



**CATOLICA  
LISBON**  
BUSINESS & ECONOMICS



**How Black Swan Events Reveal  
Known and Unknown Unknowns:  
*The Case of COVID-19***

Sina Beßlich

**Dissertation written under the supervision of Peter V. Rajsingh**

Dissertation submitted in partial fulfilment of requirements for the MSc in International Management at CLSBE, at Universidade Católica Portuguesa and for the Master of International Business at Smith, at Smith School of Business, 15.06.2020.

## **Abstract**

**Title:** How Black Swan Events Reveal Known and Unknown Unknowns:  
*The Case of COVID-19*

**Author:** Sina Beßlich

The unknown offers a great puzzle to strategists. Black Swan events, characterized by rare occurrence and retrospective predictability, have extreme impacts on economies and societies (Taleb, 2007). The primary research purpose of this study is to examine whether Black Swan events increase awareness of *known and unknown unknowns* by discovering perceptions of existing and novel uncertainties. Precisely, we analyze how unexpected tail events enhance consciousness of unknown unknowns and alter mental models of known uncertainties.

To discover a recent Black Swan phenomenon, we chose the novel Coronavirus (COVID-19) as empirical context. Qualitative examination of 36 semi-structured interviews implies that the Coronavirus crisis considerably changes the range of uncertainties, which can shape future management research and practice. Although the majority of discovered uncertainty areas (72.5%) were recognized *ex ante* COVID-19, our findings show that the current pandemic also reveals strategically relevant unknown unknowns.

Based on the framework of environmental uncertainty developed by Jauch and Kraft (1986), we develop a novel model that illustrates strategic decision-making in the context of Black Swan uncertainties. 2020's Black Swan, COVID-19, triggers strategic decision-makers to reconsider current interdependencies to reduce the potential harm of future uncertainty shocks. Since our results disclose that uncertainty related to Black Swan events essentially creates novel uncertainties, executives are required to acknowledge that they cannot ignore or eliminate uncertainty. Instead, managers are advised to embrace the occurrence of Black Swans and the existence of *known and unknown unknowns* for (anti)knowledge exploration.

**Keywords:** Black Swan Events, Uncertainty, Unknown Unknowns, Antiknowledge, Strategy, Disruption, COVID-19

## **Resumo**

**Título:** Como os Eventos Cisne Negro Revelam Incertezas Conhecidas e Desconhecidas:  
O Caso da COVID-19

**Autor:** Sina Beßlich

O desconhecido traz um grande quebra-cabeça para estrategistas. Os eventos conhecidos como Cisne Negro são caracterizados por terem uma ocorrência rara e previsibilidade retrospectiva. Estes têm grande impacto nas economias e sociedades (Taleb, 2007). O objetivo principal deste estudo é examinar se os eventos Cisne Negro aumentam a conscientização sobre *incertezas conhecidas e desconhecidas*, através do descobrimento de percepções sobre incertezas existentes e novas.

Para explorar um fenômeno recente do cisne negro, escolhemos o novo Coronavírus (COVID-19) como contexto empírico. A examinação qualitativa sobre 36 entrevistas semiestruturadas sugere que a crise do Coronavírus altera consideravelmente o leque de incertezas, o que pode resultar na moldura de futuras práticas de gestão e pesquisa. Embora a maioria das áreas de incerteza descobertas (72,5%) tenham sido reconhecidas *ex ante* COVID-19, nossos resultados mostram que a pandemia atual também revela incertezas desconhecidas estrategicamente relevantes.

Com base na estrutura de incerteza do ambiente desenvolvida por Jauch e Kraft (1986), desenvolvemos um novo modelo que ilustra a tomada de decisões estratégicas no contexto das incertezas do Cisne Negro. A COVID-19 faz com que os tomadores de decisão estratégicas reconsiderem as interdependências atuais para reduzir o dano potencial de futuros choques de incerteza. Como nossos resultados revelam que a incerteza relacionada aos eventos do Cisne Negro cria novas incertezas, os executivos devem reconhecer que não podem ignorá-las ou eliminá-las. Em vez disso, os gerentes são aconselhados a adotar a ocorrência de cisnes negros e a existência de incertezas conhecidas e desconhecidas para a exploração do conhecimento (prévio).

