, we estimated the years of a strategic shift. As previously discussed, Renault's strategy evolved from narrow to product-based, and then to broad cost-leadership. An estimation of years is as follows: Narrow from 2000 - 2006; Product-based from 2006 - 2013; and Broad Cost Leadership from

2013 - 2019. Even though the Renault-Nissan alliance was formalized in 1999, we assume that successful market expansion took a few years to materialize (Saci & Aliouat, 2014; Das, Sen & Sengupta, 2017; Ryu, Kim, & Ryu, 2019), and therefore describe it during the Product-based period of 2006 through 2013. Over those respective timeframes, Renault's average percentage of R&D expenditure was 4.94%, 4.77%, and 5.24% (Group Renault, n.d.). Their average year-by-year growth was -0.02%, -0.07%, and 0.14% (Group Renault, n.d.). This indicates that as Renault concentrated on eliminating costs, their R&D intensity fell each year, even when they expanded their product line. Only when their strategy evolved into a broad cost leader did they begin increasing their R&D spending again.

4.4.1 Strategy and R&D

Figure 4.5 below displays a scatter plot of R&D intensity and firm strategy from 2000 to 2019. It can be articulated from the figure that as Renault concentrated on eliminating costs, their R&D intensity fell during the Narrow phase. In the Product-based phase, there was a slight spike when expanding their customer demographic, but nonetheless an overall loss in R&D intensity for the period (Figure 4.5). This may be due to Renault having a market focus and concentrating on offering similar products in new geographic locations. As previously mentioned, Renault joined an alliance with Nissan and supplied a relatively similar product range. Therefore, they were able to expand their customer base without developing new models, possibly lowering the need for R&D intensity. Only when their strategy evolved into a Broad Cost Leadership position did they begin increasing their R&D intensity substantially (Figure 4.5). This may be due to the large EV revolution and industry shifts in automotives that have occurred in the last ten years. Hence, Renault's new wave of products may demand more innovation and thus more R&D intensity.

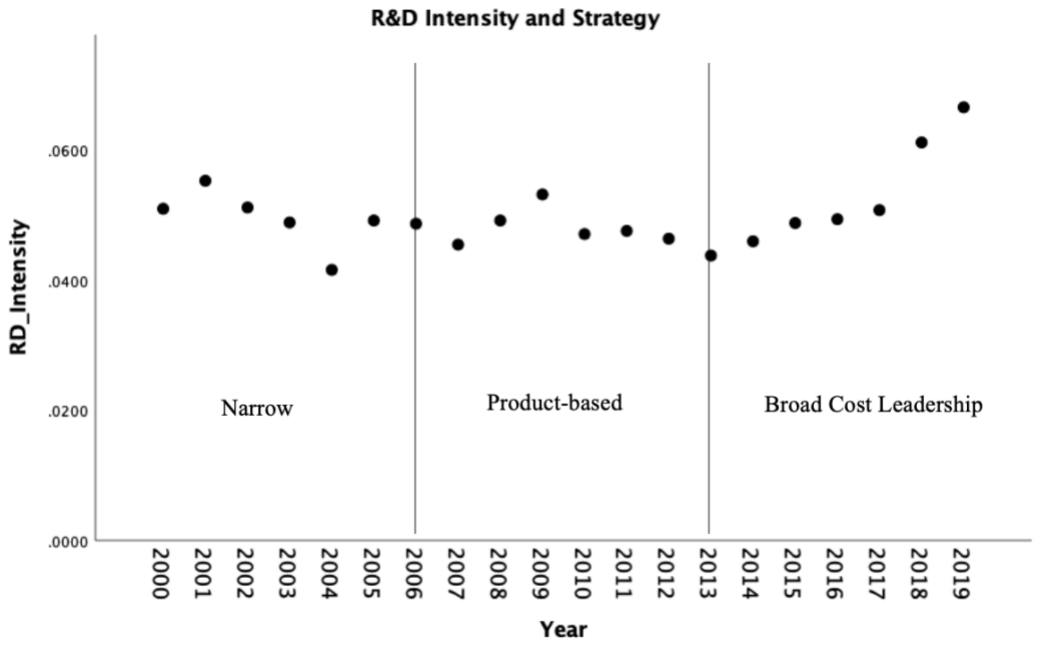

Figure 4.5 Scatter Plot of R&D Intensity and Renault's Strategy from 2000 to 2019

4.4.2 Strategy and Firm Performance

Moreover, firm performance varied during these subsequent strategic periods. Figures 4.6 and 4.7 demonstrate the relationship between performance variables, ROA and ROE, and firm strategy, respectively. As previously mentioned, Renault restructured and cut costs during the beginning of their Narrow strategic focus. As a result, performance metrics may have been improved. This can be seen in both Figures 4.6 and 4.7; ROA and ROE increased from 2000 through 2006. Renault then joined a large and costly alliance during the Product-based phase that may have strained resources and slightly lowered firm performance. In the graphs, ROA and ROE trended downwards during the Product-based phase from the years 2006 through 2013. Moreover, it must be noted that Renault performed poorly for two years during this phase, which may be a result of the global financial crisis in 2008 and 2009. (Runde, 2009). Lastly, a product expansion focus on the Logan model and in the EV market produced successful performance metrics during the beginning of the Broad Cost Leadership phase, but has not continued for the last couple years. This trend is visualized from the years 2013 through 2019 in Figure 4.6 and Figure 4.7.

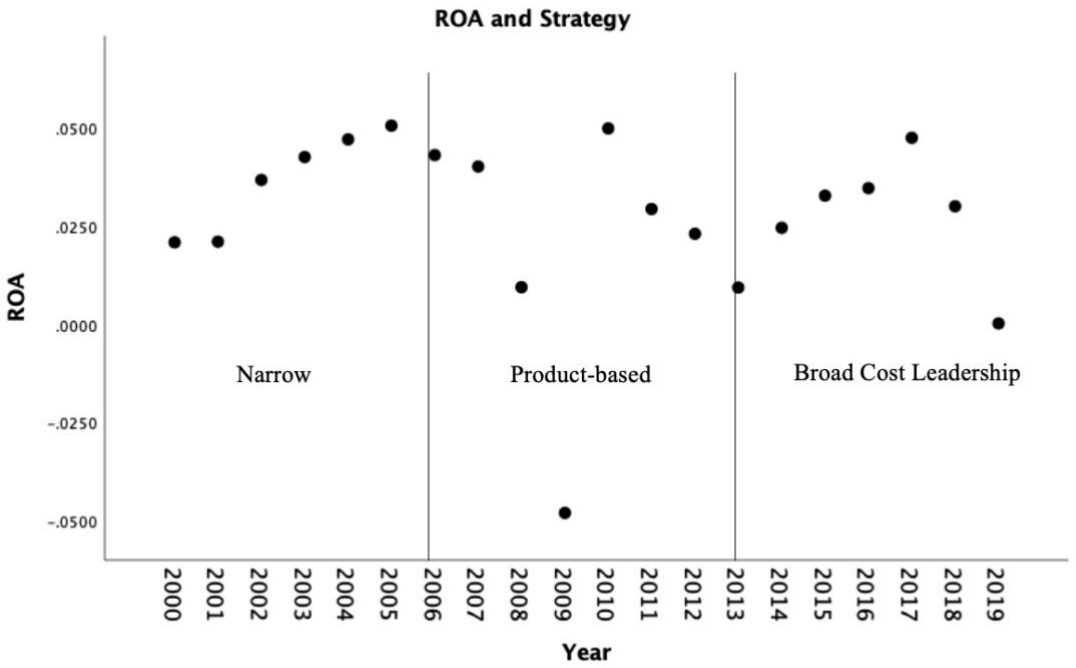

Figure 4.6 Scatter Plot of ROA and Renault's Strategy from 2000 to 2019

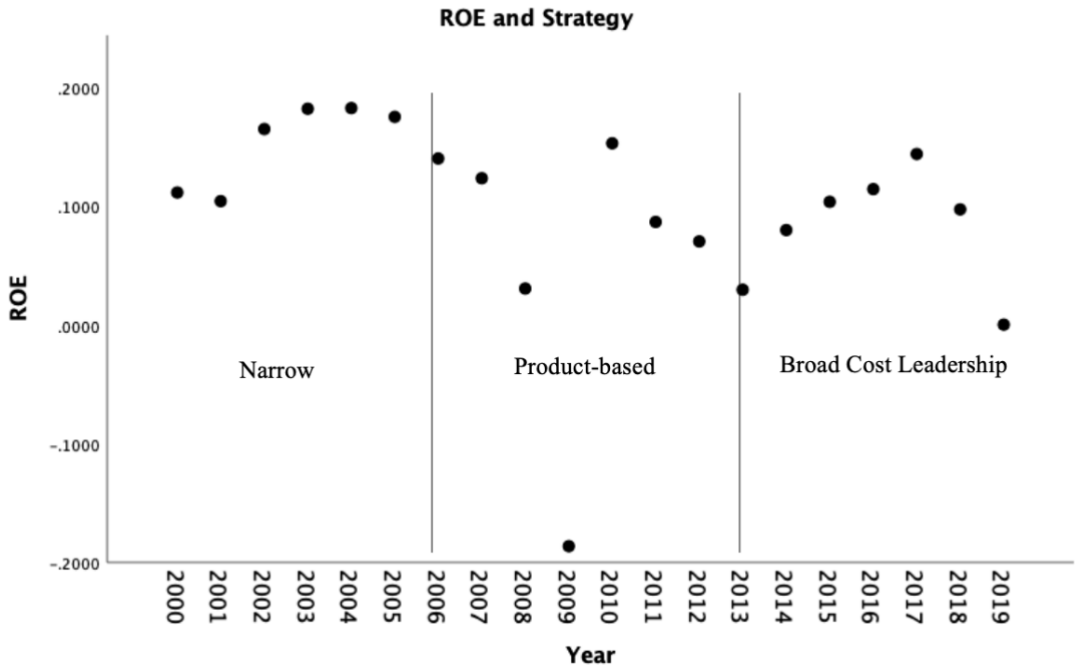

Figure 4.7 Scatter Plot of ROE and Renault's Strategy from 2000 to 2019

4.5 Summary of Renault

Following is a summary of the analysis of Renault's strategic evolution, R&D intensity, and firm performance from the years 2000 through 2019. Of the eight measured correlations, none were statistically significant at the *p* .05 level, indicating that R&D intensity has a limited impact on the chosen metrics. Nonetheless, a visual representation of the data with scatter plots showcased relationship patterns. Further, grouping various strategic periods and comparing them against R&D intensity and firm performance has led to interesting results. Performance variables ROA and ROE were found to exert a minor impact on firm performance. Moreover, during the years 2000 through 2006, Renault had a Narrow Cost strategic focus and subsequently restructured to cut costs. During this period, Renault's R&D intensity slightly fell, and their performance improved. Since no new product models were created, it may be estimated that the need for innovative R&D intensity was lessened (Figure 4.5). Renault's performance increase may be a result of eliminating excess costs since their aforementioned strategic core competence is based on a cost focus. To transition to a Product-based strategy for the years 2006 through 2013, Renault joined an alliance with Nissan, thereby expanding its customer diversity without directly expanding product diversity. During this period, R&D intensity stagnated, and firm performance dropped (Figure 4.5). Since their product offering remained relatively stagnant, declining R&D intensity may be a result of limited product development. During this period, the global financial crisis occurred (Runde, 2009), and when combined with an expensive alliance may have negatively affected Renault's performance. To evolve to a Broad cost leadership strategy, Renault needed to expand their product offering during the years 2013 through 2019. Their R&D intensity increased (Figure 4.5) as they drastically expanded their EV product lineup. This may be a result of new product offerings requiring substantial R&D investment (Pisano & Wheelwright, 1995). Renault's performance, measured by ROA and ROE, initially increased but has dropped in the years 2018 and 2019 (Figure 4.6, & Figure 4.6).

