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MANAGEMENT | RESEARCH ARTICLE

Managerial rationales for investing and divesting under uncertainty

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Abstract: This study examines the strategic investment and divestment decisions of fifteen Norwegian power companies that were made in response to an increasingly uncertain business environment. The objective is to investigate the rationales underlying decisions for strategic renewal through the lens of real options logic. The qualitative analysis of 68 decisions allowed for an in-depth understanding of the multiple considerations top managers of energy companies deliberate prior to making strategic directive decisions. Findings show that uncertainty triggers diversification and that companies tend to move unidirectionally. However, the underlying rationales and determinants for strategic decisions vary considerably among the companies examined in this study—from deliberate, long-sighted strategic visions to opportunistic, short-sighted gut feelings. Further, boards of directors and owners exert some influence on top managers' strategic decisions to expand their business activities. Knowing that some arguments carry more influence is important for managers who attempt to steer companies through turbulent times successfully.



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PUBLIC INTEREST STATEMENT

New innovations, new technology, new regulations, and ever-changing customer preferences require companies, even those in industries that are traditionally slow-moving, to develop capabilities for strategic change and renewal. However, how do companies change when the future is uncertain? This study investigates strategic renewal in an industry that has been slow to change: the Norwegian power industry. For the past one hundred years, this industry has been predictable, but today it faces rapid and radical changes in technology, regulations, and market preferences. This study examines how top managers respond strategically to new uncertainty, especially in terms of investing in and divesting from new business areas. Furthermore, the study investigates the underlying managerial rationale behind these strategic decisions. Findings suggest that, across the industry, increased uncertainty triggers strategic diversification and investments. However, there is variety in the strategic rationales that develop in different companies, and some stakeholders exert more influence than others.

Subjects: Economics; Business, Management and Accounting; Industry & Industrial Studies

Keywords: real options; strategic decision-making; managerial rationales; strategic renewal; uncertainty; incumbents; power companies

1. Introduction

The Norwegian hydropower industry has century-long experience supplying renewable, reliable, and inexpensive electricity. Considering global climate change and the growing energy demand, the future might appear positive for this industry. However, conventional power production is only one part of what power companies must do today. These companies need to both renew themselves and develop new business, as customer behavior changes and new technological solutions open new markets and intensify competition. These changes challenge an industry that was once fully regulated, in which companies operated locally, and where customers had no alternative suppliers. The gradual transition from a stable environment with low uncertainty to an unpredictable environment with high uncertainty has altered the strategic challenges and introduced pressure to act swiftly. Top managers of incumbent power companies find themselves in a strategic predicament, facing a never-before-experienced and increasingly turbulent, complex, and uncertain business environment. Commitment and traditions on one hand and the need for flexibility and renewal on the other pull top managers' attention in opposite directions (Raisch, Birkinshaw, Probst, & Tushman, 2009). Smart grid development, the demand for more renewable energy, digitalization, new customer requirements, and technological growth (for example, smart homes and the Internet of Things [IoT]) create uncertainty about the future business environment and about which strategies will lead to future success.

This need for strategic renewal is accompanied by the challenge of decision-making under uncertainty. Facing tumultuous environments, uncertainty, and radical technological change can be difficult for any company, but history and a rich literature on innovation have shown that it is particularly difficult for incumbents (e.g. Benner, 2010; Tushman & Anderson, 1986) in the renewable energy industry (Nisar, Ruiz, & Palacios, 2013).

Strategic decision-making under uncertainty has absorbed researchers for years and has been explored from different perspectives, such as prospect theory (Kahneman & Tversky, 1979), transaction cost theory (e.g. Bergh & Lawless, 1998) and, more recently, real options theory (Krychowksi & Quélin, 2010; Miller & Park, 2002). In this study, real options logic is adopted to explore the forces that influence managers' strategic decisions to invest and divest in the face of uncertainty.

Ever since the term "real options" was introduced (Myers, 1984) and applied in the management literature (Kogut, 1991), researchers have studied its relevance to making strategic decisions under uncertainty and to determining how to build innovation portfolios to meet an unpredictable future (McGrath & MacMillan, 2009). However, previous real options research is often single-sided; it either focuses on investment decisions (e.g. Fernandes, Cunha, & Ferreira, 2011; Wooster, Blanco, & Sawyer, 2016), that is, exercising a call option, or on divestment decisions (e.g. Damaraju, Barney, & Makhija, 2015; O'Brien & Folta, 2009), that is, exercising a put option. Arguably, this focus leaves an incomplete picture of how investment and divestment options are exercised to build a total portfolio. This study seeks to address this gap by analyzing both investment and divestment decisions.

Decisions about market expansion and contraction are important for companies' strategic renewal. A decision to invest in a new business activity is associated with risk, but also with risk diversification. A decision to divest carries the risk of forfeiting benefits from future growth opportunities, but also limits the downside of an unsatisfactory business activity and frees resources for future opportunities. Applying real options logic, this study investigates if the sample companies have made directive decisions related to strategic renewal to respond to increasing environmental uncertainty. Hence, the first research question is:

Research question 1: To what extent, and in what areas, do Norwegian power companies exercise real options in terms of investment and divestment activities under uncertainty?

To fully understand the managerial logic behind these strategic decisions, this study responds to a previous call for more research on the managerial frames of firms that make strategic decisions to invest and divest in an environment of uncertainty (Damaraju et al., 2015). Thus, the second question this study raises is how to understand the underlying rationales for top managers' strategic management of real options. The second research question is:

Research question 2: What is the managerial rationale underlying strategic decisions to invest and divest business activities under uncertainty?

Through a qualitative in-depth study of real-world decisions to invest and divest in response to an uncertain environment, with data provided by managers' subjective assessments, this study aims to build a deeper understanding of the complexity faced by managers and the forces driving decisions to invest and divest. Through a case-based approach, 68 investment and divestment decisions and their underlying rationales, made by fifteen Norwegian hydropower companies between 2000 and 2015, are analyzed qualitatively. The industry itself reported increasing turbulence and uncertainty around the millennium, therefore we chose year 2000 as the starting point for our investigation.