**Palavras-chave:** Eventos Cisne Negro, Incerteza, Incertezas Desconhecidas,  
Conhecimento Prévio, Estratégia, Disrupção, COVID-19

## **Acknowledgements**

First of all, I would like to express my gratitude to all individuals that have stepped aside their personal interests to safeguard our lives and livelihoods in this challenging time. These include doctors and nurses as well as supermarket cashiers, journalists, politicians, truck drivers, farmers, and so on. As this dissertation rationalizes the current global health catastrophe, I would like to underline the importance of those ‘hidden heroes’ within and beyond the Coronavirus situation.

Secondly, I would like to thank Professor Peter V. Rajsingh for his constant availability and willingness to support my research process. Specifically, I would like to acknowledge his continuous efforts to challenge my thoughts and his enthusiasm for investigating ‘ugly black bird’ phenomena throughout this process.

Thirdly, I would like to recognize all professionals that were willing to take time in these hectic times to share their perspective on the strategic impact of the Coronavirus. I want to thank Alexander Drees, Anthony Dickinson, Dr. Clemens Schwerdtfeger, Gregory Glanzmann, Johnny Sørensen, Karen Frisch, Katrine Brusgaard, Niels Heyer, Orlando Santos, Steve van Houten, Stuart Hardy, Torsten Schneider, Dr. Wilfried Kienzle, Wilfried von Rath and all other 22 anonymous participants that have contributed to the outcome this study.

Finally, I would like to express my appreciation towards everyone that has supported me personally along the journey. A special thanks to you, mum and dad, who did not only enable me to pursue an academic education but also act as my closest professional and personal advisors. Thank you, Silas, for always challenging that pure thinking does not change the world. Thank you, JC, for loving me even in the most non-romantic or stressful moments. Thank you, Hannah, Anina, Laura, Ana, and all my other amazing friends for the fantastic time in Lisbon and everywhere else.