4.6 BMW’s Strategy

4.6.1 BMW’s Strategic Characteristics

Bayerische Motoren Werke AG, also stated Bavarian Motor Works and known as BMW Group, is a German multinational automotive manufacturer that was founded in 1917 as an aircraft engine manufacturer (BMW Group., n.d.). The group is a leading manufacturer of both luxury cars and motorcycles and has an impressive portfolio of premium brands ranging from micro-cars to large SUVs (BMW Group., n.d.). The group markets its car brands under BMW, Mini, and Rolls-Royce, with motorcycles being marketed under the brand BMW Motorrad (BMW Group., n.d.). In 2017, BMW was the world's fourteenth-largest automaker in the world in production (Wagner, 2020). The BMW Group has its headquarters in Munich, but produces and assembles vehicles in 14 countries and has R&D centers in 7 countries (BMW Group., n.d.). The international firm employs around 130,000 people and has focused more on the Asian marketplace in recent years, with China being the group's top market focus (BMW Group, 2019). BMW has a long and rich history in both the luxury car segment and the racing world—especially in touring cars and Formula 1 (BMW Group, 2019). This crossover between performance and every day has helped them develop an iconic brand image (BMW Group, 2019). In 2019, BMW was the third most valuable car brand behind Toyota and Mercedes (Kantar Millward Brown, 2019). As written by Freyssent (2009), BMW is the second most profitable carmaker after Porsche. Since the turn of the century, BMW has had immense growth as its strategy shifted from a regionally focused company to a global leader (Freyssent, 2009). The German brand has been able to realize success due to the following three overarching strategic decisions: First, BMW reorganized its production model towards a Japanese-style 'lean model' based on the international expansion of its production model (Freyssent, 2009). Second, BMW focused on maintaining and strengthening its core brand image in the premium segment with increased differentiation of luxury products (Freyssent, 2009). Finally, BMW was able to internationally expand its brand portfolio through strategic decisions based on timely acquisitions and divestments (Freyssent, 2009).

Since their founding, BMW has heavily concentrated on the Bavarian market, with the company proudly touting ‘made in Germany’ (Freyssent, 2009). However, in the mid-1990s, BMW began internationalizing production in order to diversify its product structure and transition to a more sustainable production model (Freyssent, 2009). They had a goal to increase flexibility with comprehensive production schedules that relied more on suppliers (Freyssent, 2009). Long-term supplier relationships would start the trend of limiting in-house production and add value, thereby giving BMW a high level of product and production flexibility (Freyssent, 2009). The shift from ‘made in Germany,’ to a ‘made by a German company,’ was a bold and ultimately wise choice from the group (Freyssent, 2009).

Their strategy to become a global producer contained three steps (Freyssent, 2009). First, integrate full vehicle production in their main markets of Europe, North America, and Japan (Freyssent, 2009). Second, set up complete knockdown factories (CKD) in emerging markets to overcome local laws relating to the minimum number of local parts and added value within each country (Freyssent, 2009). CKD factories receive all the necessary automobile parts and then assemble them in-house. Finally, pursue a double strategy for all international production sites: for each site, manufacture a world model, and a regional model (Freyssent, 2009).

The acquisition of the British Rover Group was the first step in growing outside their borders (Freyssent, 2009). This acquisition would ultimately be deemed a failure, but the brand established its new internationally focused mindset (Freyssent, 2009). Ten years later, the move proved to be a catastrophe, and BMW sold Land Rover and Jaguar to Ford (Freyssent, 2009). After the Rover debacle in the early 2000s, BMW refocused its core competency of differentiation in premium market segments. They developed a new sport activity vehicle (SAV), aimed at the luxury large vehicle space, and the first generation of the successful X5 began in a new factory in the US (Freyssent, 2009). Moreover, BMW kept the Rover brands Rolls-Royce cars and Mini, thereby reflecting their strategy of becoming full-range producers—from small to large luxury cars—at an international level (Freyssent, 2009). To summarize this period from the late 1990s through the early 2000s, BMW changed from a

regional Bavarian producer and exporter of a small range of luxury cars to a global producer of a broad range of premium and niche models (Freyssent, 2009).

For the better part of the last decade, BMW has focused on what they coin the "BMW ONE > NEXT" strategy, emphasizing profitability and long-term value in the space of future mobility technologies (BMW Group., n.d.). This strategy includes the development of its EV segment, the BMW i-range. The development has come from outside BMW's traditional R&D models and is emphasizing a rigorous expansion of their electronic mobility models (BMW Group., n.d.). The group is planning on releasing five new electronic models in 2021, intending to expand to at least 12 models in 2025 (BMW Group, 2019).

Ultimately, active internationalization with a strategically planned process proved to be BMW's greatest foundation for success over the last 25 years (Freyssent, 2009). Without restructuring production systems through a greater reliance on suppliers, BMW would never have been able to concentrate more on R&D activities resulting in a wave of new products (Freyssent, 2009). Without broadening its product scope, BMW would not have been able to broaden its customer base and increase revenue and production capacities (Freyssent, 2009). Without the increased revenue and performance, BMW would not have been able to expand R&D activities once again—linking the cycle to expanding product diversity into the new automobile generation (Freyssent, 2009).

4.6.2 BMW's Strategic Position

By employing the extended framework (Figure 2.3) used by Moon et al. (2014), we shall plot BMW's generic strategy and then analyze how it evolved. There are eight total comprehensive generic strategies (Figure 2.3), and BMW may be categorized as employing a *broad differentiation* strategy—they appeal to a broad market segment with a large variety of high-quality and highly-priced product offerings. We dissected this placement with the three criteria mentioned above: competitive source, competitive scope, and competitive target (Moon et al. 2014).

BMW offers a wide variety of vehicles ranging from small-sized 2-series sedans to large-sized x-series sport activity vehicles (SAVs) (BMW Group., n.d.). They also offer coupes, convertibles, EVs, and high-performance sports cars (BMW Group., n.d.). In total, BMW offers almost 35 different model vehicles that may further be customized with engine and components choices (BMW Group., n.d.). Most of these current models began production between 5 - 10 years ago (BMW USA, n.d.). Moreover, the group offers even more differentiated micro and premium models through their other brands, Mini and Rolls Royce. Thus, BMW's competitive target may be classified as a *broad product-based strategy*. The group appeals to many customer segments, for anyone that can afford to buy a BMW may be deemed a potential customer. Many of these customers come from high-income groups, but with some of BMW's lowest-priced models being around $35,000—and Mini's as low as $25,000—the group is beginning to appeal to wider market segments (BMW Group., n.d.). Hence, the BMW group's competitive scope may be considered a *broad customer-based strategy*. As noted in the historical analysis, BMW's success is the result of a differentiation strategy—which is based on a reputation for quality mass-produced products that may be priced above industry standard (BMW USA, n.d.). Therefore, BMW's primary competitive source is *differentiation* rather than cost-leadership within the industry it competes in. By combining these three criteria, we arrive at the strategic position of *broad differentiation*.

4.6.3 BMW's Strategic Evolution

BMW has realized a broad strategy over the last 25 years by evolving from a narrow strategy to a customer-based strategy, and then to a broad differentiation strategy. Figure 4.3 displays a visual representation of BMW's strategic evolution. During this period, BMW evolved its product offering and target market while emphasizing its competitive advantage of differentiation. The strategic evolution came from extended internationalization in supplier networking and production, expanding both their standardized and regional model bases, and investing in future technologies.

Since beginning in the automotive market in the early 1930s and until the mid-1990s, BMW has concentrated on the Bavarian market for both productions and as target consumers (Freyssent, 2009). Throughout this extended timeframe, BMW concentrated on offering

luxurious cars (BMW Group., n.d.). This strategic focus can be seen in Figure 4.5 as starting at number 1, with a narrow differentiation strategy. However, in the 1990s, BMW began expanding this narrow differentiation focus and pursuing a customer-based strategy. The German carmaker shifted their focus from a ‘made in Germany’ motto to a ‘made by a German company’ (Freyssent, 2009). The group expanded its narrow focus on the Bavarian market to a global one while first emphasizing production expansion through a greater reliance on suppliers (Freyssent, 2009). Since they pursued a double strategy for all their production sites—manufacturing a world model and a regional model—BMW was able to expand its product offering while maintaining a successful high-quality model lineup (Freyssent, 2009). This strategic move can be seen in Figure 4.3 as moving from number 1 to 2 while pursuing greater product diversity and realizing a customer-based strategy. The firm was able to expand its product offering, thus while maintaining a focus on the luxury car market. As a result, BMW evolved from a narrow differentiation strategy to a customer-based strategy by expanding its product diversity from narrow to broad.

BMW then evolved from a customer-based strategy to a broad strategy. By first acquiring the Rover group, BMW began pursuing customer diversity with the help of established brands (Freyssent, 2009). Even though the acquisition would be deemed a failure, BMW was able to hold on to the brands of Mini and Rolls Royce cars, which expanded their market presence and strategy (Freyssent, 2009). This strategic move can be seen in Figure 4.3 as moving from 2 to 3, while pursuing greater customer diversity (Freyssent, 2009). BMW was able to integrate these differing firms in order to supplement competitive strengths, since all three concentrated on differentiation (Freyssent, 2009). Furthermore, BMW has jointly expanded their fossil-fuel and EV lineups, while also pursuing additional markets primarily in Asia (BMW Group, 2019). The group is currently expanding their focus and resource commitment to China—the brand has become the country's largest premium carmaker (BMW Group, 2019). BMW’s strategic evolution can be seen in Figure 4.3, as moving finishing with a broad differentiation strategy. Hence, BMW was able to evolve from a customer-based strategy to a broad differentiation strategy by expanding its market focus both geographically and technology-based from narrow to broad.

Over the analyzed time frame, the continued expansion of the BMW strategy may be described as a result of interrelated process changes stemming from management decisions. After reorganizing their production system to improve efficiency, BMW focused on improving the beginning of the product life-cycle—also stated, increase knowledge transfers with internal R&D through a greater reliance on system suppliers for external production (Freyssent, 2009). After settling on a range of products, BMW invested heavily in the differentiation of those products (BMW Group., n.d.). By combining standardized world models with regionally diverse models, BMW was able to dually maintain its global presence and expand its customer base (BMW Group., n.d.). As a result of these decisions, BMW has become a true global leader in the luxury car segment in a relatively short amount of time, while realizing a broad differentiation strategy.

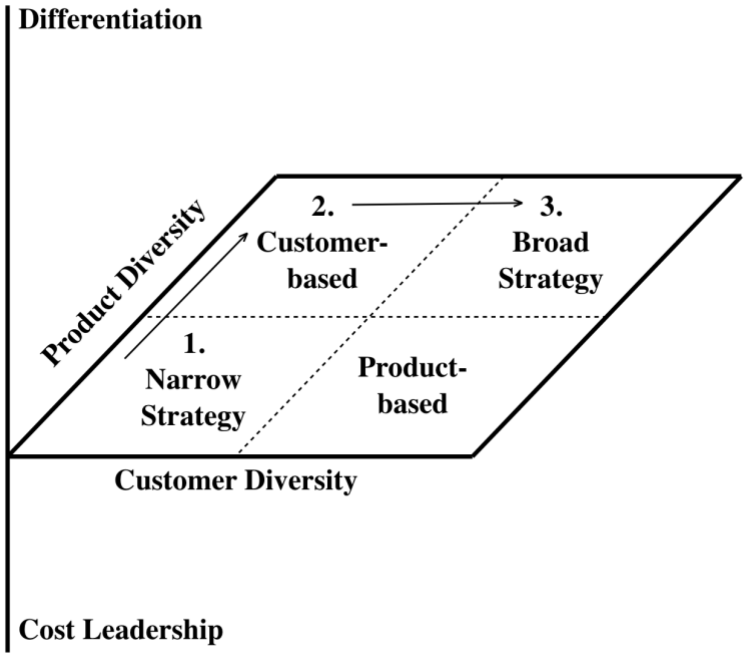

Figure 4.3 BMW–Strategic Evolution Pathway (Moon et al., 2014)

4.7 BMW’s R&D

BMW's 22 R&D centers, called 'research and innovation centers,' are dispersed across seven countries (BMW Group, n.d.). The BMW Group Research and Innovation Centre, called 'FIZ' for short, is the firm's main R&D center. The enormous campus is located in Munich, Germany, and employs about 20,000 people (BMW Group, n.d.) All of the BMW Group's innovation centers are directly connected to the FIZ, which dually acts as a service provided and provides direction for future developments (BMW Group, n.d.).

It can be stated that BMW's strategic competence is based on the concept of investing in future technology to upgrade the already advanced quality of their brand. This helps BMW sustain its established differentiation advantage. This is not to say that the firm does not invest in efficiency gains relating to cost advantages, but rather that most of their R&D can be estimated as part of furthering brand quality. As with Renault, we conducted a descriptive case analysis to determine the relationship between BMW's R&D intensity and firm performance. In order to interpret the results effectively, we have selected to display the results with bivariate correlations and scatter plots.