This approach seeks to contribute to both theory and practice by responding to the call by Damaraju et al. (2015) for more research on what underlies strategic decisions, particularly decisions to divest. Theoretically, this study takes a real options perspective; it provides a relevant lens for understanding the sequence of underlying factors that lead up to strategic investment and divestment decisions (Li, James, Madhavan, & Mahoney, 2007). In this manner, the current study extends theory by investigating both investment and divestment decisions and their underlying rationales. In terms of contributions to practice, the study's findings add insights for top managers as they steer incumbent companies in times of turbulence, complexity, and uncertainty. For example, analysis reveals that organizational legacy, through strategic alignment, is an important predictor for divestments, while external influence, through boards of directors and owners, is an important predictor for investments. Top managers must consider such forces consciously and critically when they commence strategic discussions about future directions.

The research article is structured as follows. Section 2 reviews the literature on organizational identity and strategic decisions under uncertainty, focusing on decisions about business-area expansion and contraction. Section 3 presents methodological considerations; Section 4 describes the case study analysis as well as findings. In Section 5, the paper moves to a discussion of the findings and implications for theory and practice and then to Conclusions, as well as the limitations of the study, in Section 6.

2. Literature review

Even when the need for organizational change is obvious, responding efficiently and effectively is difficult (e.g. Tripsas & Gavetti, 2000). Today's business environments are turbulent, complex, and uncertain, and companies face demands that are constantly changing. Assuming that the ultimate goals of today's companies are sustained prosperity and growth, they face the challenges of increasing dynamism and discontinuous change (Brown & Eisenhardt, 1997). Sustained prosperity and growth require innovation and strategic renewal, which "includes the process, content, and outcome of [the] refreshment or replacement of attributes of an organization that have the potential to substantially affect its long-term prospects" (Agarwal & Helfat, 2009, p. 282). In other words, strategic renewal requires companies to do something new or different.

Central to the process of strategic renewal is strategic decision-making (Eisenhardt & Zbaracki, 1992; Schmitt, Raisch, & Volberda, 2018). Incumbent companies in industries with a long history of stability and predictability find strategic renewal particularly difficult (Ross, Fisch, & Varga, 2018)

because they carry different burdens than younger companies launched in a high-speed world, especially in terms of organizational legacies and long-lasting perceived identities. Strategic decision-making is even more challenging under uncertainty, but real options logic seems a promising avenue for analyzing and understanding that process (Li et al., 2007; Miller & Park, 2002; Trigeorgis & Reuer, 2017).

With roots in finance theory, options theory has become relevant for strategic management through real options logic. In the field of strategic management, real options logic has been developed specifically as a tool for managers making decisions under uncertainty (Adner & Levinthal, 2004; Dixit & Pindyck, 1995; Kogut, 1991). An option is a right, but not an obligation, to take a specific action in the future at a specified cost, the exercise price. Just as a financial option provides the right, but not the obligation, to purchase or sell the underlying asset at a given price at some point in the future, a real option provides the opportunity to invest or divest nonfinancial resources, such as engagement in a business activity. The idea is to limit future downsides and maximize future upsides through option acquisition. In other words, any preceding sequence of decisions leading to a future decision to invest or divest—or to remain at status quo—can be considered the acquisition of real options. The decision to either invest in a new business activity or divest from an existing business activity is the exercise of the real option.

A premise of real options logic is that uncertainty is of central importance to whether an investment is worth making (Dixit & Pindyck, 1995; McGrath & Nerkar, 2004). In a situation without uncertainty, where tomorrow is expected to be the same as to today, today's value of a business activity is a good predictor for tomorrow's value. However, if uncertainty is high, today's value of any business activity may be a bad predictor of tomorrow's value.

In fast-paced environments, managers frequently must decide whether to pursue new opportunities, exit existing engagements, or continue as is (Helfat & Eisenhardt, 2004), that is, to exercise real options to invest, divest, or continue. Interestingly, despite the need for flexibility in turbulent times, previous real options research shows that, under uncertainty, companies are less willing to both invest (Xie, 2009) and divest (O'Brien & Folta, 2009); companies in mature industries find both difficult (Ross et al., 2018).

Making decisions under uncertainty is a bigger cognitive challenge than routine decision-making because of biases toward the known and existing (Bedenk & Mieg, 2018). Companies tend to escalate commitment to an existing course of action rather than exit when faced with negative results, with the risk of the “sunk cost fallacy” or “throwing good money after bad” (e.g. Arkes & Blumer, 1985; Staw, 1981). Real options theory, however, challenges the view that sunk cost is always a fallacy, as persistence and the option to “wait and see” are regarded as real options (O'Brien & Folta, 2009; Xie, 2009).

Investing and divesting are choices that require a deviation from the current situation, whereas continuation (often) does not require any preceding process. The choice of investing in new business activities in uncertain times is associated with spreading risk and, possibly, benefiting from future profitability, while at the same time limiting the flexibility to invest in something else. The choice of divesting, in contrast, is associated with specializing and controlling risk and loss. Often, decisions to invest and divest are preceded by a sequence of smaller commitments, such as pilots or downscaling. This concept, to make small investments before large to control downsides while maintaining upsides, is central to real options practice (McGrath & MacMillan, 2009). A real investment option preserves the opportunity to participate in future developments; options to make further investments are kept open and future rights to make decisions are valuable (McGrath & Nerkar, 2004). A real divestment option, on the other hand, indicates an opportunity to decide to abandon the investment in the future.

Real options research often focuses on investment options, such as joint ventures or R&D, but options to divest are part of the logic as well (O'Brien & Folta, 2009). For example, uncertainty

makes companies more reluctant to exercise their put options (Damaraju et al., 2015). Therefore, it might be expected that companies would make more investment decisions than divestment decisions (i.e. exercising more call options than put options). On the other hand, research also suggests that companies have reasons not to act at all: path dependence (Sydow, Schreyögg, & Koch, 2009), organizational identities (Albert & Whetten, 1985), and legacies (Morais-Storz, Platou, & Norheim, 2018). In other words, not making a choice is also making a choice.