**Table of Contents**

**ABSTRACT.....I**

**RESUMO..... II**

**ACKNOWLEDGEMENTS.....III**

**LIST OF FIGURES ..... VI**

**LIST OF TABLES ..... VII**

**LIST OF ABBREVIATIONS..... IX**

**1. INTRODUCTION..... 1**

    1.1. TOPIC PRESENTATION ..... 1

    1.2. RESEARCH QUESTIONS..... 3

    1.3. ACADEMIC RELEVANCE ..... 4

    1.4. MANAGERIAL RELEVANCE..... 4

    1.5. OUTLINE..... 6

**2. LITERATURE REVIEW..... 7**

    2.1. CHAOS THEORY ..... 9

    2.2. DISRUPTION ..... 9

    2.3. THE EXTERNAL ENVIRONMENT..... 10

    2.4. UNCERTAINTY..... 11

        2.4.1. *Unknown Unknowns*..... 12

        2.4.2. *Perceived Uncertainty*..... 13

    2.5. STRATEGY ..... 15

        2.5.1. *Strategic Uncertainty* ..... 15

        2.5.2. *Strategy Formulation and Implementation* ..... 15

        2.5.3. *Strategic Agility*..... 17

    2.6. THE INTERNAL ENVIRONMENT..... 18

        2.6.1. *Dynamic Capabilities* ..... 18

        2.6.2. *Collaboration and Information Styles*..... 18

        2.6.3. *Decision-Making Styles*..... 20

    2.7. PERFORMANCE OUTCOMES ..... 21

    2.8. COLLECTIVE ACTIONS OF OTHERS ..... 21

<b>3. EMPIRICAL CONTEXT: 2020’S BLACK SWAN COVID-19</b> .....	<b>23</b>
3.1. THE GLOBAL SPREAD OF A NOVEL CORONAVIRUS .....	23
3.2. FROM A MEDICAL CRISIS TO AN ECONOMIC RECESSION? .....	25
3.3. IS COVID-19 A BLACK SWAN? .....	26
3.4. EXPECTED AREAS OF UNCERTAINTY ASSOCIATED WITH THE CORONAVIRUS	28
<b>4. METHODOLOGY</b> .....	<b>30</b>
4.1. QUALITATIVE RESEARCH DESIGN .....	30
4.2. DATA COLLECTION .....	30
<b>5. ANALYSIS &amp; RESULTS</b> .....	<b>32</b>
5.1. UNCERTAINTY DIMENSIONS RELATED TO EXTERNAL ENVIRONMENT .....	34
5.2. UNCERTAINTY DIMENSIONS RELATED TO STRATEGY .....	34
5.2.1. <i>Uncertainty Dimensions Related to Strategic Uncertainty</i> .....	34
5.2.2. <i>Uncertainty Dimensions Related to Strategy Formulation &amp;</i> <i>Implementation</i> .....	35
5.2.3. <i>Uncertainty Dimensions Related to Strategic Agility</i> .....	36
5.3. UNCERTAINTY DIMENSIONS RELATED TO INTERNAL ENVIRONMENT.....	36
5.3.1. <i>Uncertainty Dimensions Related to Dynamic Capabilities</i> .....	37
5.3.2. <i>Uncertainty Dimensions Related to Collaboration &amp; Information Styles</i>	37
5.3.3. <i>Uncertainty Dimensions Related to Decision-Making Styles</i> .....	38
5.4. UNCERTAINTY DIMENSIONS RELATED TO PERFORMANCE OUTCOMES.....	39
<b>6. DISCUSSION</b> .....	<b>40</b>
<b>7. MANAGERIAL IMPLICATIONS</b> .....	<b>44</b>
<b>8. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH</b> .....	<b>45</b>
<b>9. CONCLUSION</b> .....	<b>46</b>
<b>10. REFERENCES</b> .....	<b>48</b>
<b>11. APPENDIX</b> .....	<b>77</b>

**List of Figures**

Figure 1: Overview of Worldwide Officially Reported COVID-19 Cases (May 06<sup>th</sup> 2020)..... 2

Figure 2: FTSE 100 Plunges on Coronavirus Fears (Week-on-Week Percentage Change) ..... 5

Figure 3: Internet Search Intensity for Coronavirus vs. Other Global Epidemics ..... 5

Figure 4: Intensity of Bloomberg News Stories Related to COVID-19 ..... 6

Figure 5: Revised Model of Environmental Uncertainty ..... 8

Figure 6: Stock Market Reaction to WHO Declaring COVID-19 a Global Emergency ..... 14

Figure 7: Organizational Strategies to Cope with Uncertainty ..... 16

Figure 8: Intensity of Information Published on Twitter with the Hashtag ‘Coronavirus’ ..... 20

Figure 9: Cumulative Number of COVID-19 Cases (March 1<sup>st</sup> – March 24<sup>th</sup>)..... 24

Figure 10: Unknowable Disease-Related Aspects that Drive Uncertainty ..... 24

Figure 11: Executives Expectations of Economic Recovery from the Coronavirus ..... 26

Figure 12: U.S. Oil Prices Turn Negative ..... 28

Figure 13: Industry Background of Research Participants..... 31

Figure 14: Dimensions of Uncertainty Associated with COVID-19 ..... 33

Figure 15: Observed Known vs. Unknown Uncertainty Areas Connected to COVID-19 ..... 40