4.7.1 Correlations

As in the case with Renault, bivariate correlations between BMW’s R&D intensity and each of the dependent and control variables were computed. The control variables—firm size, marketing intensity, capital structure, and operation capability—are displayed in red (Table 4.2). Whereas, the dependent variables—ROA and ROE—are depicted in blue (Table 4.2). From Table 4.2, it can be inferred that capital structure exerts the strongest significance at $p = 0.02 < p = 0.05$. Other variables do not possess any statistical significance at the 5% level and can be deemed as minor when examining the relationship between R&D intensity and firm performance.

Table 4.2 Bivariate Correlations–BMW

Correlations

		RD_Intensity	Firm_Size	Marketing_Intensity	Capital_Structure	Operation_Capability	ROA	ROE
RD_Intensity	Pearson Correlation	1	-.233	-.171	-.514*	.179	.334	.341
	Sig. (2-tailed)		.324	.472	.020	.450	.150	.141
	N	20	20	20	20	20	20	20

4.7.2 Scatter Plots- Dependent Variables

The dependent variables—ROA and ROE—are demonstrated visually through scatter plots (Figure 4.8,& Figure 4.9). It can be deduced from Figures 4.8 and 4.9 that 11.1 % of ROA is predicted by R&D intensity; whereas, 11.7% of ROE is anticipated by R&D intensity. Further, it can be articulated from Figures 4.8 and 4.9 that an increase in R&D intensity results in a subsequent increase in ROA and ROE, respectively. Thus, the relationship between firm performance and R&D intensity is deemed as limited and positive.

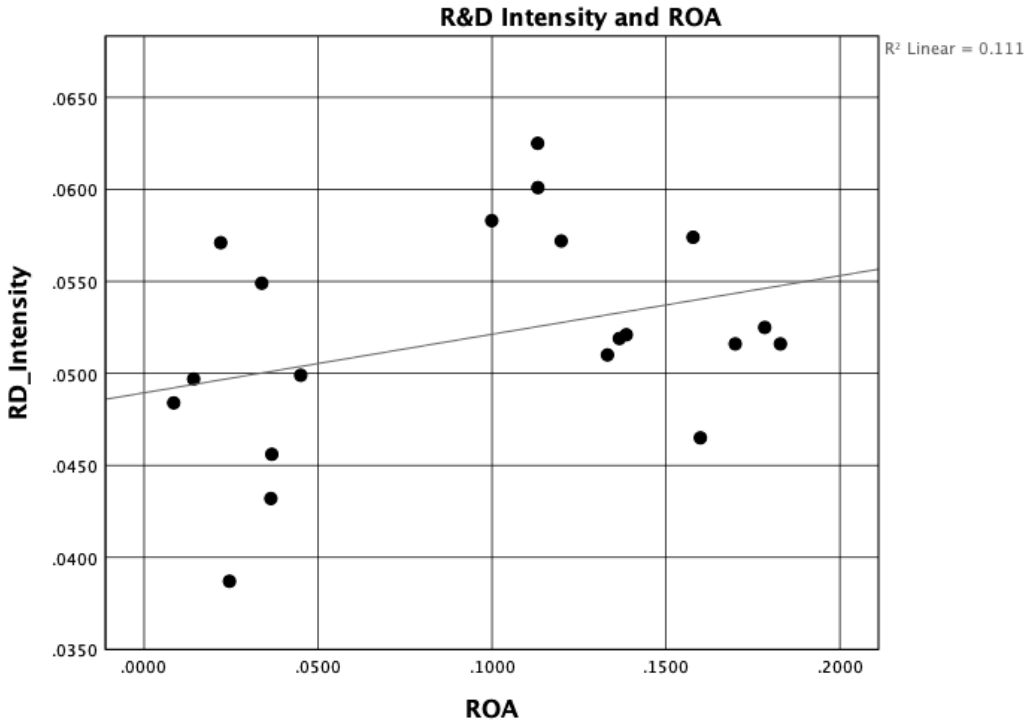

Figure 4.8 R&D Intensity and ROA–BMW

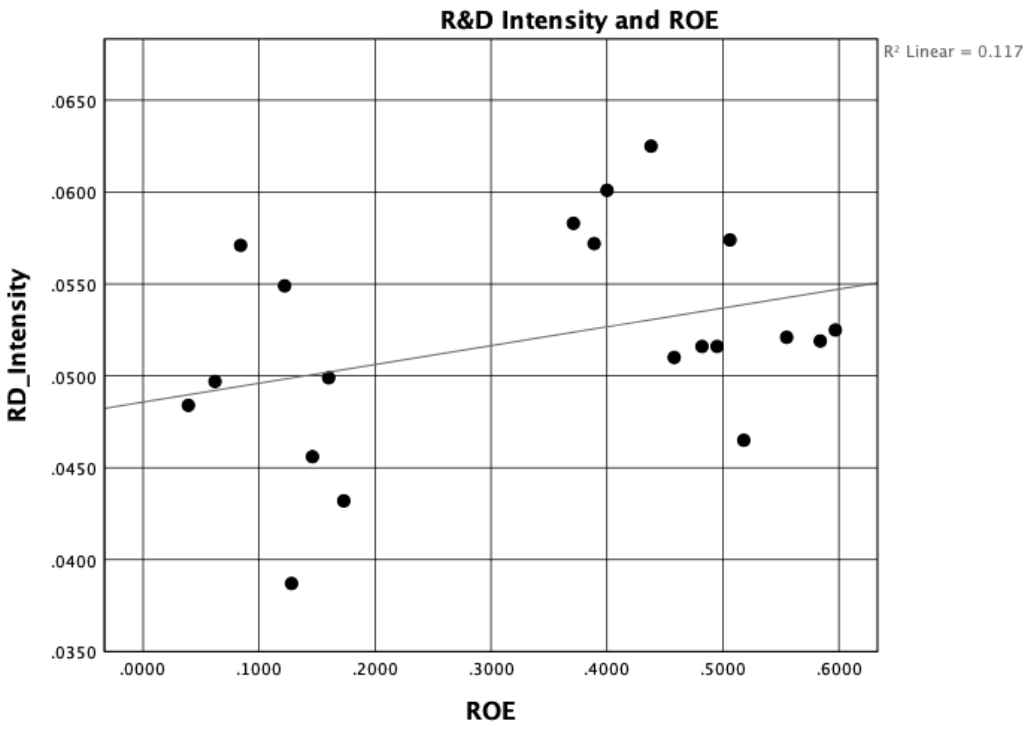

Figure 4.9 R&D Intensity and ROE–BMW

4.7.3 Scatter Plots- Control Variables

Capital structure demonstrated the most considerable significance to R&D intensity when compared to other control variables (Table 4.2); it is articulated visually using a scatter plot (Figure 4.10). It can be deduced from Figure 4.10 that capital structure negatively affects R&D intensity, in which an increase in the debt-to-equity ratio results in a reduction in R&D intensity. The coefficient of determination is equal to 26,4%, implying that 26,4% of capital structure is detected by R&D intensity. The trend can be explained since a firm with a higher debt-to-equity ratio might refrain from conducting money-demanding activities such as R&D before paying out a portion of its debts (Guo, Wang, & Wei, 2018; Chen & Ibhagui, 2019). Scatter plots of R&D intensity and remaining control variables can be found in Appendix B.

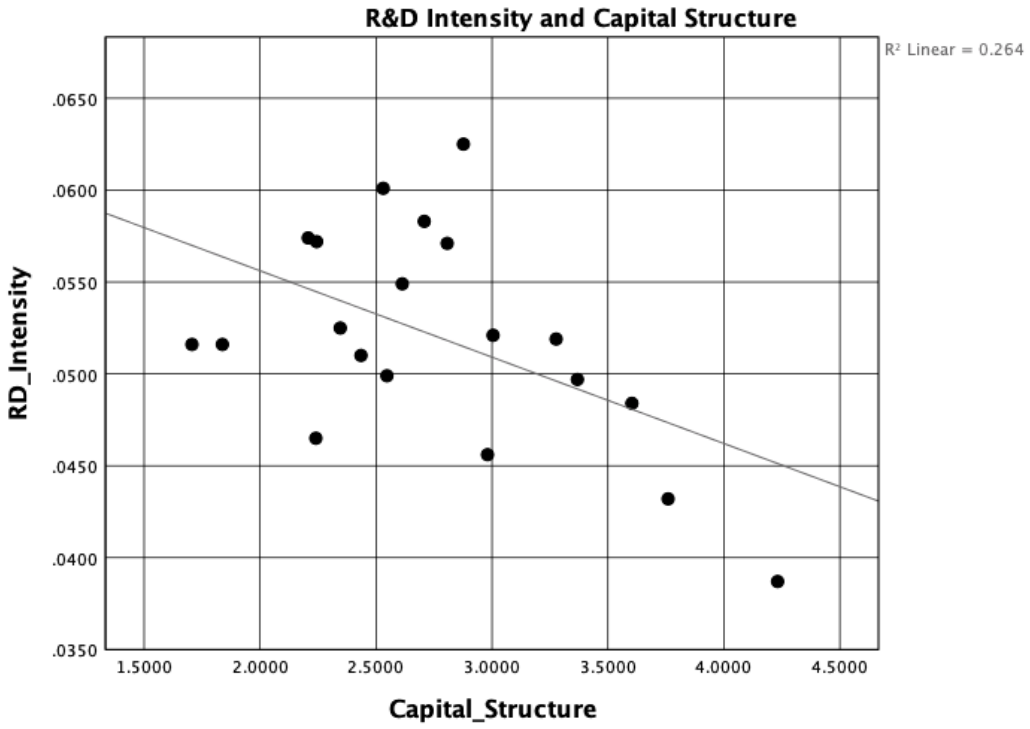

Figure 4.10 Scatter Plot of R&D Intensity and Capital Structure–BMW

4.8 BMW's Strategy, R&D, and Firm Performance

Over the described timeline from 2000 through 2019, BMW had an average R&D expenditure of total income of about 5.2%, with an average year-by-year decrease of 0.3% (BMW Group., n.d.). ROA and ROE had great fluctuations (BMW Group., n.d.), which may have slightly skewed the performance ratios and thus the results and analysis. The mentioned timeline describes BMW from the years 2000 - 2019, but in order to analyze strategic periods, we grouped different periods. BMW's historical analysis and subsequent evolution of strategy did not have specific time frames; therefore, we estimated the periods of a strategic shift. For comparability reasons, we grouped periods in similar overlapping seven-year increments to Renault. As previously mentioned, BMW's strategy evolved from Narrow to Customer-based, and then to Broad Differentiation. An estimation of years is as follows: Narrow from 2000 - 2006; Product-based from 2006 - 2013; and Broad Differentiation from 2013 - 2019. Over each of those respective timeframes, BMW's average R&D intensity was 5.31%, 5.12%, and 5.24% (BMW Group., n.d.). The average year-by-year growth was

respectively 0%, 0.06%, and -0.15% (BMW Group., n.d.). These results signify that BMW's R&D intensity was relatively stagnant, and even decreased slightly, as they evolved to a broad differentiation strategy. Perhaps shifting funds internally instead of increasing total R&D intensity resulted in the needed innovation for BMW to realize broad differentiation success.

4.8.1 Strategy and R&D

Figure 4.11 demonstrates the relationship between R&D intensity and firm strategy between 2000-2019. Contrary to Renault, BMW's R&D intensity during the Narrow phase expanded instead of relatively stagnating (Figure 4.11). This may be due to the aforementioned production expansion focus while emphasizing facilities abroad. After realizing a Customer-based strategy with a newly established expanded product lineup and production facilities abroad, BMW's R&D intensity stagnated (Figure 4.11). This may be due to a reaffirmed delivery and efficiency focus in order to manage a newly internationalized supplier network. Moving to a Broad Differentiation strategy, BMW's R&D intensity was relatively stagnant, and even decreased slightly (Figure 4.11). Only in the last couple years has R&D intensity begun to increase again (Figure 4.11). As previously mentioned, BMW has focused on market expansion while transitioning to a Broad strategy and has increased their presence in the Asian marketplace. Since there were relatively few spikes in R&D intensity during the final phase, perhaps shifting funds internally instead of increasing total R&D intensity resulted in the needed innovation for BMW to realize Broad Differentiation success.