Why companies choose to exercise their real options as they do is not only a matter of clear-headedness and sound internal market and profitability analysis. For example, the success of some companies in a new market legitimates the entry of other industry peers (Haveman, 1993; this practice is particularly relevant for incumbents, as they are more likely to look to their competitors for legitimation to respond to innovations (Debruyne & Reibstein, 2005). Companies are more likely to divest business activities that are unrelated to the rest of their business portfolio and more likely to keep business activities that are related, despite a lower option value (O'Brien & Folta, 2009). Further, strategically responsible top managers are central to strategic decisions about investing, divesting, and keeping options open. Despite growing attention to real options logic for decision-making under uncertainty, real options research on managers' understanding, on evaluation of strategic decisions, and on the underlying drivers for strategic decisions remains underdeveloped (Damaraju et al., 2015). As Li et al. state, "Real options theory maintains that the managerial flexibility to adjust a predetermined course of action upon arrival of new information is economically valuable under uncertainty" (2007, p. 46). However, managers are boundedly rational (Simon, 1991), even when they evaluate real options (Tiwana, Wang, Keil, & Ahluwalia, 2007). Managers are subject to both internal (Hambrick, 2007; Herrmann & Nadkarni, 2014) and external (Guler, 2007) influences when they make strategic decisions. For example, managers have subjective representations about their environments that influence how they sense environmental opportunities (Helfat & Peteraf, 2015) and how they define the company's strategic agenda (Dutton & Jackson, 1987). Therefore, investigating the drivers for certain strategic decisions, it is critical to target top managers' rationales for evaluating real options to invest and divest.

Real options theory has been used increasingly as a tool for analyzing and understanding strategic decision-making under uncertainty. As such, it seems an appropriate theoretical perspective for analyzing the ongoing strategic renewal of the Norwegian power utility sector. Even though the literature on real options in strategic decision-making is well developed in some areas, the current literature requires more research in other areas, especially in both investment and divestment decisions, as well as in the underlying strategic rationales for exercising options in an environment of uncertainty.

3. Methods

This study uses a systematic multiple case study approach to investigate strategic decision-making under uncertainty, with the Norwegian power utility industry as the case industry. Currently, top managers of incumbent utility companies in Norway, as elsewhere, face an expected radical change in market conditions. Outcomes are associated with elevated levels of uncertainty. The technological advances of the past two decades, such as smart grid development, advances in renewable-energy solutions, digitalization, smart homes, and the Internet of Things, combined with changing customer demands and new regulations, simultaneously challenge and open opportunities to these companies. This shifting environment creates uncertainty about the future market for utility companies and about the strategies that can lead them to advantageous strategic positions for the future. These developments and conditions make the Norwegian power utility industry ideal for this study.

This study builds on fifteen case studies of companies that represent the Norwegian power utility industry population. A qualitative approach was chosen because the study's aim is to explore a "why" question (Eisenhardt, 1989; Yin, 2014). The study searches for insight into behavior associated with strategic renewal and into top managers' rationales for strategic decisions and related behavior.

Adopting a qualitative method permits both an exploratory approach to strategic behavior and sufficient depth in data to determine diverse strategic rationales behind observed behavior.

3.1. Data sources and firm sample

In line with good case study practice, and attempting to grasp the depth and collect the nuances of reliable data, this study relies on two primary data sources: (1) interviews with the CEOs of fifteen Norwegian power companies and (2) the same companies' archival data in the form of annual reports, press articles, governmental registers, and public websites. Case companies were selected with a two-phase screening approach. First, information about the population of eligible companies was collected. Second, a set of criteria for a stratified sample was defined (Yin, 2014). The selection criteria were geographic region of Norway, annual power production, number of grid customers, number of employees, and current business activities. The fundamental premise for selecting companies was creating a sample that represents the population of Norwegian electric power companies without collecting too much redundant information. Hence, the need to reflect industry diversity was balanced with the need for a weighted sample.

First, Norway was divided into five balanced geographical regions, each coded with letters A–E, and all companies were assigned to the appropriate region. Further, the companies' annual hydropower production, number of grid customers, and number of employees were registered; companies were grouped accordingly (see Table 1 for intervals). Finally, business activities other than hydropower production and grid operations were registered. This categorization enabled a sample selection based on five criteria.

To provide some perspective, hydropower accounts for 96% of Norway's total power production, which is approximately 140,000 GWh. This study's sample includes four of the ten largest Norwegian power producers, as well as four small-scale producers. Hydropower production varies among the companies, from less than 100 GWh to more than 5,000 GWh annually. The number of grid customers ranges from approximately 3,000 to above 500,000, and the number of employees ranges from fewer than 50 in three companies to more than 500 in four companies.

All case companies are well-established and engaged in power production, grid operations, and at least one other area of business. The most frequent other current business areas are power retail and fiber optics/broadband, present in twelve and nine companies, respectively. See Table 1 for an overview of the sample.

The companies' CEOs were considered the most appropriate informants due to their strategic responsibility and familiarity with their companies' strategic decisions. CEOs have access to information from above from board of directors and owners and from below from the organization. All fifteen CEOs of the case companies agreed to participate in an interview.

3.2. Data collection and analysis

A semi-structured interview guide intended for the case companies' CEOs was designed based on the topics of Research Questions 1 and 2 above. CEOs were asked to explain their views on uncertainty in their business environment and to describe strategic investment and divestment decisions triggered by this uncertainty. They were also asked to elaborate on the rationale behind each strategic decision. This study aims for a deeper understanding of the discretionary assessment underlying strategic decisions made in an uncertain business environment. In other words, CEOs themselves determined whether a decision was the exercise of a real option under uncertainty or not. These semi-structured interviews were conducted with the CEOs of all fifteen companies. Each interview lasted approximately 60 minutes and was recorded and subsequently transcribed for analysis.

The archival data were secondary sources for the study in the sense that they served predominantly as interview preparation and as supplements to the information provided during the

Table 1. Firm sample, overview

Company id	Region	Hydropower production [GWh]	Grid customers	Employees	Other current business areas		
					Power retail	Fiber optics/ broad-band	Other
1	D	> 5000	> 150 000	> 1000	x		x
2	B	< 100	< 5000	50-199	x	x	x
3	A	< 100	5000-20 000	50-199		x	
4	C	> 5000	80 000-150 000	500-1000	x	x	x
5	B	3000-5000	80 000-150 000	500-1000	x	x	x
6	B	100-500	5000-20 000	< 50	x	x	x
7	C	100-500	5000-20 000	50-199	x	x	x
8	C	< 100	< 5000	< 50		x	
9	A	1000-3000	20 000-80 000	200-499	x		
10	B	1000-3000	80 000-150 000	200-499	x		x
11	E	3000-5000	> 150 000	> 1000	x		x
12	C	100-500	5000-20 000	< 50	x	x	
13	A	1000-3000	20 000-80 000	200-499	x		
14	A	< 100	5000-20 000	50-199	x	x	x
15	E	< 100	5000-20 000	50-199	x	x	x

interviews. Company websites, news archives, and annual reports, together with news articles, industry publications, and governmental registers, served as the main sources of archival information.