Figure 16: Participants’ Assessment on Known vs. Unknown Unknowns..... 41

Figure 17: New Model of Black Swan Uncertainties ..... 43

**List of Tables**

Table 1: Semi-Structured Interview Guide ..... 80

Table 2: Demographic Overview of Research Participants ..... 81

Table 3: Economic Impact on Emerging Markets and Developing Countries ..... 82

Table 4: Financial Recovery of the Economy ..... 82

Table 5: Individual Freedom vs. Society Interests ..... 83

Table 6: Inequality and Poverty ..... 83

Table 7: Long-term Economic Impact ..... 84

Table 8: Nationalistic Movements ..... 84

Table 9: Shift from an Employee-led to an Employer-led Job Market..... 85

Table 10: Abrupt Change of Industry Sizes, Structures and Powers ..... 85

Table 11: Operational Complexity and Fragility ..... 86

Table 12: Uncertainty Management ..... 86

Table 13: Business Model Digitalization ..... 87

Table 14: Competitive Collaboration ..... 87

Table 15: Focus on Sustainability ..... 88

Table 16: Horizontal Diversification..... 88

Table 17: Rethinking Just-In-Time Production..... 89

Table 18: Risk Premia for Global Supply Chains ..... 89

Table 19: Sponsoring and Support for Sports & Culture ..... 90

Table 20: Supply Chain Dependencies ..... 91

Table 21: Vertical Integration ..... 91

Table 22: Cost Cutting ..... 92

Table 23: Innovation Efforts ..... 92

Table 24: Shift in Consumer Behavior..... 93

Table 25: Strategic Adaptability ..... 94

Table 26: Digital Leadership Skills..... 95

Table 27: Digital Literacy ..... 95

Table 28: Measures for Resilience Building ..... 96

Table 29: Appreciation & Reflection on the Meaning of Life..... 97

Table 30: Cultural Changes..... 98

Table 31: Crisis Management ..... 99

Table 32: Digitizing Internal Processes ..... 100



Table 33: Employee Safety Measures ..... 100

Table 34: Home Office..... 101

Table 35: Mental Health Effects of Digital Working..... 102

Table 36: Reduced Professional Travel ..... 103

Table 37: Social Distancing ..... 103

Table 38: Decision-Making Procedures and Speed ..... 104

Table 39: Forecasting and Prediction Efforts..... 104

Table 40: Development of Prices ..... 105

Table 41: Liquidity Management ..... 105

Table 42: Short-Term Economic Impact..... 106

## **List of Abbreviations**

AIDS – Acquired Immunodeficiency Syndrome

COVID-19 – Coronavirus Disease 2019

FTSE 100 – Financial Times Stock Exchange 100

H1N1 – Hemagglutinin Type 1 Neuraminidase Type 1 (Swine Flu)

H5NI – Hemagglutinin Type 5 Neuraminidase Type 1 (Avian Influenza)

HIV – Human Immunodeficiency Virus

IMF – International Monetary Fund

MERS – Middle East Respiratory Syndrome

NATO – North Atlantic Treaty Organization

OECD – Organization for Economic Co-operation and Development

RQ – Research Question

SARS – Severe Acute Respiratory Syndrome

SARS-CoV-2 – Severe Acute Respiratory Syndrome Coronavirus 2

WHO – World Health Organization

WTO – World Trade Organization

## 1. Introduction

*“If anything kills over 10 million people in the next few decades, it's most likely to be a highly infectious virus rather than a war. Not missiles, but microbes. Now, part of the reason for this is that we've invested a huge amount in nuclear deterrents. But we've actually invested very little in a system to stop an epidemic. We're not ready for the next epidemic.”*