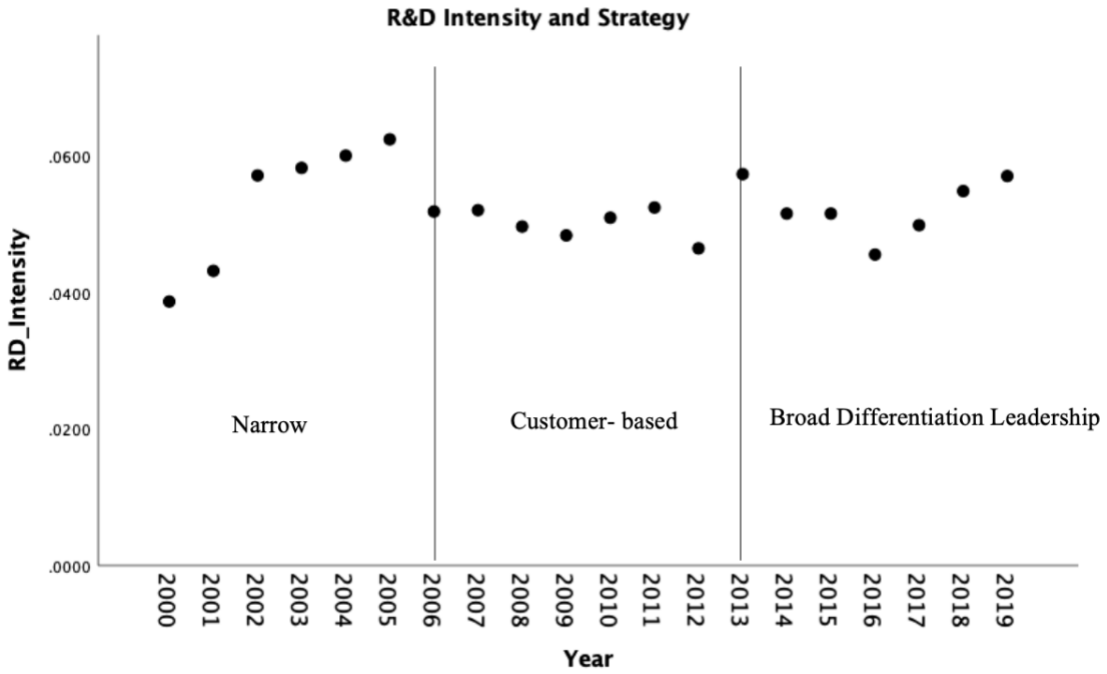

Figure 4.11 Scatter Plot of R&D Intensity and Strategy of BMW from 2000 to 2019

4.8.2 Strategy and Firm Performance

It is difficult to identify similar patterns regarding firm performance during the strategic periods for BMW. Whether due to R&D intensity, external conditions, or expanding production abroad, it can be seen that ROA and ROE increased during the Narrow phase from the years 2000 through 2006 (Figure 4.12, & Figure 4.13). After realizing a Customer-based strategy, BMW had firm success in all but two years of the timeframe from 2006 through 2013 (Figure 4.12, & Figure 4.13). The two poor performance years in 2008 and 2009 in Figures 4.12 and 4.13 are more than likely caused by the global financial crisis in 2008 and 2009 (Runde, 2009). The company has a lower performance when pursuing a Broad Differentiation strategy and during the years 2016 through 2019 (Figure 4.12, & Figure 4.13). This may be a result of focusing on market expansion, as mentioned in the previous analysis.

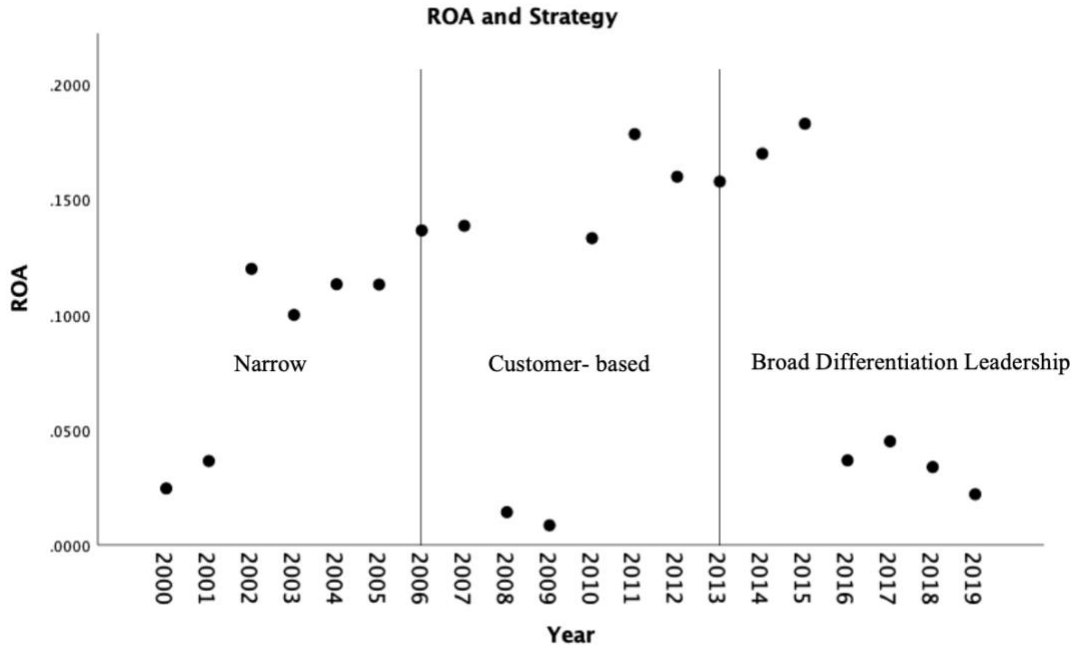

Figure 4.12 Scatter Plot of ROA and Strategy of BMW from 2000 to 2019

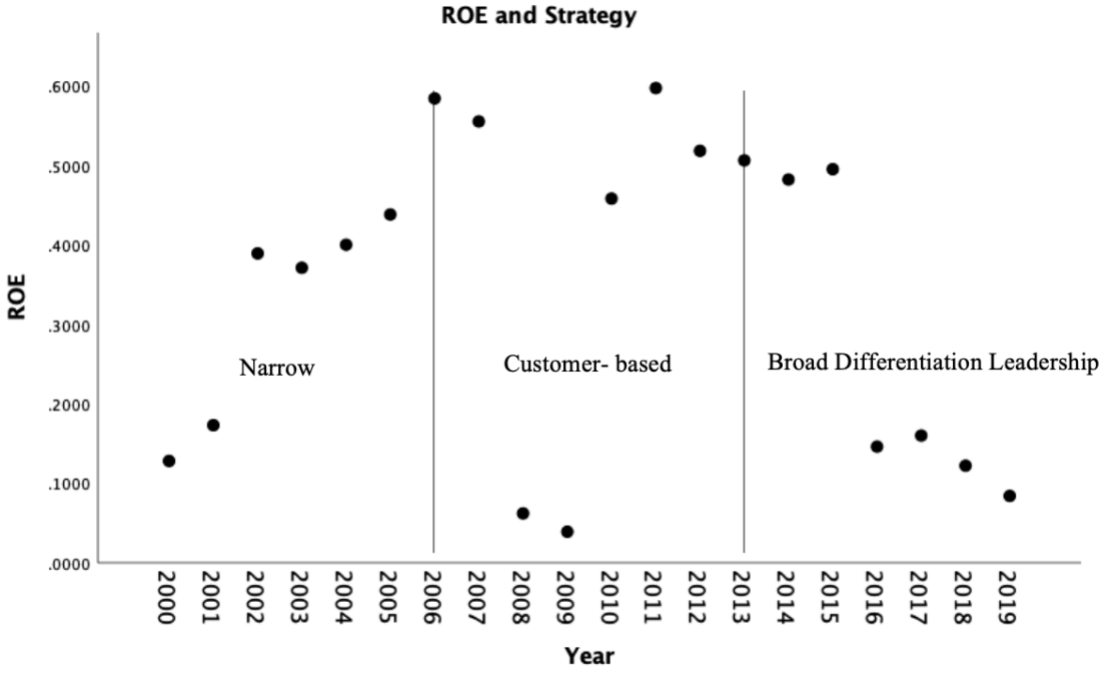

Figure 4.13 Scatter Plot of ROE and Strategy of BMW from 2000 to 2019

4.9 Summary of BMW

Following is a summary of the analysis of BMW's strategic evolution, R&D intensity, and firm performance from the years 2000 through 2019. Of the eight measured correlations, the only capital structure was statistically significant at the *p* .05 level. Capital structure was found to negatively affect R&D intensity, where an increase in debt-to-equity results in a reduction in R&D intensity. Similar to Renault, R&D intensity had limited statistical significance. However, a visual representation of the data with scatter plots highlighted relationship patterns. ROA and ROE exerted a positive, yet, limited impact on R&D intensity. Grouping different identifiable strategic periods, we were able to analyze trends related to strategy. During the years 2000 through 2006, BMW had a Narrow Differentiation strategic focus and began transitioning to a Customer-based strategy by emphasizing production expansion. During this time frame, the firm released new product models, requiring factories to supply both standard and regional models (Freyssent, 2009). R&D intensity increased substantially, along with firm performance. After realizing a Customer-based strategy, BMW began expanding its customer diversity with greater emphasis on its acquired brands of Mini and Rolls-Royce. During this period, BMW expanded its market presence but stagnated in R&D intensity and performance. The global financial crisis occurred during this period and may have negatively affected firm performance (Runde, 2009). While transitioning to a Broad Strategy in the years 2013 through 2019, BMW continued expanding its market focus with a greater emphasis on the Chinese market and concentrated more on the EV vehicle market space in Europe (BMW Group, 2019). During this period, BMW's R&D intensity first dipped and then slightly rose. Their performance has been relatively poor for the last four years.

5. Case Comparison

5.1 Strategy

We found that companies can expand their competitive scope, in terms of product diversity or customer segments, without altering existing sources of competitive advantage so long as they maintain a particular competitive focus at a given point in time. However, we found that firms occasionally supplement their source of competitive advantage (i.e., cost or differentiation) to realize targeted growth. For example, Renault pursued differentiation while expanding their product lineups to include EVs in order to gain a significant head start into a new market. BMW sought a cost focus while reorganizing its global production chain for efficiency gains (Freyssent, 2009). Even though Renault and BMW occasionally pursued mixed strategies at some point during their evolution, their strategic goals remained independent. Ultimately, BMW's evolution targeted upgrading quality through product diversification in order to sustain its differentiation advantage. On the other hand, Renault pursued customer expansion to grow its scale economies in order to maintain its cost advantage. A cost reduction may be necessary for a differentiated player to realize increased gains from premium pricing. Differentiation may be needed for a cost-leader to expand their market potential and distance themself from relative competitors (Grant, 2016). Moreover, it can be assumed that a BMW cost focus and a Renault quality focus are used to gain an advantage over competitors within the same market segment (Moon et al., 2014; Porter, 1985). As a result, BMW and Renault are able to evolve their strategies and expand their competitive scopes without disregarding core competitive advantages. Hence, elements influencing strategic expansion are independent and allow for a mixed strategy as the firms evolve.

Our findings corroborate the work of Moon et al. (2014) in relation to the effectiveness of extending Porter's (1980) generic strategies to an eight-category framework for categorizing firm strategy. Further, we support his findings that firms evolve over time from a narrow strategy to a broad strategy and may pursue mixed strategies at some point during their

evolutions (Moon et al., 2014). Additionally, we support his previous research that capturing and maintaining a ‘core competitive advantage’ and ‘broadening without diluting’ is more conducive to success than avoiding a mixed strategy. We found that in certain circumstances, being ‘stuck-in-the-middle’ may be necessary for strategic expansion (Moon et al. 2014). This directly contradicts previous research regarding the detriment of being strategically ‘stuck in the middle’ (Porter 1980, 1985), and aligns with research claiming there is no reason to discriminate against a mixed-strategy in specific circumstances (Mintzberg, 1988; Murray, 1998; Moon et al., 2014). Moreover, this study contradicts research claiming that generic strategies are too static for the current business environment (Flower, 2004; Magretta, 2012; Belton, 2017). We do concur that it may be increasingly difficult to measure strategic positions due to technological advancements and the globalization of markets (Reeves & Deimler, 2011). Ultimately, we support research that claims the generic strategies and positioning remain relevant (Dess & Davis, 1984; Robinson & Pearce, 1988; Miller & Friesen, 1986, cited in Kotha & Vadlamani, 1995).