For further analysis, interview data was structured and combined with the relevant archival data to analyze each strategic decision and the CEO's attributed strategic rationale. From the data, primarily from the interviews, it was possible to extract strategic decisions made because of experienced uncertainty. In total, 68 strategic decisions—44 investments and 24 divestments—were analyzed. Findings and analyses are presented in more detail below.

4. Description and findings

The Norwegian power industry has a long tradition of producing renewable electricity, and close to all Norwegian power production comes from hydropower (96%). Many of today's companies have century-long traditions, as many hydropower facilities were established during the 1900s. Often, local governments were involved in establishing these facilities. Today, many of these companies are still wholly or majority-owned by municipalities or county municipalities. This means that in most cases the members of the board of directors are politically appointed, which strengthens the political influence on these firms' strategic behaviors. This history and structure apply to the companies in this sample as well. The only exceptions are company 11 and company 14. Company 11 is owned in part by private investors and a pension fund, while company 14 is a cooperative owned by its customers. This dominance of public ownership in the Norwegian power industry is a historic remnant from before the industry was deregulated in the early 1990s. Before deregulation, power production and supply were public responsibilities, and price and distribution were regulated by law. Deregulation introduced competition between market actors, first nationally, then among the Nordic countries, and, eventually, in the entire EU/EEA area. However, as the industry remained very profitable and attractive after deregulation, most municipalities, counties, and the state have largely retained ownership of Norwegian power companies.

Without a doubt, Norwegian power companies have served as cash cows for municipalities across the country for decades. Any municipality that is home to a profitable hydropower facility is considered lucky, and the power profits have been welcome contributions to municipal treasuries. The fact that utility companies run critical public infrastructure may have been a political argument for retaining public ownership in this sector, even after deregulation.

4.1. Research question 1—strategic decisions to invest and divest under uncertainty

The interviews with CEOs yielded descriptions of a total of 68 strategic decisions. Each decision was made between 2000 and 2015 and was explained by the source as the outcome of a process done under uncertainty. All fifteen companies decided to invest, and twelve of the fifteen made divestment decisions in the relevant time period. Table 2 shows the number of investment and divestment decisions per company, in total 44 investment decisions and 24 divestment decisions.

While the exercise of real options under uncertainty indicates an expansion of business areas, a deeper analysis reveals in which business areas the companies chose to invest and divest. Tables 3 and 4 respectively illustrate the investments and divestments by business area. Although the 44 investment decisions distribute among nine different business areas, two business areas stand out, namely new power production and fiber optics, broadband, telecom. Of the fifteen companies, thirteen chose to invest in fiber optics, broadband, and telecom activities, and nine invested in new power production. Table 3 shows that each business area can include more than one investment decision, indicating that some companies have focused their investments and targeted a particular business area. The category new power production does not include conventional investments in hydropower but, rather, investments in other renewables, such as wind and small turbine hydropower, biogas or fuel production, or investments abroad.

The absolute number of divestment decisions (24) is smaller than the number of investment decisions (44), indicating a net business area expansion among the sample companies during the

Table 2. Number of investment and divestment decisions per company

Strategic decisions	Company id															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
A	2	4	4	4	4	3	5	2	3	3	2	1	1	3	3	44
B	3	2	2	2	2	1	2	0	2	2	3	0	1	0	2	24
Sum decisions	5	6	6	6	6	4	7	2	5	5	5	1	2	3	5	68

Table 3. Current areas of business recently invested

	Current area of business	Company id														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	Conventional power production (hydropower)															
B	New power production (incl. wind power, small hydro power plants, gas production, fuel production and investments abroad)	x		3 ^x	x	2 ^x		x	x	2 ^x	x				2 ^x	
C	Financial power trade															
D	Power distribution															
E	End customer activities, incl. power sales															
F	Venture, risk investments, startups	x	x								x					
G	District heating		x					x				x				
H	Fiber, broadband, telecom		x	x	x	x	x	x	x	x	x	x	x	x	x	x
I	IoT, smart tech				x											
J	Real estate		x													
K	Electric installation services															
L	Alarm services				x				x							
M	R&D					x										
N	Miscellaneous*															2 ^x
		2	4	4	4	4	4	5	2	3	3	2	1	1	3	3

* Miscellaneous includes: technology development, financial services, consulting, retail, contracting, heat pumps

relevant period. This data leads to the conclusion that the increased level of uncertainty led to broader business area portfolios in the sample. Table 4 shows that divestment decisions vary more than investment decisions. The 24 strategic decisions to divest distribute among seven business areas, of which one is *miscellaneous*, which includes activities unrelated to hydropower.

Even though there is heterogeneity in the strategic divestment decisions, three patterns are noticeable. First, there are several divestments in the category *new energy production*. This result might be related to the fact that some new energy sources (such as wave, tidal, and offshore floating wind technologies) have not become cost-competitive despite significant investments over the past decade. Second, there are several divestments in *fiber optics*, *broadband*, *telecom* that might be a result of continuous consolidation in the Internet service provider market, where there are significant advantages of scale. Finally, there are no divestments in areas that were originally considered core business areas, while there is an increasing tendency for divestments in more unrelated business areas (see, for example, the *miscellaneous* category). Hence, real options developed in areas unrelated to the core activity are much more likely to be divested than those that fall closer to the core activity.

4.2. Research question 2—top management rationales underlying strategic decisions to invest and divest under uncertainty

Analysis revealed ten categories of underlying rationales for strategic decisions to invest and divest. Each category is described below. In total, 44 decisions to enter and 24 decisions to exit were analyzed. The data reveals at least one argument for each decision. In total, 59 arguments for investments and 25 arguments for divestments were analyzed. Each argument has been used in deciding future directions in a situation of uncertainty and can be regarded as a determinant for the exercise of real options. All ten categories and frequencies are presented in Figure 1.

Only three of the ten categories of arguments are used for both decisions to invest and divest: strategic alignment, competence, and regulatory conditions/governmental incentives. Profitability and prioritizing capital investments are naturally associated with decisions to divest, and market analysis/growth opportunities, geographical opportunities, and potential synergies for expansion opportunities are naturally associated with investments. Further, although trendspotting/foresight could lead to decisions to disengage, inherently they are opportunity-oriented activities that search for future expansion and possibilities; hence, they lead naturally to decisions to invest.

4.3. Rationales for investments

Top managers point to eight different primary arguments for deciding to exercise options to invest: market analysis/growth opportunities, owner and board influence, competence, geographical opportunities, trendspotting/foresight, potential synergies, regulatory conditions/governmental incentives, and strategic alignment. Each investment decision can involve more than one argument.