-  
Bill Gates, 2015

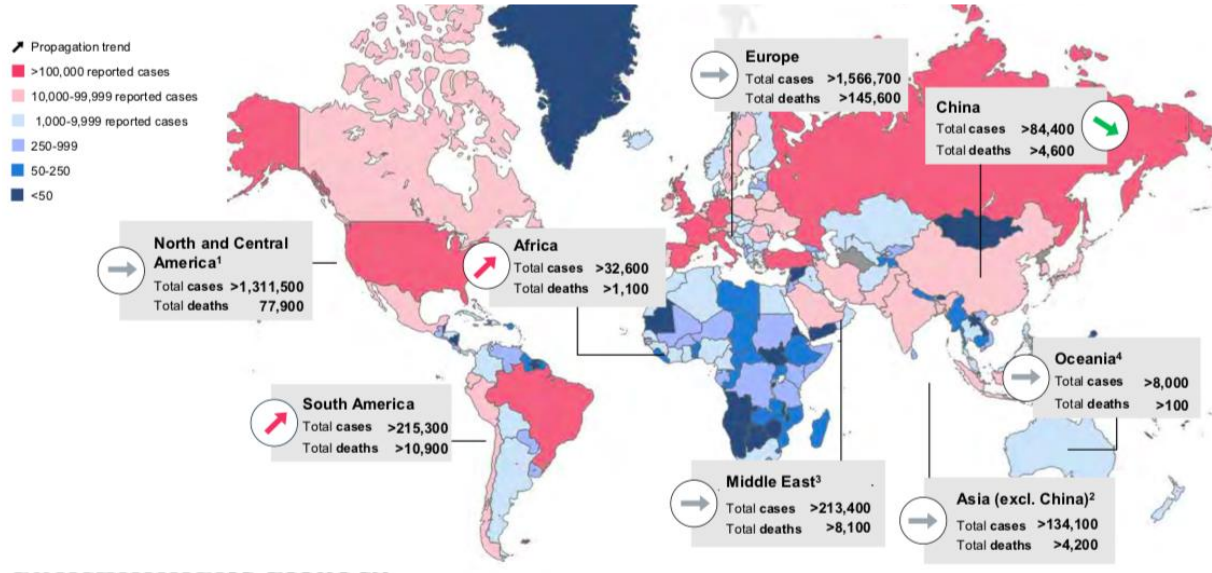
### 1.1. Topic Presentation

The human mind expects ‘big bangs’ such as terror attacks, earthquakes, fanatical politicians, or populist movements to change the world. However, things that profoundly change the world can be tiny objects (Lorenz, 1963). A butterfly (or a bat) flaps its wings in Wuhan, China, and subsequently, an economic hurricane ravages the entire world. According to chaos theory, a seemingly stable system (such as the global economy) can transform from order into wild chaos (Rajagopal, 2015). Although the economic system is assumed to have a degree of stability whereby we can predict events, the realities of today’s hyper-connected global economy, with its exposure to a broad array of exogenous forces, presents a network of compound rather than simple linear relationships. Therefore, efforts to predict the future are often off the mark (Lorenz, 1963). The aggregate of prediction errors is enormous, but it is not the magnitude of projection inaccuracies but rather the absence of awareness of these errors that is staggering (Taleb, 2007). All it takes to invalidate empirically significant results derived from a considerable number of confirmatory investigations is one single negating observation or, as Taleb puts it (2007), one Black Swan.

A recent Black Swan or outlier phenomenon originated as a ‘butterfly’ and currently pushes the global economy towards a worldwide depression is the outbreak of the novel Coronavirus (COVID-19). The virus was allegedly first identified in a cluster of patients who all visited the Huanan seafood market in Wuhan, China presenting with an undisclosed form of viral pneumonia (Zhu *et al.*, 2020). As a result of the annual spring festival migration, the disease spread to almost every province in China within a few days (Hsu *et al.*, 2020). The World Health Organization (WHO) recorded the first officially confirmed COVID-19 patient outside of China on January 13th in Bangkok, Thailand (WHO, 2020a). In March 2020, 114 countries reported COVID-19 cases, and the WHO officially declared the virus (SARS-CoV-2) and the disease (COVID-19) a pandemic (WHO, 2020b; WHO, 2020c). Several transmission