5.2 R&D and Firm Performance

On the question of R&D, investment, and firm performance, the descriptive case analysis of the two case studies showed several common elements and a few contrasting findings. Both experiments on Renault and BMW did not detect any significance for the effect of marketing intensity and operational capability on the linkage between R&D intensity and firm performance. Other shared aspects relate to the impact of R&D intensity on ROA and ROE. Despite the bivariate correlations presented in Table 4.1 and Table 4.2, which signified an insignificant result for the variables mentioned above, the scatter plots constructed showed a slightly different outcome. For Renault, Figure 4.2 and Figure 4.3 graphically displayed the interplay between R&D intensity and ROA and ROE, respectively. The coefficient of determination depicts that 12,7 % and 10.2% of ROA and ROE, respectively, can be predicted by R&D intensity. For BMW, Figure 4.8 and Figure 4.9 visually demonstrated the relationship between R&D intensity, ROE, and ROE. The coefficient of determination illustrates that 11.1% and 11,7% of ROA and ROE are anticipated by R&D intensity, respectively. What is common across both Renault and BMW is the magnitude of the effect of R&D intensity on ROA and ROE slight and limited impact. Possible explanations for the

result include the selection of performance variables—ROA and ROE—as other variables such as Tobin's Q could have given a more concrete illustration of firm performance (Guo, Wang, & Wei, 2018; Chen & Ibhagui, 2019). Moreover, firm performance is likely to be affected by a multitude of external and internal factors (Grant, 2016) other than R&D intensity, justifying why the linkage between these two elements: R&D intensity and firm performance, is rather weak.

Nevertheless, it is interesting to note that the nature of the relationship varied between Renault and BMW. In Renault, ROA and ROE are somewhat negatively impacted by an increase in R&D intensity (Figure 4.2, & Figure 4.3); firm performance is adversely affected by R&D investment. On the other hand, in the case of BMW, ROA and ROE are moderately positively impacted by a rise in R&D intensity, indicating a positive impact of R&D investment on firm performance (Figure 4.8, & Figure 4.9). Moreover, comparing Renault to BMW, firm size was a significant variable for Renault, whereas capital structure was relatively more vital for BMW. All factors considered, the linkage between R&D expenditures and firm performance may be deemed statistically insignificant; nonetheless, a minor trend is observable. Investment in R&D might depress firm performance in Renault's case and enhance it in BMW’s case. This finding partially corroborates the ideas of Morbey (1988), Morbey (1989), and Monte & Papagani (2003), who suggest that the relationship between R&D intensity and firm performance is insignificant. However, the overall result of our findings regarding the R&D effect on firm performance has not been described before. Our results contradict previous studies on R&D investment and firm performance discussed who have proposed either a positive or a negative outcome (Ayad, Dufrene, & Obi, 1996; Gou, Wang & Shou, 2004; Chen & Ibhagui, 2019), overlooking the option of having a mixed result similar to the one we deduced in our study.

5.3 Strategy, R&D, and Firm Performance

In order to clarify our findings, we need to integrate our results from the strategic analysis and compare it with previous research within the same field. As noted previously, Renault's strategic core is cost leadership, and BMW's is differentiation. Subsequently, R&D intensity had minor and inverse effects on firm performance for Renault and BMW. R&D intensity

correlated to a slight decrease in Renault's firm performance and a slightly positive one for BMW. In accordance with the present results, previous studies (Fryxell, 1990; Guo, Wang, & Wei, 2018) have demonstrated that based on firm strategy, the impact of R&D intensity differs. R&D expenditures of firms working under a differentiated strategy were positively affected by firm performance for a prolonged time frame (Fryxell, 1990; Guo, Wang, & Wei, 2018). On the other hand, the impact of cost-leadership firms' R&D investments was limited by a threshold, where an increase beyond it can lead to negative returns (Fryxell, 1990; Guo, Wang, & Wei, 2018). Hence, it seems possible that our results may relatively be due to a difference in business strategies for Renault and BMW.

Nevertheless, R&D investment singularly plays a minor role in steering firm performance, suggesting that a supreme force must exist. As previously discussed, firm strategy lies at the core of each firm (Porter 1996). Thereby, to guarantee firm success, decisions about all expenditures have to be aligned with a firm’s overarching business strategy (Grant, 2016). A firm that aims to minimize its costs must do that throughout all of its departments, including R&D (Guo, Wang, & Wei, 2018). A firm that aims to claim a unique position needs to identify customer preferences and optimize current firm resources and capabilities (Grant, 2016). Hence, it becomes inherently difficult to pinpoint strategic success as a result of one factor, such as R&D investment. We have discussed the strategic evolution of both Renault and BMW, proposing an alteration in the optimum level of R&D investment at different periods, depending on strategies in various periods.

6. Discussion and Conclusion

6.1 Main Findings and Discussion

6.1.1 The Product Relationship of Strategy, R&D, and Firm Performance

Despite little significance, scatter plots that have examined the relationship between strategy, R&D intensity, and firm performance have resulted in interesting and identifiable patterns (Figure 4.5, Figure 4.6, Figure 4.7, Figure 4.11, Figure 4.12, & Figure 4.13). Foremost, we have identified a pattern relating to having a product focus and R&D intensity. In order to realize a Broad strategy, Renault focused on expanding its EV lineup, and this was consequently the period with the most substantial growth of R&D intensity. While transitioning to a Customer-based strategy, BMW expanded production facilities to offer new product models, and this was their most extensive R&D intensity period. Hence, when the firms were concentrating mainly on product expansion instead of market expansion, R&D intensity expanded (Figure 5.1). An R&D intensity increase may be due to product expansion requiring substantially more innovation and investment in technology to produce competitively new models than market expansion (Dannenberg, Burgard, & Wyman, 2015).

Notably, the firm performance also increased slightly during these periods (Figure 4.6, Figure 4.7, Figure 4.12, & Figure 4.13). As both firms focused on their production capabilities—either with an expanded EV product lineup by Renault, or international facility expansion for BMW—firm success in terms of ROA and ROE, followed. This may be due to having a more intra-organizational focus instead of pursuing a strategy that places primary importance on external conditions—i.e., Focusing more on product diversity instead of customer diversity (Figure 5.1). The field of strategic management has long recognized the importance of managing internal firm resources and capabilities (Penrose & Piteli, 2009). However, it may be that focusing highly on external-market positioning is less conducive to innovation and performance than previously thought (Porter, 1980; 1985; 1996). However, it must be noted that Renault's performance dropped in the years 2018 and 2019 despite a

product focus, and maybe a result of market conditions (Figure 4.6 and Figure 4.7). Nonetheless, a pattern associated with a focus on product diversity exists for both firms (Figure 5.1). Whether this results from a greater focus on product diversity or beneficial market conditions remains to be seen.

Previous research has shown that innovation drives success in the automotive market, and increasing a product portfolio results in a stronger market position (Wyman, 2015). Our findings corroborate this theory by highlighting R&D intensity and firm performance (Figure 5.1). Since R&D intensity goes up during product expansion, we can assume companies are expanding their product lines through increased R&D expenditures (Pisano & Wheelwright, 1995). It must be noted that an increase in R&D intensity is not enough to improve performance, but rather is one of the steps. Successful performance requires increasing R&D intensity and R&D efficiency to improve competitive positioning and long-term profitability (Wyman, 2015; Pisano & Wheelwright 1995).

Explanations of the statistical insignificance we obtained relate to the complexity of the relationship between strategy and R&D investment on firm performance. First, the firm performance was examined using accounting-based profit indicators—ROA and ROE—leaving market-based indicators unexplored. Second, Morbey & Reithner (1990) highlights the influence of firm productivity on profitability. He argues that investments in R&D may generate beneficiary financial returns if employee productivity was high (Morbey & Reithner, 1990). All of which signifies a direct relationship between firm productivity and performance (Morbey & Reithner, 1990). Applying this perspective to our study may give a possible explanation for the results. Our selected firms may have possibly not maintained a high level of productivity when investing in R&D throughout various strategic periods. However, the relationship is further complicated as—besides strategy, R&D investments, and firm productivity—a list of other factors may impact this relationship.

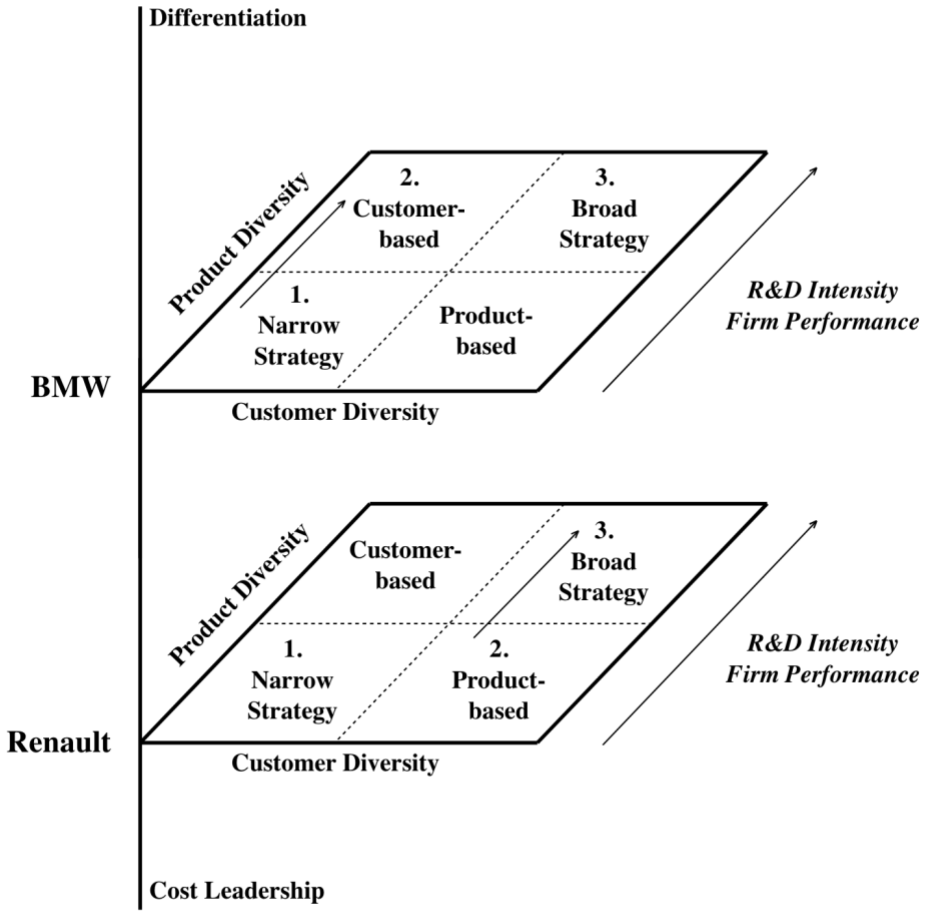

Figure 5.1 Strategic Evolution, R&D intensity, and Firm Performance of Renault and BMW

6.1.2 The Strategic Iceberg

We now address the limited impact of using R&D metrics as a tool to analyze strategy and performance. Although accessible metrics may correlate to performance, the overall performance of a firm is dictated by underlying factors that may not be visible to external observers, such as management of firm strategy. Therefore, reviewing expenditures found in annual reports does not provide an adequate picture of strategic direction, and its relationship to overall firm performance. For example, if management internally shifts resources without incurring added-expenses—in order to expand its product portfolio and realize a customer-based strategy—the firm will not adequately display the level of strategic effort through reporting metrics. If a firm enters an alliance to supply distant markets through a partner firm in order to realize a product-based strategy, the firm may distort strategic signaling since the partner firm will record the income metrics. As a result, an observer would be unaware of a strategic shift in focus and is poorly able to identify a metric that is conducive to firm performance.

Research has shown that there is a level of intrinsic information asymmetry in management research (Bergh, Ketchen, Orlandi, Heugens, & Boyd, 2018). Our findings support this statement as limited information, defined as information not required for annual reporting purposes (Bergh et al., 2018), may have lessened the significance of our analysis. As previously mentioned, company strategy is vital for firm success (Porter, 1996; Grant, 2016). Therefore, it makes sense that companies would not want to disclose all strategic management decisions, which may harm competitive positioning (Bergh et al., 2018). Moreover, there may be informational asymmetries between the levels within a company (Bergh et al., 2018). If R&D subsidiaries have specific knowledge that is not available to headquarters, or delivered slowly, upper management will not be able to make relevant decisions (Bergh et al., 2018). It is only by eliminating the internal line between visible and nonvisible that management can make well-informed decisions (Bergh et al., 2018). Nonetheless, outside of the organization, informational asymmetry will continue to be a problem for researchers in strategic management since important firm information will remain private (Bergh et al., 2018).

Strategic fit emphasizes the alignment of the firm's internal and external expenditures with its overall strategy (Grant, 2016). Our findings corroborate this theory as our analysis illustrates the importance of strategy in guiding various decisions within a firm. We believe that strategy forms the core of each business, in which decisions about all expenditures align with the firm's strategy. To illustrate this concept, we present Figure 5.2: The Strategic Iceberg. Located above the horizontal axis are visible items to external parties. These may be annual reports showcasing items such as firm expenditures, R&D investments, and various performance variables. Below the horizontal axis are effects that go relatively unnoticed. These may be items such as management's extended strategic focus and long-term orientation of the firm. Thus, unseen factors make it intrinsically difficult to pinpoint specific effects on firm performance.