4.3.1. Market analysis/growth opportunities

The most frequent explanation for an investment is market analysis/growth opportunities. This category is selected when the explanation for investment includes commercial assessment, analysis of customer needs, growth potential for the existing business in new markets, and more. This category also encompasses a few explanations that can be considered “reactive,” such as lack of growth opportunities within existing business areas (“*We invested because we had few opportunities within our traditional business*”) and “others did” (“*Many actors in our industry invested in that business area, and we did so, too, probably because they did*”).

4.3.2. Owner and board influence

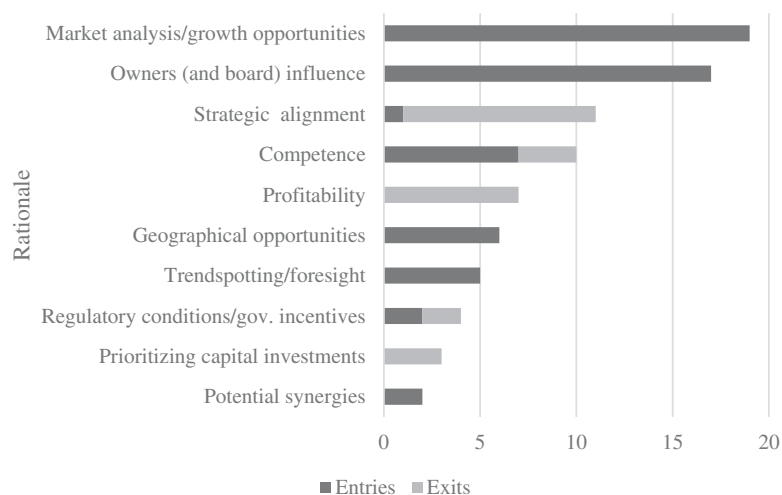
Another prevalent explanation for investment is that the decision was made after dialogue with or influence from the company owners or board of directors. The “influence” motive includes cooperation (“*together with [the owner] we discovered that ...*”), requests (“*our owners wanted us to [enter market]*”; “*our owner, a municipality, wanted fiber optics infrastructure and came to us. We*

Table 4. Current areas of business recently divested

Current area of business	Company id														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A															
B			2 ^x	x			x		x		x				
C															
D															
E															
F										x					
G															
H				x					x	x	x		x		
I															
J															
K	x														
L							x				x				
M															
N	2 ^x	2 ^x			2 ^x	x									2 ^x
	3	2	2	2	2	1	2	0	2	2	3	0	1	0	2

* Miscellaneous includes: technology development, financial services, consulting, retail, contracting, heat pumps

Figure 1. Categorization of rationale behind strategic decisions to invest and divest.



agreed that we would develop”), board decisions (“the board decided”), and pressure (“a certain political pressure from the owners that we should contribute to develop local companies”). Decisions regarding investing in fiber optics, in particular, are often (at least partly) explained by the influence of owners and boards.

4.3.3. Competence

Companies invested in a new business area to take advantage of existing competence in new markets, (“We defined our competitive advantages”; “We had competence and capacity [...] and saw opportunities abroad”), to acquire companies with desired competences (“We acquired a company that had the competence we were looking for”), and to hire for future projects (“We entered [two business areas] partly because we needed to staff the organization for an upcoming big project”).

4.3.4. Geographical opportunities

Companies’ physical environment, both in terms of its natural conditions and the businesses in close geographical proximity, led to new business investments. One company established a heat infrastructure company to take advantage of excess heat from local industry, while another engaged in new energy source development because their operating region is an area of power deficiency.

4.3.5. Trendspotting/foresight

This category differs from market analysis in that it is less analytic and based more on larger trends and beliefs about the future. (“We are heading towards the low emission society. Wind and solar will be important.”; “We believe [technology] can become a future game changer”; “We aimed to understand what we will face in the future”). These rationales involve inherent uncertainty and risk. One CEO demonstrates a conscious and strategic focus on foresight, explaining how his company has embraced the need for risk-taking and foresight during uncertain times by investing in venture business.

4.3.6. Potential synergies

Discovering potential synergies appears to be an impetus for investing in new business areas. A few companies point to potential synergies with existing business activities. However, for this study realizing synergies was never the sole explanation for making investments.

4.3.7. Regulatory conditions/governmental incentives

Two of the investigated investments are (partly) explained by regulatory conditions or governmental incentives. One investment took place because funding and incentives were provided through a governmental asset company investing in developing countries. Another was motivated in part by fortunate regulatory conditions.

4.3.8. Strategic alignment

Strategic alignment is rarely used as a motive for investing, but one company argues that strategic alignment was part of the rationale behind engaging in wind power production, as it matched the core of the company's strategic niche: "to produce and distribute and sell renewable energy."

4.4. Rationales for divestments

Managers explain divested business decisions with five different reasons: strategic alignment, profitability, prioritizing capital investments, competence, and regulatory conditions/governmental incentives.

4.4.1. Strategic alignment

Often, divestments are a result of a strategic discussion about the company's direction and next steps. One CEO said, "[O]ur principal direction was to abandon businesses that were not related to renewable energy and invest more heavily in our renewable energy business." Interestingly, discussions of strategic alignment often highlight the core business, while external activities are selected out. "Our company was in a difficult financial situation that provoked a clearing up and focus on core business." In situations like these and to allow for new diversified business areas, companies first need to challenge the perception of core business.

4.4.2. Profitability

Unsatisfactory profitability is an obvious and important reason for divesting business areas. Companies abandon business areas both when projects are unprofitable and when they have low profitability. One CEO explained, "[We divested] because the business was marginal and required a lot of focus." Another said, "We understood it was too expensive and we decided to de-escalate our commitment."

4.4.3. Prioritizing capital investments

To some extent, this category is related to the previous category, profitability, in that unprofitable business can be maintained as long as the company chooses to support the business financially. Both profitability and prioritizing capital investments are used as arguments to defend choosing not to invest and to explain divestment decisions. The profitability argument is used when the decision is based on the business area to focus on, and prioritizing capital investments takes a portfolio perspective. "We couldn't afford to grow hard enough in both [a] and [b], and we had to choose one of them."

4.4.4. Competence

Three companies abandoned business areas because of lack of competence. "We believe that was not our strength." "[W]e couldn't develop the technology to work."