epicenters, for instance, Iran, Italy, and Spain, have developed outside of China. (WHO, 2020d). While officially-declared COVID-19 cases reached an inflection point in China in the middle of February, other countries reported a great exponential spread of the disease at the beginning of March (Callaway *et al.*, 2020). Despite containment efforts in the form of social distancing, travel restrictions, intensified testing, and sophisticated cleaning implemented by governments across the world, the virus spread globally (McKinsey & Company, 2020). Nevertheless, the propagation trend was reduced in some areas such as the virus' origin, China (Figure 1). On June 11<sup>th</sup>, the cumulative number of global COVID-19 patients has reached 7,409,132 with a total of 417,377 deaths reported (John Hopkins University, 2020).

**Figure 1: Overview of Worldwide Officially Reported COVID-19 Cases (May 06<sup>th</sup> 2020)**



Source: McKinsey & Company (2020)

The disease impacts organizations and individuals beyond mortality and morbidity in today's hyper-connected global economy (McKibbin & Fernando, 2020). The effects of COVID-19 are visible across numerous macro and microeconomic contexts. Irrespective of size and location, companies face supply chain disruptions, reduced labor supply, rising costs of doing business, changing demand patterns, rise in equity premia, and amplified country risk premia based on exponentially increasing uncertainty (McKibbin & Fernando, 2020). Or, as framed by Charles Gave (2020), *“the current COVID-19 uncertainties are revealing the global system's fragilities, both short and long term.”*

The freezing up of economic activity, coupled with uncertainties, is causing declines in output, consumption, investment, and ultimately firm performance. The director of the World Trade Organization (WTO), Roberto Azevêdo, stated that these inevitable declines will have enormous long-term consequences for households and businesses, on top of the health risks (WTO, 2020). Moreover, economic analysts from McKinsey & Company expect “*countries around the world [to] probably find themselves more in debt than ever*” (Cadena & Ferrari-Haines, 2020). Hence, management of uncertainty is a critical challenge for organizations (Thompson, 1967; Basu & Bundick, 2017). This imperative implicates the academic discipline of strategy – indeed, this is fundamentally the purpose of engaging in strategic thinking (Allaire & Firsirotu, 1989). Failures to address major environmental shifts, such as COVID-19, negatively affect firm performance and can potentially challenge a firm’s very existence (Audia *et al.*, 2000). Therefore, analyses of uncertainties associated with the outbreak of COVID-19 are critical for understanding how uncertainties, as a phenomenon, bear upon business practice.

Extreme events, such as the outbreak of COVID-19, are effective starting points of antiknowledge analysis. In this context, we define *antiknowledge* as cultivating what we do not know and do not expect (Taleb, 2007). Lacking awareness of antiknowledge fundamentally forms *unknown unknowns*. In contrast, increased mindfulness of antiknowledge can sequentially enhance knowledge by leading to a recognition of potential future scenarios that incorporate different forms of strategic and operational alterations (Wilkin & Sutton, 1986). Thus, the research purpose of this study is to examine whether Black Swan events increase awareness of *known and unknown unknowns* by discovering perceptions of existing and novel uncertainties.

## 1.2. Research Questions

The distinct formal research questions being examined are as follows:

1. How do Black Swan events raise awareness of unknown unknowns?
2. How do Black Swan phenomena alter mental models pertaining to known uncertainties?
3. Has the COVID-19 crisis changed the range of uncertainties, which can shape future management research and practice?