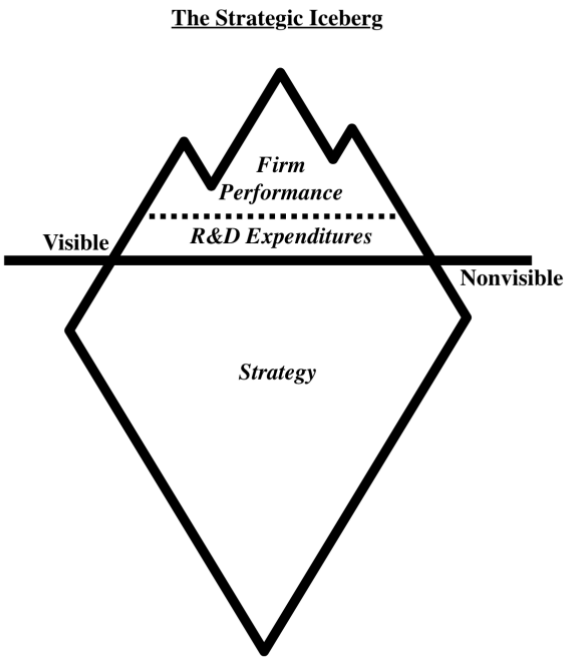

Figure 5.2 The Strategic Iceberg

6.2 Conclusion

The purpose of our dissertation was to examine the relationship between R&D investment and strategy on firm performance for two automotive firms: Renault and BMW. Previous research claims that strategy must be unique in a specific way, but they rarely explain a process to success (Grant, 2016). This is the first study, to our knowledge, to investigate the linkage between R&D intensity and strategy on firm performance using novel theories in strategic management. Expanding on previous research of Moon et al. (2014), we not only recognized the importance of having either a product or customer focus but analyzed if R&D intensity may be of strategic importance. As mentioned by previous research (Moon et al. 2014; Grant, 2016), we found an underlying strategic question to be: 'how to sell what to whom, effectively and efficiently.' By evolving and thereby expanding strategy, firms are able to realize success by targeting either product or customer expansion at a given point in time.

Built upon Porter's Generic Strategies (1980), we expanded Moon et al.'s (2014) extended the framework to include R&D and performance metrics in order to assess the consequences of strategic choices. We found that R&D intensity had a limited effect on firm performance. This may be due to underlying factors, such as strategic management, that go relatively unseen to outside observers (Figure 5.2). Therefore, identifying the interplay of a multiple-level relationship within a firm is inherently difficult without insider knowledge. This finding contributes to the field of strategic management by highlighting informational asymmetry that exists between internal participants and external observers of a firm (Verkerk, 2004). Without greater information, external observers will have difficulty evaluating the causes of long-term performance and evolution of firms—especially in regards to complex phenomena such as organizational strategy. Nonetheless, we recognized a pattern between having a product focus with an increase in R&D intensity and firm performance (Figure 5.1). The trend is identifiable despite the metrics having limited statistical significance. This finding may contribute to the field of strategic management by highlighting the importance of having an internal product focus instead of an external market focus in business to the consumer industry. As a result, managers of international automobile conglomerates may focus greater

on expanding product diversity—through increased R&D intensity—for performance improvements.

The case studies discussed in this dissertation support the emphasized benefit of having a product focus (Figure 5.1) and a newly identified strategic iceberg of firm examination (Figure 5.2). However, a more rigorous empirical test, including a larger sample of firms, will be necessary to corroborate these findings in the automotive industry. We recommend identifying metrics that adequately showcase firm strategy, as this will be an essential improvement to increase study reliability. Furthermore, strategies and their subsequent evolution vary between industries and geographic markets. Therefore, increasing the sample size to include different geographically originated firms and various industries could be an interesting topic for future research.

Hence, we conclude that the linkage between strategy and R&D investment on firm performance is vulnerable to internal and external influences. We contribute to research by providing fresh and supplementary evidence on the complexity of the relationship between internal firm operations of R&D expenditures and strategy on firm performance. We highlight and emphasize firm evolution and the importance of examining performance under various strategic periods. Lastly, observed trends discussed previously provide a base to how the relationship between our three studied elements could look like if the scope of the study were widened.

References

Alam, M.S., Atif,M., Chien-Chi, C., & Soytas,U. (2019). Does corporate R&D investment affect firm environmental performance? Evidence from G-6 countries, *Energy Economics,* vol.78, pp.401–411, Available online: https://www.sciencedirect.com/science/article/pii/S0140988318304778 [Accessed 28 April 2020]

Al-Matari, E.M, Al-Swidi, A.K., & Hanim, F. (2014). The Measurements of Firm Performance's Dimensions, *Asian Journal of Finance and Accounting,* vol.6, no.1, Available online: https://www.researchgate.net/publication/271065423_The_Measurements_of_Firm_Performance%27s_Dimensions [Accessed 21 May 2020]

Amadeo, K. (2019). What is Competitive Advantage? Three Strategies that Work, Available online: https://www.thebalance.com/what-is-competitive-advantage-3-strategies-that-work-3305828 [Accessed 23 April 2020]

Ayadi, O. F., Dufrene, U. B. & Obi, C. P. (1996). Firm performance measures: temporal roadblocks to innovation?, *Managerial Finance*, vol.22, pp.18–32.

Bekhet, A.K., & Zauszniewski, J. (2012). Methodological triangulation: An approach to understanding data, *Nurse researcher*, vol.20, no.2, pp.3–40, Available online: https://www.researchgate.net/publication/234131612_Methodological_triangulation_An_approach_to_understanding_data [Accessed 27 April 2020]

Belton, P. (2017). An Analysis of Michael E. Porter's Competitive Strategy, London: Macat Library, Available online: https://www.taylorfrancis.com/books/9781912281060 [Accessed 23 April 2020]

Bergh, D., Ketchen, D.J, Orlandi, I., Heugens, P., & Boyd, B.K. (2018). Information Asymmetry in Management Research: Past Accomplishments and Future Opportunities,

Journal of Management, vol.45, no.1, Available online: https://www.researchgate.net/publication/327804777_Information_Asymmetry_in_Management_Research_Past_Accomplishments_and_Future_Opportunities [Accessed 25 May 2020]

Bloomenthal, A. (2020). Coefficient of Determination, Investopedia, Available online: https://www.investopedia.com/terms/c/coefficient-of-determination.asp [Accessed 09 May 2020]

BMW Group. (n.d.). The BMW Group – A global company, Available online: https://www.bmwgroup.com/en/company/locations.html#&unit=map_filter_4 [Accessed 09 May 2020]

BMW USA. (n.d.). All BMW Models, Available online: https://www.bmwusa.com/all-bmws.html [Accessed 10 May 2020]

BMW Group. (2019). BMW Group Sets Strategic Course for Future, Press release, Available online: https://www.press.bmwgroup.com/global/article/detail/T0293364EN/bmw-group-sets-strategic-course-for-future?language=en [Accessed 09 May 2020]

BMW Group. (2019). Joy Creates New Era, PowerPoint presentation by Jochen Goller, Available online: https://www.bmwgroup.com/content/dam/grpw/websites/bmwgroup_com/ir/downloads/en/2019/Capital-Markets-Day-China/BMW-GROUP-China-CMD-03.07.2019_Region-China.pdf [Accessed 09 May]

BMW Group. (2020). Prior BMW Group Annual Reports, Available online: https://www.bmwgroup.com/en/investor-relations/financial-reports.html?fbclid=IwAR3RAkJ4ItcJ8VnXyJ3TNml9nXA7dTPyUwyB6htgkETHwLfYXtGpsmzCDFM#prior+bmw+group+annual+reports [Accessed 09 April]

Bryman, A., & Bell, E. (2011). Business Research Methods, Cambridge, New York, NY: Oxford University Press

Campbell, S., & Shirley, C. (2018). Estimating the Long-Term Effects of Federal R&D Spending: CBO's Current Approach and Research Needs, Congressional Budget Office, Available online: https://www.cbo.gov/publication/54089 [Accessed 29 April 2020]

Chen, Y., & Ibhagui, O.W. (2019). R&D-firm performance nexus: New evidence from NASDAQ listed firms, *North American Journal of Economics and Finance,* vol.50, Available through: LUSEM Library website https://www.lusem.lu.se/library [Accessed 15 April 2020]

Christensen, C.M., Raynor, M.E., & McDonald. R. (2015). What is Disruptive Innovation? *Harvard Business Review,* Available online: https://hbr.org/2015/12/what-is-disruptive-innovation [Accessed 25 April 2020]

Cregger, J., Hill,K., Menk,D., & Swiecki, B. (2014). Just How High-Tech is the Automotive Industry? Prepared by CAR for Auto Alliance, *Business Research,* Available online: https://www.cargroup.org/publication/just-how-high-tech-is-the-automotive-industry/ [Accessed 15 April 2020]

Dannenberg, J., Burgard, J., & Wyman, O. (2015). A comprehensive study on innovation in the automotive industry, Available online: http://www.emic-bg.org/files/CarInnovation2015_engl.pdf [Accessed 14 April 2020]

Das, S., Sen, P.K, & Sengupta, S. (2017). Impact of Strategic Alliances on Firm Valuation, *Academy of Management Journal,* vol.41, no.1, Available online: https://journals.aom.org/doi/10.5465/256895 [Accessed 15 May 2020]

Erickson, G. & Jacobson, R. (1992). Gaining comparative advantage through discretionary experience: the returns to R&D and advertising, *Management Science*, vol. 38, pp.79–1264

Ettlie, J. E. (1998). R&D and global manufacturing performance, *Management Science*, vol.44, pp.1–11.

European Automobile Manufacturers Association. (n.d.). Research and Innovation, Available online: https://www.acea.be/industry-topics/tag/category/research-and-innovation [Accessed 15 April 2020]

Flower, E. (2004). Competition,Technology and Planning: Preparing for Tomorrows Library Environment. Information Technology and Libraries, pp.67–69.

Freyssent, M. (2009). The Second Automobile Revolution–Trajectories of the World Carmakers in the 21st Century, Basingstoke and New York: Palgrave Macmillan, 468 p.

Fryxell, G. E. (1990). Multiple outcomes from product R&D: profitability under different strategic orientations, *Journal of Management*, vol.16, pp.46-633, Available through: LUSEM Library website https://www.lusem.lu.se/library [Accessed 19 April 2020]

Fuhrmann, R. (2019). How to Calculate Return on Equity - ROE, Investopedia, Available online: https://www.investopedia.com/ask/answers/070914/how-do-you-calculate-return-equity-roe.asp [Accessed 29 April 2020]

Gou, B., Wang, Q. Z. & Shou, Y. Y. (2004). Firm size, R&D, and performance: an empirical analysis on software industry in China, in International Engineering Management Conference 2004, IEEE, Singapore.

Grant, R.M. (2016). Contemporary Strategy Analysis, West Sussex: Wiley 9th edition

Group Renault. (2017). Drive The Future 2017-2022: New strategic plan builds on record results, targets sustainable, profitable growth, Press release, Available online: https://media.group.renault.com/global/en-gb/groupe-renault/media/pressreleases/21197704/drive-the-future-2017-2022-le-nouveau-plan-strategique-sappuie-sur-des-resultats-records-et-vise-une [Accessed 05 May 2020]

Group Renault. (n.d.). The Groupe Around the World, Available online: https://group.renault.com/en/our-company/locations/ [Accessed 07 May 2020]

Groupe Renault. (2020). Documents and Publications, Available online: https://group.renault.com/en/finance-2/financial-information/documents-and-publications/?fbclid=IwAR3vYW6254iF43cjaO0hOEeUlfd-z5C_D8GHqEEVn3wLOFRxghgKdgUC44I [Accessed 07 April 2020]

Guo, B., Wang, J., & Wei,S.X. (2018). R&D spending, strategic position and firm performance, *Frontiers of Business Research China,* vol.12, no.14, Available through: LUSEM Library website https://www.lusem.lu.se/library [Accessed 15 February 2020]

Hall, L. A., & Bagchi-Sen, S. (2007). An analysis of firm-level innovation strategies in the US biotechnology industry, *Technovation,* vol.27,pp.4–14.