4.4.5. Regulatory conditions/governmental incentives

This argument works both ways, to discourage and encourage divestment. In the data, there are two examples where companies divested business activities because of the regulatory regime: "[B]ecause of terrible framework conditions."; "The framework conditions have not been sufficient to carry the development, although the projects are good."

5. Discussion

This study investigated companies' strategic invest/divest decisions made with the intent to handle increasing environmental uncertainty. The Norwegian power utility industry was chosen as an appropriate industry from which to select case firms. This choice was made because the industry experienced an extraordinary long period of stability to which the actors adapted, but, after a period of deregulation and a low rate of technological change, it now faces significant levels of uncertainty, due to ongoing changes in technology, regulations, and customer demand. The choice was apt, as it was observed that this industry, stable for almost a century, developed diversifying and experimental behaviors. Observations included diversification into a broader range of activities outside historical core activities (i.e. conventional hydropower production and distribution), market contraction, and more focused business activities.

Results revealed that all of the incumbent companies in the study decided to invest in new business activities; the majority of the companies also decided to divest some activities in the same period, as a response to increased turbulence, complexity, and uncertainty. The list of the strategic decisions made is not exhaustive but, rather, reflects the CEOs' subjective assessments of relevant decisions made in light of the uncertain environment. With a total of 44 decisions to invest and 24 decisions to divest, the net result is that uncertainty triggers diversification. CEOs exercised a set of real options to broaden their range of activities, and, thus, be better able to deal with uncertainty about the future. These results are in line with the finding of Damaraju et al. (2015), that firms prefer to keep their options open in uncertain times, and McGrath and Nerkar's (2004) stance that expansion can be a valuable strategy under uncertainty. Consequently, the Norwegian power utility industry now reflects much more diversified actors than would be observed during this industry's period of stability.

A real option approach was adopted to conceptualize investment/divestment decisions. First, this approach was valid, as the decisions investigated here clearly fell under the academic definition of exercising real options, as explained in Section 2. They were choices that provided real options for future strategic moves. Second, from a reliability perspective, the interviews with CEOs and the analysis of the rationales behind their decisions echoed the academic understanding of the term real options (Dixit & Pindyck, 1995; McGrath & MacMillan, 2009). Explanations from CEOs confirmed that their investment and divestment moves were based on maximizing future upsides and minimizing future downsides.

It is interesting to observe underlying commonalities in the invest/divest decisions that firms made to deal with increased uncertainty in their industry. All of the firms in the sample identified themselves primarily as hydropower companies that dealt with the production and distribution of clean, renewable hydropower. With investment decisions, the preferred option was to develop new activities in fiber optics or power production. This study suggests that organizational identities (Albert & Whetten, 1985) and legacies (Morais-Storz et al., 2018) influenced strategic decisions—they predominantly were made on the rationale that fiber optics or power production were close to the core competence and existing activities of the firm. Investment decisions were largely suggested from external stakeholders through the board of directors. External stakeholders suggesting investment were mainly owners (municipalities and counties) that wanted to use the power utility firm's resources to build infrastructure (for example, securing increased local power production and access to broadband services for local industry and citizens).

Looking at divestments, no activity defined as a core activity was ever considered for divestment, in line with O'Brien and Folta's (2009) research that showed unrelated business is more likely to be divested. New activities remained small in comparison to the main activities within hydropower, and the perception of what were core activities did not change in the investigation period. These findings suggest that real options were developed primarily with the intention of achieving risk balance and supporting core activities, not necessarily replacing them. In other words, real options were not developed as part of a strategy to transition from a hydropower company to some other enterprise, such as a wind-energy or an IT company. This finding is in line with previous innovation research (Li et al., 2007) and research on the emerging renewable energy industry (Løvdal & Aspelund, 2012) that suggest that, despite resources and competence, incumbents might not be the most appropriate agents to lead an energy transition.

This study contributes to the call for more studies on the strategic rationale underpinning decisions to exercise real options (Damaraju et al., 2015). While findings suggest that there is a broad range of strategic rationales that support these decisions—everything from a “gut feeling” to influence from internal and external stakeholders—some patterns emerged. One of the most intriguing findings was the influence of external stakeholders. As discussed above, boards of directors played a significant role in pushing firms to enter new business areas. While the influence of owners and boards led only to investments and not to divestments, the effect on investments was so pronounced that it is the second most important explanation for investment decisions offered by the sample data. It is a specific characteristic of this industry that municipalities and county municipalities control ownership

to such an extent. These institutions typically have a broad range of interests (Hodges, Wright, & Keasey, 1996); it is reasonable to assume that they have exercised their ownership in the power companies to use them as tools to build critical public infrastructure and to increase the security of local power supplies. These investments might not be financially attractive for the power company but, rather, investments that they are instructed to make by their boards of directors, influenced by the diverse interests of public owners (Calabrò, Torchia, & Ranalli, 2013). There are several examples where companies have made investments inspired by industry peers—mimetic isomorphism (Haveman, 1993)—in line with research from Debruyne and Reibstein (2005). Other external influences, such as arguments related to pursuing new business opportunities, strategic synergies, and better exploitation of existing resources such as competence, are more universal characteristics that are likely to be observed in other industries as well.

Only the largest firms in the study used systematic analyses for trendspotting and corporate foresight. These actors built their strategic rationale for invest/divest decisions on systematic strategic analyses and industry reports on the national and European level. The smaller actors followed an effectuation approach (Sarasvathy, 2001), where decisions were influenced largely by local-level factors.

The most frequently used rationale for divestment decisions is strategic alignment. Strategic alignment is widely defined, but here it should be interpreted as organizational identity (Albert & Whetten, 1985). In this case, the alignment is to what the company is or already does. As noted above, there were no examples of firms that changed the perceptions of what their core activities were. Hence, divestment decisions are often made based on the activities the organization has had over a long time period and on the perception of what a company's core activities are. This is a strong marker of the influence of organizational legacy on the strategic decision-making firms do under uncertainty. It is also an effect that adds to these companies' strategic inertia, as new activities are always evaluated based on their relatedness to activities with a stronger organizational legacy.

Finally, the study identifies some relationships between the strategic rationales for investment and divestment decisions (Damaraju et al., 2015). Naturally, the underlying rationales for investment decisions differ from those underlying divestment decisions. *Strategic alignment, competence, and regulatory conditions/governmental incentives* are double-sided, in that these arguments supported both decisions to invest and decisions to divest (as illustrated in Figure 1). Among the single-sided arguments, some arguments mirror each other: *market analysis and growth opportunities* mirror *profitability*. Both *prioritizing capital investments* and *potential synergies* are portfolio-oriented rationales, one inherently limiting while the other is inherently expanding. The remaining single-sided rationales only apply to investments (*owner and board influence, geographical opportunities, trendspotting/foresight*). The *geographical opportunities* rationale is one that encourages expansion inherently; one could also argue that *trendspotting/foresight* is a rationale that is predominantly expanding. As noted above, owners and boards of directors exert significant influence for investments only.