### **1.3. Academic Relevance**

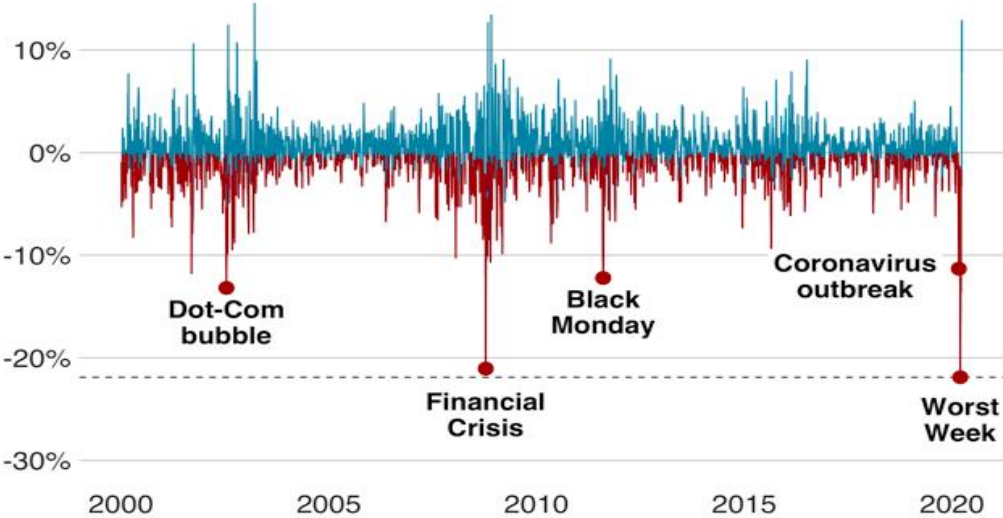
The importance of uncertainty remains widely acknowledged within and beyond strategy literature (e.g., Knight, 1921; Lawrence & Lorsch, 1967; Milliken, 1987; Eisenhardt, 1989a; Miller, 1992; Priem *et al.*, 2002; Michel, 2007). While strategic management scholars have demonstrated the importance of studying the effect of individual components of uncertainty on various strategic decisions (e.g., Beckman *et al.*, 2004; Carson *et al.*, 2006), the number of studies examining uncertainties triggered by specific Black Swans remains limited. The official call for further papers on the implication of uncertainties for management and organizations from the Academy of Management Review, a leading journal of strategy academia, underlines the necessity for further research in this domain (Academy of Management Review, 2018). By building on, extending, and applying the model of environmental uncertainty developed by Jauch and Kraft (1986) to the outbreak of COVID-19, this dissertation contributes to the existing body of knowledge in a crucial subfield. Firstly, this study analyzes a novel empirical context that has begun to change mental models surrounding antiknowledge and uncertainty. Secondly, it expands the literature on uncertainty, enhancing existing frameworks that discuss chaos, disruption, environmental factors, perception, strategy, decision-making, and firm performance theory. Thirdly, by conducting a significant number of expert interviews, this study gathers and analyses a new set of primary data, which, in turn, delivers useful insights about the range of uncertainties that can shape future research.

### **1.4. Managerial Relevance**

Uncertainties associated with the outbreak of COVID-19 comprise not only an intellectual enigma for academics but substantially affect business practices. By understanding industries as complex systems, managers can improve the strategic value of decision-making and develop innovative inter- and post-crisis scenarios (Levy, 1994). To stay competitive, organizations need to act before uncertainty reaches an inflection point and begins to compound (Kahneman & Tversky, 1982). Traditional economic metrics such as a historic fall of stock prices (Figure 2) and other behavioral statistics, including individual searches for information (Figure 3 & 4), signal the managerial relevance of the economic impact of COVID-19. Systemic disruptions not only require executives to develop crisis management strategies, but also have enduring effects on the competitive environment. The findings of this paper add substantial