Hamel, G. (2006). The Why, What, and How of Management Innovation, *Harvard Business Review,* vol. 84(2), no.163, pp.72–84, Available online: https://hbr.org/2006/02/the-why-what-and-how-of-management-innovation [Accessed 18 April 2020]

Hargrave, M. (2020). Return on Assets–ROA, Investopedia, Available online: https://www.investopedia.com/terms/r/returnonassets.asp [Accessed 29 April 2020]

Harvard Business School. (n.d). Micheal E.Porter, Available online: https://www.hbs.edu/faculty/Pages/profile.aspx?facId=6532 [Accessed 21 April 2020]

Harvard Business School. (n.d). Operational Effectiveness vs. Strategy, Available online: https://www.isc.hbs.edu/strategy/business-strategy/pages/operational-effectiveness-vs-strategy.aspx?fbclid=IwAR25lG7dqDwwycGgZBZ6MMkv_LA-7FTGTBxS_5Yj6k8VBFopX1kEIIxaP3Q [Accessed 21 April 2020]

Harvard Business School. (n.d). Strategic Positioning, Available online: https://www.isc.hbs.edu/strategy/business-strategy/Pages/strategic-positioning.aspx [Accessed 27 April 2020]

Hayes, A. (2019). Q Ratio – Tobin's Q, Investopedia, Available online: https://www.investopedia.com/terms/q/qratio.asp [Accessed 10 May 2020]

Hector, H.G., Nicola, G., Alexander, T., Sara, A., Zoltan, C., & Petros. G. (2019). The 2019 EU Industrial R&D Investment Scoreboard, European Commission, Available online: https://iri.jrc.ec.europa.eu/scoreboard/2019-eu-industrial-rd-investment-scoreboard [Accessed 10 April 2020]

Helms, R.M., & Allen, R.S. (2006). Linking strategic practices and organizational performance to
Porter's Generic Strategies, *Business Process Management,* vol.12, no.4, pp.433–454.

Ito, K., & Pucik, V. (1993). R&D spending, domestic competition, and export performance of Japanese manufacturing firms, *Strategic Management Journal,* vol.14, no.1, pp.61–75.

Kantar Millward Brown. (2019). BrandZ Top Global Brands, Available online: https://www.millwardbrown.com/brandz/rankings-and-reports/top-global-brands [Accessed 09 May 2020]

Katz, M.L., & Shapiro.C. (1994). Systems Competition and Network Effects, *Journal of Economic Perspectives*, vol.8, pp.93–115

Knight, G.A., & Cavusgil.S.T. (2004). Innovation, Organizational Capabilities, and the Born-Global Firm, *Journal of International Business Studies*, vol.35, no.2, pp.124–141

Kotha, S., & Vadlamani, B.L. (1995). Assessing Generic Strategies: An Empirical Investigation of Two Competing Typologies in Discrete Manufacturing Industries, *Strategic Management Journal*, vol.16, no.1 , pp.75–83

Kumbhakar, S.C., Ortega-Argiles, R., Potters, L., Vivarelli,M., & Voigt,P. (2012). Corporate R&D and firm efficiency: evidence from Europe's top R&D investors, *Journal of*

Productivity Analysis., vol.37, no.2, pp.125–140, Available through: LUSEM Library website https://www.lusem.lu.se/library [Accessed 20 February 2020]

Lamarsaude, B. (2015). Case Study: The merger between Renault and Nissan, figshare, thesis, Available online: https://doi.org/10.6084/m9.figshare.6151115.v1 [Accessed 05 May 2020]

Lin, B., Lee, Y. & Hung, S. (2006). R&D intensity and commercialization orientation effects on financial performance, *Journal of Business Research*, vol. 59, pp.85–679

Long, W. F. & Ravenscraft, D. J. (1993). LBO's debt and R&D intensity, *Strategic Management Journal*, vol. 14, pp.35–119

Lufthans, F., & Stewart.T.I. (1977). A General Contingency Theory of Management, *The Academy of Management Review*, vol.2, no.2, pp.181–195, Available online: https://digitalcommons.unl.edu/managementfacpub/179/ [Accessed 22 April 2020]

Magretta, J. (2012) . Michael Porter answers managers' FAQs, Emerald Group Publishing Limited, vol.40, no.2, pp.11–15.

Martin, R.L. (2015). There Are Still Only Two Ways to Compete, *Harvard Business Review*, available online: https://store.hbr.org/product/there-are-still-only-two-ways-to-compete/H01ZZ6 [Accessed 27 April 2020]

Mekić, A., & Mekić,A. (2014). Supports and Critiques on Porter's Competitive Strategy and Competitive Advantage, International Conference on Economic and Social Studies, Available online: https://www.researchgate.net/publication/266967720_Supports_and_Critiques_on_Porter's_Competitive_Strategy_and_Competitive_Advantage [Accessed 23 April 2020]

Merriam Webster. (n.d.). Strategy, Available online: https://www.merriam-webster.com/dictionary/strategy [Accessed 21 April 2020]

Merriam Webster. (n.d.). Trade-off, Available online: https://www.merriam-webster.com/dictionary/trade-off[Accessed 21 April 2020]

Merriam Webster. (n.d.). Research and Development, Available online: https://www.merriam-webster.com/dictionary/research%20and%20development [Accessed 15 May 2020]

Micheal Porter: Why business can be good at solving social problems. (2013). YouTube video, added by TED [online], Available at: https://www.youtube.com/watch?v=0iIh5YYDR2o [Accessed 27 April 2020]

Mintzberg.H. (1987). Crafting Strategy, *Harvard Business Review,* vol.65, pp.66–75, Available online: https://hbr.org/1987/07/crafting-strategy [Accessed 23 April 2020]

Mintzberg, H. (1988). Generic strategies: Toward a comprehensive framework, *Advances in Strategic Management*, vol. 5. JAI Press, Greenwich, CT, pp.1–67.

Monash University. (n.d.). Competitive Scope, available online: https://www.monash.edu/business/marketing/marketing-dictionary/c/competitive-scope

Monte, A.D., & Papagni, E. (2003). R&D and the growth of firms: empirical analysis of a panel of Italian firms, *Research Policy*, vol. 32, Issue 6, pp.1003–1014

Moon, H.C., Yin,W., Helm,C., & Hur, Y.K. (2014). Extending Porter's generic strategies: from three to eight, *European J. International Management*, vol.8, no.2

Morbey, G.K. (1988). R&D: its relationship to company performance, *Journal of Product Innovation Management*, vol.5, pp.191–200

Morbey, G.K. (1989). R&D expenditures and profit growth, *Research Technology Management*, vol.32, pp.20–23.

Morbey, G.K.& Reithner, R.M. (1990). How R&D Affects Sales Growth, Productivity, and Profitability, *Research Technology Management*, vol. 33, no. 3, pp. 11-14, Available online: https://www.jstor.org/stable/pdf/24127120.pdf?refreqid=excelsior%3A645d46074ce4e2f4dad4fadf026c5439 [Accessed 20 May 2020]

OECD. (2015). Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris, Available online: https://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2015_9789264239012-en [Accessed 15 May 2020]

Ocasio, W., & Joseph, J. (2006). Rise and Fall - or Transformation?: The Evolution of Strategic Planning at the General Electric Company, 1940–2006, *Long Range Planning,* vol.41, no.3, pp.248–273, Available online: https://www.sciencedirect.com/science/article/pii/S0024630108000265?casa_token=fn3KajWQmuUAAAAA:ijxSAYddaNJ-fG75ObHPgUeBlp4uHngb84_aQ2zIRHEPibk9w_iGTdKUtELSp5834xtZInnOc2c [Accessed 05 May 2020]

Patel, P.C., Fernhaber, S.A., McDougall-Covin.P.P., & Van der Have,R. (2014). Beating competitors to international markets: The value of geographically balanced networks for innovation, *Strategic Management Journal*, vol.35, no.5, pp.691–711

Penrose, E., & Pitelis. C. (2009). The Theory of the Growth of the Firm (Fourth Edition), Oxford University Press, USA

Pisano, G.P, & Wheelwright.S.C. (1995). The New Logic of High-Tech R&D, *Harvard Business Review,* Available online: https://hbr.org/1995/09/the-new-logic-of-high-tech-rd [Accessed 25 April 2020]

Porter, M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors, New York: Free Press

Porter, M. E. (1985). The Competitive Advantage: Creating and Sustaining Superior Performance, New York: Free Press

Porter, M. E. (1996). What Is Strategy?, *Harvard Business Review,* vol.74, no.6 pp. 61–78

Porter, M.E. (2008). Competitive Strategy: Techniques for Analyzing Industries and Competitors with a New Introduction, New York: Free Press

Reeves, M., & Deimler. M. (2011). Adaptability: The New Competitive Advantage, *Harvard Business Review*. Available online: https://hbr.org/2011/07/adaptability-the-new-competitive-advantage [Accessed 23 April 2020]

Renault Nissan Mitsubishi. (n.d.). Alliance Ventures, Available online: https://www.alliance-2022.com/ventures/ [Accessed 06 May 2020]

Reyes.K.H. (2013). Globalization of R&D in the Automotive Industry: Applying Current Knowledge to a Mexico Case Study, Master thesis, System Design and Management Program, Massachusetts Institute of Technology, Available online: https://dspace.mit.edu/handle/1721.1/83790 [Accessed 15 May 2020]

Richter, F. (2019). Mega-Merger Creates Fourth Largest Car Maker, *statista,* Available online: https://www.statista.com/chart/18174/top-10-automobile-manufacturers/ [Accessed 05 May 2020]

Rivoza, P. (2006). Are You Networked for Successful Innovation?, Magazine Spring, Research Feature, Available online: https://sloanreview.mit.edu/article/are-you-networked-for-successful-innovation/ [Accessed 18 April 2020]

Runde, J. (2009). Dissecting the Black Swan, Critical Review, vol,21, no.4, pp.491–505, Available online: https://www.researchgate.net/publication/249051524_Dissecting_the_Black_Swan [Accessed 29 April 2020]

Ryu,D., Kim, M.H., & Ryu, D. (2019). The Effect of International Strategic Alliances on Firm Performance before and after the Global Financial Crisis, Emerging Markets Finance

and Trade, vol.55, no.15, pp.3539-3552, Available online: https://doi.org/10.1080/1540496X.2019.1664466 [Accessed 17 May 2020]

Saci, F., & Aliouat, B. (2014). Do strategic partnerships create value? ”The empirical case of SBF 250 firms”, 5th International Research Meeting in Business Management (IRMBAM 2014), Nice, France, Available online: https://halshs.archives-ouvertes.fr/halshs-01068783/document [Accessed 17 May 2020]

Selvam, M., Gayathri, J., Vinayagamoorthi, V., Kasilingam, L., & Sigo, M. (2016). Determinants of Firm Performance: A Subjective Model. International Journal of Social Science Studies, vol.4, no.7, Available online: https://www.researchgate.net/publication/303873913_Determinants_of_Firm_Performance_A_Subjective_Model/citations

Statistics Solutions. (2020). Conduct and Interpret a Bivariate (Pearson) Correlation, Available online: https://www.statisticssolutions.com/bivariate-correlation/ [Accessed 08 May 2020]

Sturgeon, T., Gereffi, G., Memedovic, O., & Biesebroeck, J.V. (2009). Globalisation of the automotive industry: main features and trends, *International Journal of Technological Learning Innovation and Development*, vol.2, no.1, pp.7-24, Available online: https://www.researchgate.net/publication/23646331_Globalisation_of_the_automotive_industry_main_features_and_trends [Accessed 15 April 2020]

Taei, P. (2018). The Many Benefits of Scatter Plots, Available online: https://www.thelogocreative.co.uk/the-many-benefits-of-scatter-plots/ [Accessed 08 May 2020]

Taleb, N.N. (2010). The Black Swan: Second Edition: The Impact of the Highly Improbable: With a new section: "On Robustness and Fragility", Random House Publishing Group

Verkerk, M.J. (2004). Trust and Power on the Shop Floor: An Ethnographical, Ethical and Philosophical Study on Responsible Behaviour in Industrial Organisations, Delft: Eburon

Wagner, I. (2020). Leading motor vehicle manufacturers worldwide in 2017, based on production, statista, Available online: https://www.statista.com/statistics/198524/15-leading-passenger-car-manufacturers-worldwide/ [Accessed 05 May 2020]

Wright, P. (1987). A Refinement of Porter's Strategies, *Strategic Management Journal,* vol.8, no.1, pp.93–101.