6. Conclusion and limitations

This study investigates the strategic behavior of Norwegian power companies in terms of investments and divestments as a response to increasing environmental turbulence, complexity, and uncertainty. The study takes a real options perspective examining strategic decisions to invest and divest as responses to perceived environmental uncertainty over a 15-year time span. Findings suggest that when faced with uncertainty, companies exercise more investment options than divestment options, hence broadening their activities. However, the investments are notably uniform across the industry. Of the 44 investment decisions, 28 are within either new power production or fiber optics, broadband, or telecom, suggesting similarities in strategic decision-making across the firms in the study.

Responding to a call from Damaraju et al. (2015) for more research on managerial frames when companies exercise their real options, this study also investigates underlying rationales for investments and divestments in new business activities. With an ultimate goal of future success,

companies' decisions to invest and divest are motivated by the need to respond to an uncertain environment. Findings suggest that rationales for decisions vary from deliberate, long-sighted strategic visions to opportunistic, short-sighted gut feelings. Examples of mimetic isomorphism were found. Often, company identity and perceptions of important core activities guide strategic decisions to invest and divest. Interestingly, the influence of boards of directors and company owners is found to be the second most common reason for investment decisions, after growth opportunities. As this is a qualitative study aiming to highlight managerial rationales for strategic decisions, the results cannot be used to represent the full investment and divestment activities of Norwegian power companies over the time period in question.

This study has implications for both policy and practice. Local and regional governments are often majority shareholders of Norwegian power companies, and need to carefully manage which tasks and responsibilities they impose on the power companies as the long-term consequence can be inefficient utility companies or that publicly owned utilities lose competitiveness. In uncertain times, managers need to develop the necessary flexibility by developing real options that increase their strategic freedom to operate. At the same time, they have to make sure they do not over-invest in these options so that they lose flexibility by tying up too much capital.

While this study makes significant contributions to the discussion of strategic decision-making under uncertainty, it does have limitations that should be considered. First, the study followed a qualitative approach within the boundaries of a single industry and a limited number of case companies. Following case research logic, these findings are applicable to any organization under similar contexts (Eisenhardt, 1989; Yin, 2014); however, more quantitative investigations to explore and confirm the applicability in more heterogeneous settings are suggested. A further limitation is that this study does not assess the relative value of any of the real options studied here. Relative value information is hard to obtain. In some cases, it does not exist, and, in other cases, managers hesitate to share it due to confidentiality concerns. From an academic point of view, it would be interesting to perform a study that also includes the financial evaluation of these real options and the relative impact of this information on the strategic rationale. Unfortunately, this information was not available for the present study. Finally, the present study relied on a subjectively defined concept of real options under uncertainty. As CEOs were asked about the strategic options they had developed to meet the uncertainty emerging in their industry, extracting a complete list of all the real options that were developed and exercised during the period of investigation was unlikely. Nor were these options necessarily the same as a list of options derived from a more stringent definition of the term. The strength of the present approach, though, is that this investigation focused on the strategic decisions that had been of major interest and concern to the CEOs and that were highlighted as responses to the environmental uncertainty.

Future research may focus on cross-verifying these findings in a more heterogeneous setting. Another focus of future research could be examining qualitatively the relationship between top managers and boards of directors/owners in strategic decision-making processes in companies facing external uncertainty.

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References

Adner, R., & Levinthal, D. A. (2004). What is Not a real option: Considering boundaries for the application of real options to business strategy. *Academy of Management Review*, 29(1), 74–85. doi:10.5465/amr.2004.11851715