Appendix A – Renault

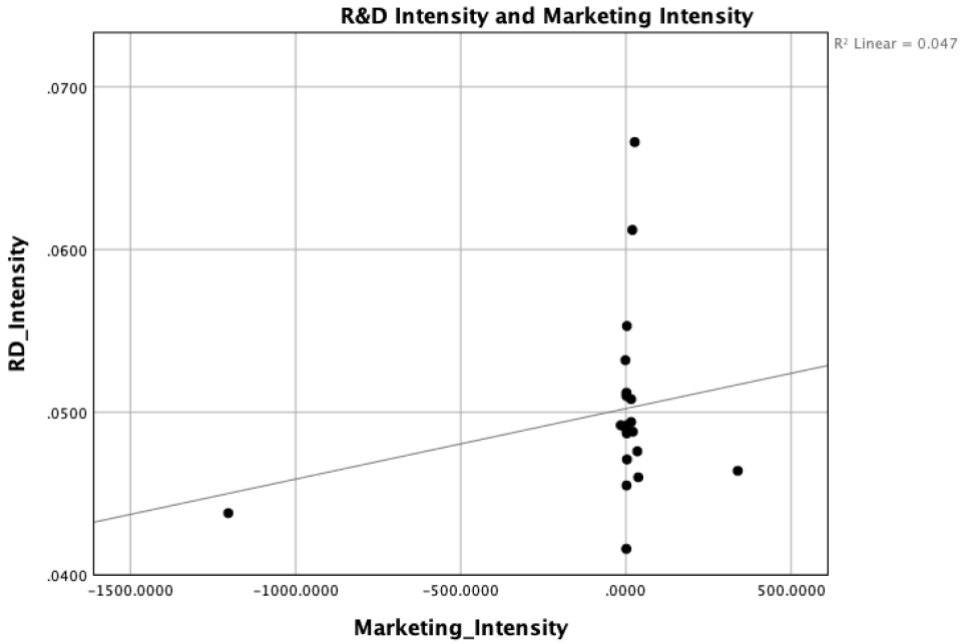

Figure 1 Renault–R&D Intensity and Marketing Intensity

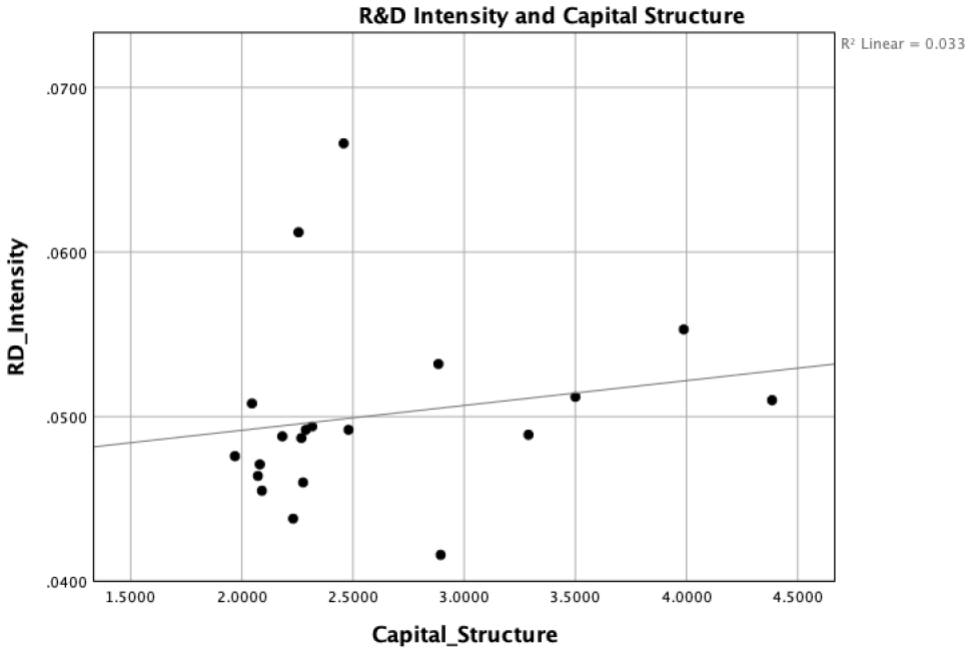

Figure 2 Renault–R&D Intensity and Capital Structure

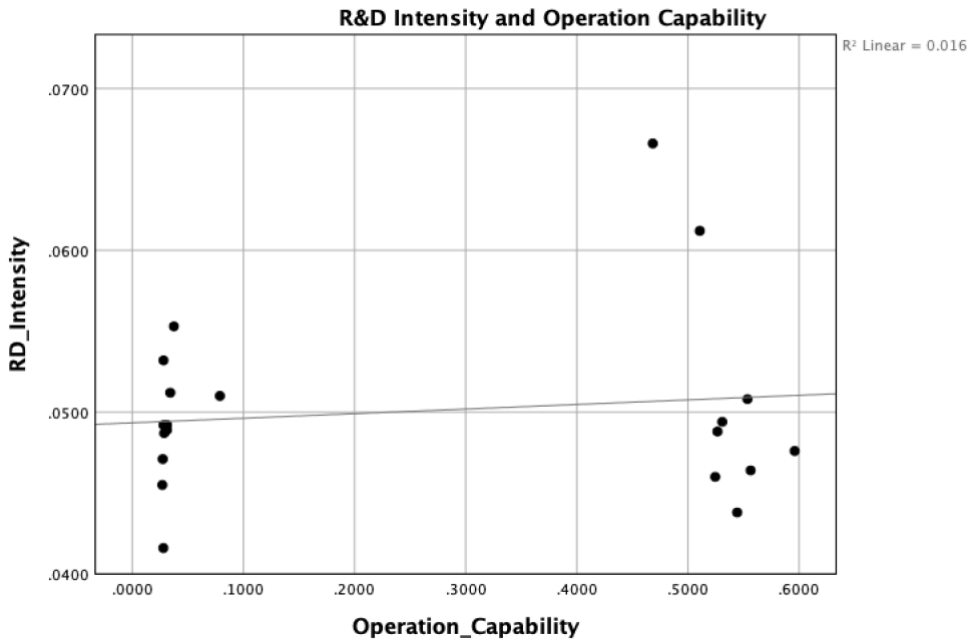

Figure 3 Renault–R&D Intensity and Operation Capability

Appendix B – BMW

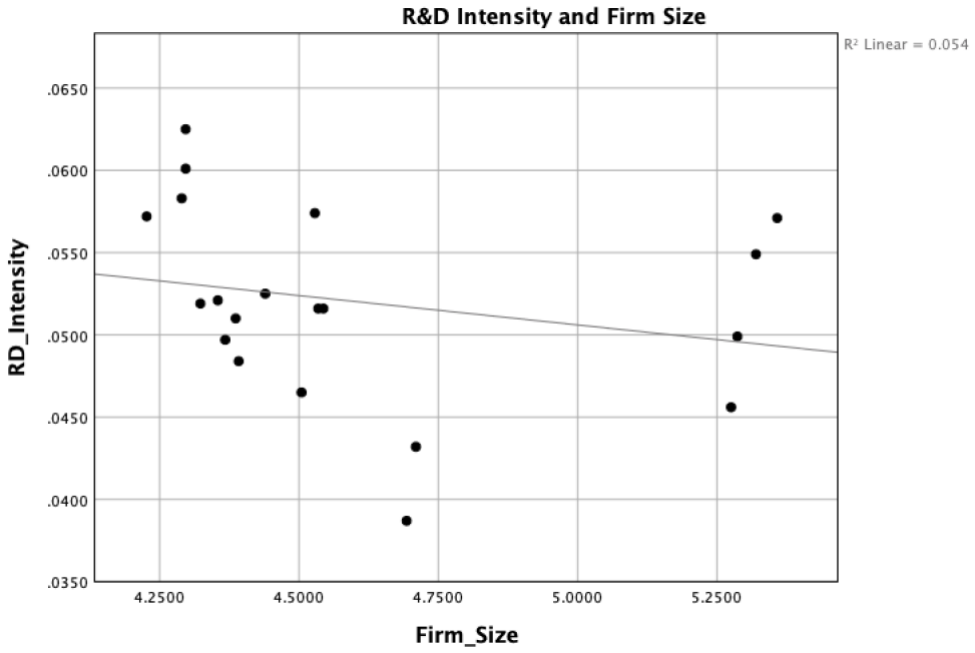

Figure 7 BMW–R&D Intensity and Firm Size

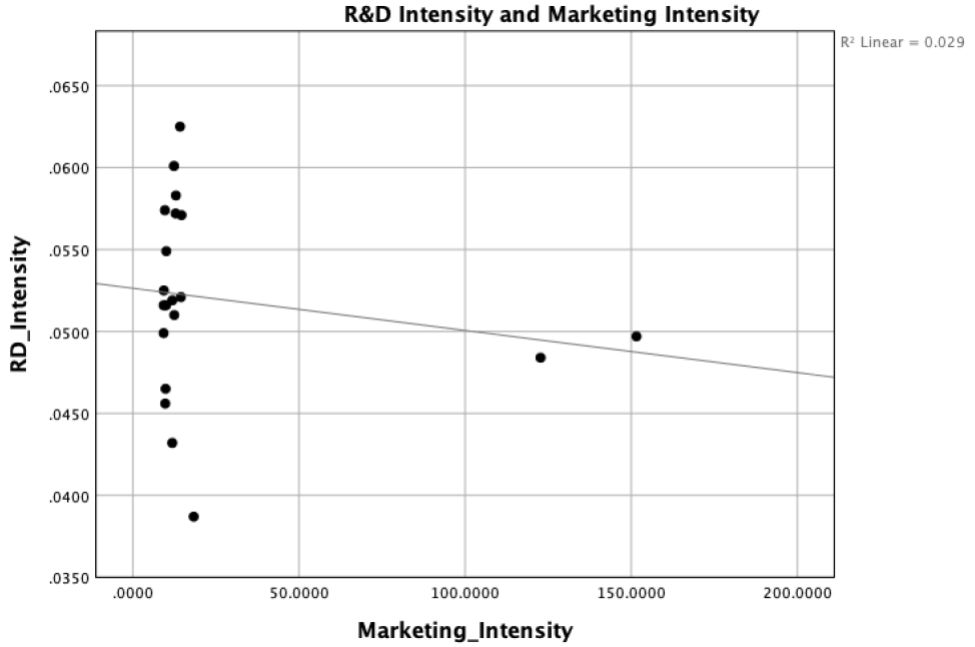

Figure 8 BMW–R&D Intensity and Marketing Intensity

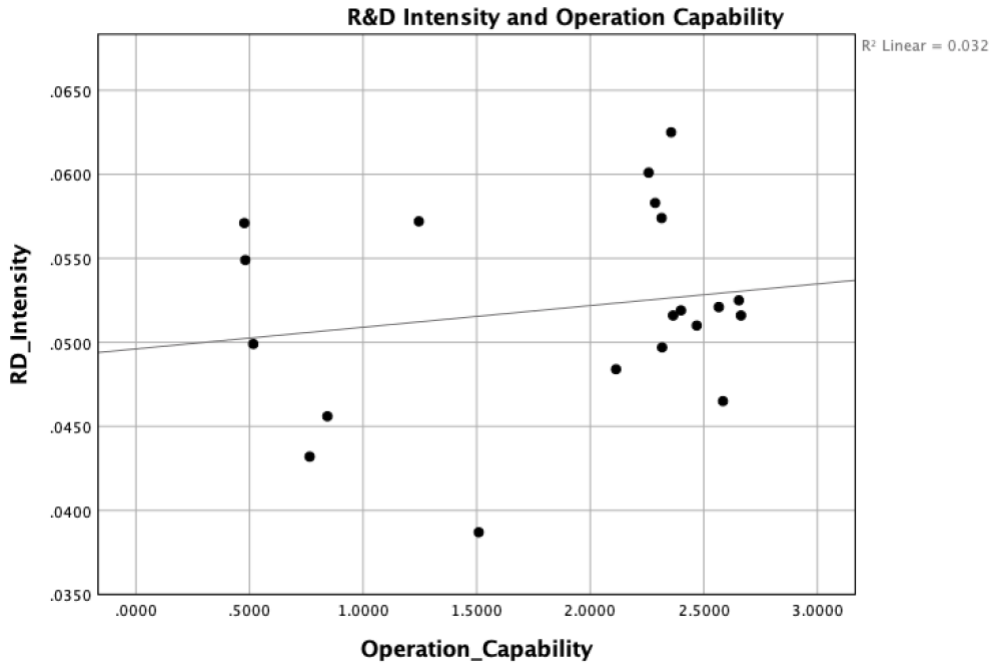

Figure 9 BMW–R&D Intensity and Operation Capability