- Agarwal, R., & Helfat, C. E. (2009). Strategic renewal of organizations. *Organization Science*, 20(2), 281–293. doi:10.1287/orsc.1090.0423
- Albert, S., & Whetten, D. A. (1985). Organizational identity. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 7, pp. 263–295). Greenwich, CT: JAI Press.
- Arkes, H. R., & Blumer, C. (1985). The psychology of sunk cost. *Organizational Behavior and Human Decision Processes*, 35, 124–140. doi:10.1016/0749-5978(85)90049-4
- Bedenk, S., & Mieg, H. A. (2018). Failure in innovation decision making. In S. Kunert (Ed.), *Strategies in failure management: Scientific insights, case studies and tools* (pp. 95–106). Cham: Springer International Publishing.
- Benner, M. J. (2010). Securities analysts and incumbent response to radical technological change: Evidence from digital photography and internet telephony. *Organization Science*, 21(1), 42–62. doi:10.1287/orsc.1080.0395
- Bergh, D. D., & Lawless, M. W. (1998). Portfolio restructuring and limits to hierarchical governance: The effects of environmental uncertainty and diversification strategy. *Organization Science*, 9(1), 87–102. doi:10.1287/orsc.9.1.87
- Brown, S. L., & Eisenhardt, K. M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, 42(1), 1–34. doi:10.2307/2393807
- Calabrò, A., Torchia, M., & Ranalli, F. (2013). Ownership and control in local public utilities: The Italian case. *Journal of Management & Governance*, 17(4), 835–862. doi:10.1007/s10997-011-9206-1
- Damaraju, N. L., Barney, J. B., & Makhija, A. K. (2015). Real options in divestment alternatives. *Strategic Management Journal*, 36(5), 728–744. doi:10.1002/smj.2243
- Debruyne, M., & Reibstein, D. J. (2005). Competitor see, competitor do: Incumbent entry in new market niches. *Marketing Science*, 24(1), 55–66. doi:10.1287/mksc.1040.0064
- Dixit, A. K., & Pindyck, R. S. (1995). The options approach to capital investment. *Harvard Business Review*, 73(3), 105–115.
- Dutton, J. E., & Jackson, S. E. (1987). Categorizing strategic issues: Links to organizational action. *The Academy of Management Review*, 12(1), 76–90. doi:10.2307/257995
- Eisenhardt, K. M. (1989). Building theories from case study research. *The Academy of Management Review*, 14(4), 532–550. doi:10.2307/258557
- Eisenhardt, K. M., & Zbaracki, M. J. (1992). Strategic decision making. *Strategic Management Journal*, 13(S2), 17–37. doi:10.1002/smj.4250130904
- Fernandes, B., Cunha, J., & Ferreira, P. (2011). The use of real options approach in energy sector investments. *Renewable and Sustainable Energy Reviews*, 15(9), 4491–4497. doi:10.1016/j.rser.2011.07.102
- Guler, I. (2007). Throwing good money after bad? Political and institutional influences on sequential decision making in the venture capital industry. *Administrative Science Quarterly*, 52(2), 248–285. doi:10.2189/asqu.52.2.248
- Hambrick, D. C. (2007). Upper Echelons theory: An update. *Academy of Management Review*, 32(2), 334–343. doi:10.5465/amr.2007.24345254
- Haveman, H. A. (1993). Follow the leader: Mimetic isomorphism and entry into new markets. *Administrative Science Quarterly*, 38(4), 593–627. doi:10.2307/2393338
- Helfat, C. E., & Eisenhardt, K. M. (2004). Inter-temporal economies of scope, organizational modularity, and the dynamics of diversification. *Strategic Management Journal*, 25(13), 1217–1232. doi:10.1002/smj.427
- Helfat, C. E., & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal*, 36(6), 831–850. doi:10.1002/smj.2247
- Herrmann, P., & Nadkarni, S. (2014). Managing strategic change: The duality of CEO personality. *Strategic Management Journal*, 35(9), 1318–1342. doi:10.1002/smj.2156
- Hodges, R., Wright, M., & Keasey, K. (1996). Corporate governance in the public services: Concepts and issues. *Public Money and Management*, 16(2), 7–13. doi:10.1080/09540969609387915
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–292. doi:10.1142/9789814417358_0006
- Kogut, B. (1991). Joint ventures and the option to expand and acquire. *Management Science*, 37(1), 19–33. doi:10.1287/mnsc.37.1.19
- Krychowski, C., & Quélin, B. V. (2010). Real options and strategic investment decisions: Can they be of use to scholars? *Academy of Management Perspectives*, 24(2), 65–78. doi:10.5465/amp.24.2.65
- Li, Y., James, B. E., Madhavan, R., & Mahoney, J. T. (2007). Real options: Taking stock and looking ahead. *Advances in Strategic Management*, 24, 31–66. doi:10.1016/S0742-3322(07)24002-1
- Løvdal, N., & Aspelund, A. (2012). Characteristics of born global industries: The birth of offshore renewables. In M. Gabriellson & V. H. M. Kirpalani (Eds.), *Handbook of research on born globals*. Cheltenham, UK: Edward Elgar Publishing Limited, 285–309.
- McGrath, R. G., & MacMillan, I. C. (2009). *Discovery driven growth. A breakthrough process to reduce risk and seize opportunity*. Boston, MA: Harvard Business Press.
- McGrath, R. G., & Nerkar, A. (2004). Real options reasoning and a new look at the R&D investment strategies of pharmaceutical firms. *Strategic Management Journal*, 25(1), 1–21. doi:10.1002/smj.358
- Miller, L. T., & Park, C. S. (2002). Decision making under uncertainty—Real options to the rescue? *The Engineering Economist*, 47(2), 105–150. doi:10.1080/00137910208965029
- Morais-Storz, M., Platou, R. S., & Norheim, K. B. (2018). Innovation and metamorphosis towards strategic resilience. *International Journal of Entrepreneurial Behavior & Research*, 24(7), 1181–1199. doi:10.1108/IJEBR-11-2016-0369
- Myers, S. C. (1984). Finance theory and financial strategy. *INFORMS Journal on Applied Analytics*, 14(1), 126–137. doi:10.1287/inte.14.1.126
- Nisar, A., Ruiz, F., & Palacios, M. (2013). Organisational learning, strategic rigidity and technology adoption: Implications for electric utilities and renewable energy firms. *Renewable and Sustainable Energy Reviews*, 22, 438–445. doi:10.1016/j.rser.2013.01.039
- O'Brien, J., & Folta, T. (2009). Sunk costs, uncertainty and market exit: A real options perspective. *Industrial and Corporate Change*, 18(5), 807–833. doi:10.1093/icc/dtp014
- Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, 20(4), 685–695. doi:10.1287/orsc.1090.0428
- Ross, J.-M., Fisch, J. H., & Varga, E. (2018). Unlocking the value of real options: How firm-specific learning

- conditions affect R&D investments under uncertainty. *Strategic Entrepreneurship Journal*, 12(3), 335–353. doi:10.1002/sej.1275
- Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, 26(2), 243–263. doi:10.5465/amr.2001.4378020
- Schmitt, A., Raisch, S., & Volberda, H. W. (2018). Strategic renewal: Past research, theoretical tensions and future challenges. *International Journal of Management Reviews*, 20(1), 81–98. doi:10.1111/ijmr.12117
- Simon, H. A. (1991). Bounded rationality and organizational learning. *Organization Science*, 2(1), 125–134. doi:10.1287/orsc.2.1.125
- Staw, B. M. (1981). The escalation of commitment to a course of action. *The Academy of Management Review*, 6(4), 577–587. doi:10.5465/amr.1981.4285694
- Sydow, J., Schreyögg, G., & Koch, J. (2009). Organizational path dependence: Opening the black box. *Academy of Management Review*, 34(4), 689–709.
- Tiwana, A., Wang, J., Keil, M., & Ahluwalia, P. (2007). The bounded rationality bias in managerial valuation of real options: Theory and evidence from IT projects*. *Decision Sciences*, 38(1), 157–181. doi:10.1111/j.1540-5915.2007.00152.x
- Trigeorgis, L., & Reuer, J. J. (2017). Real options theory in strategic management. *Strategic Management Journal*, 38(1), 42–63. doi:10.1002/smj.2593
- Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal*, 21(10/11), 1147–1161. doi:10.2307/3094431
- Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly*, 31(3), 439–465. doi:10.2307/2392832
- Wooster, R. B., Blanco, L., & Sawyer, W. C. (2016). Equity commitment under uncertainty: A hierarchical model of real option entry mode choices. *International Business Review*, 25(1, Part B), 382–394. doi:10.1016/j.ibusrev.2015.07.006
- Xie, F. (2009). Managerial flexibility, uncertainty, and corporate investment: The real options effect. *International Review of Economics & Finance*, 18(4), 643–655. doi:10.1016/j.iref.2008.11.001
- Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). Thousand Oaks, CA: SAGE Publications, Inc.



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