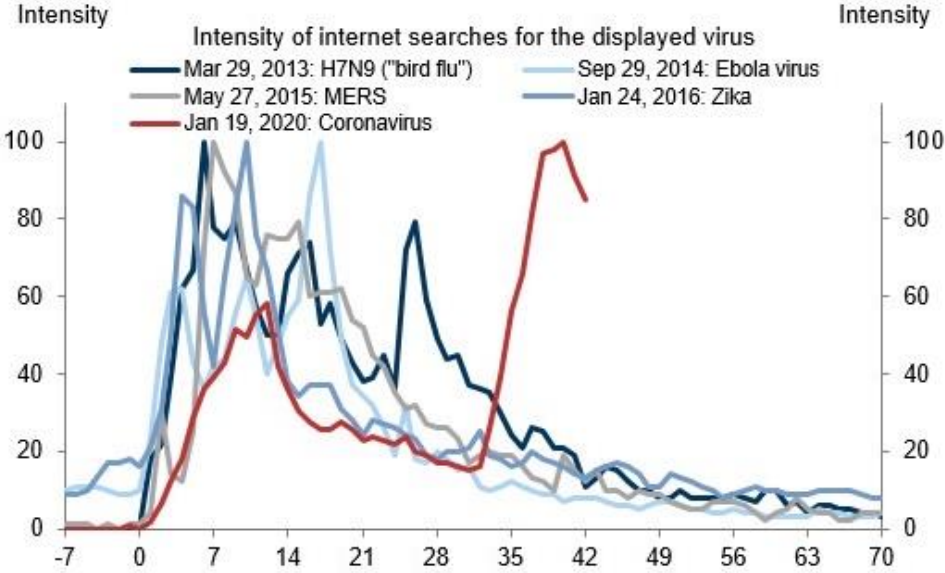
managerial value by suggesting 40 specific uncertainty domains that may be relevant for the economic and organizational challenges of the future.

**Figure 2: FTSE 100 Plunges on Coronavirus Fears (Week-on-Week Percentage Change)**



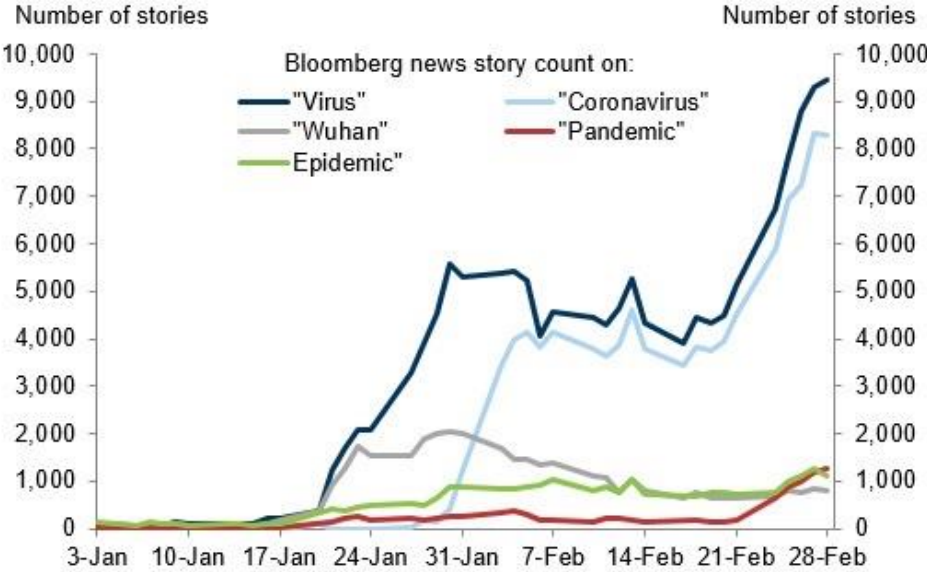
Source: Jones, Brown, and Palumbo (2020)

**Figure 3: Internet Search Intensity for Coronavirus vs. Other Global Epidemics**



Source: Nathan, Galbraith, and Grimberg (2020)

**Figure 4: Intensity of Bloomberg News Stories Related to COVID-19**



*Source: Nathan, Galbraith, and Grimberg (2020)*

**1.5. Outline**

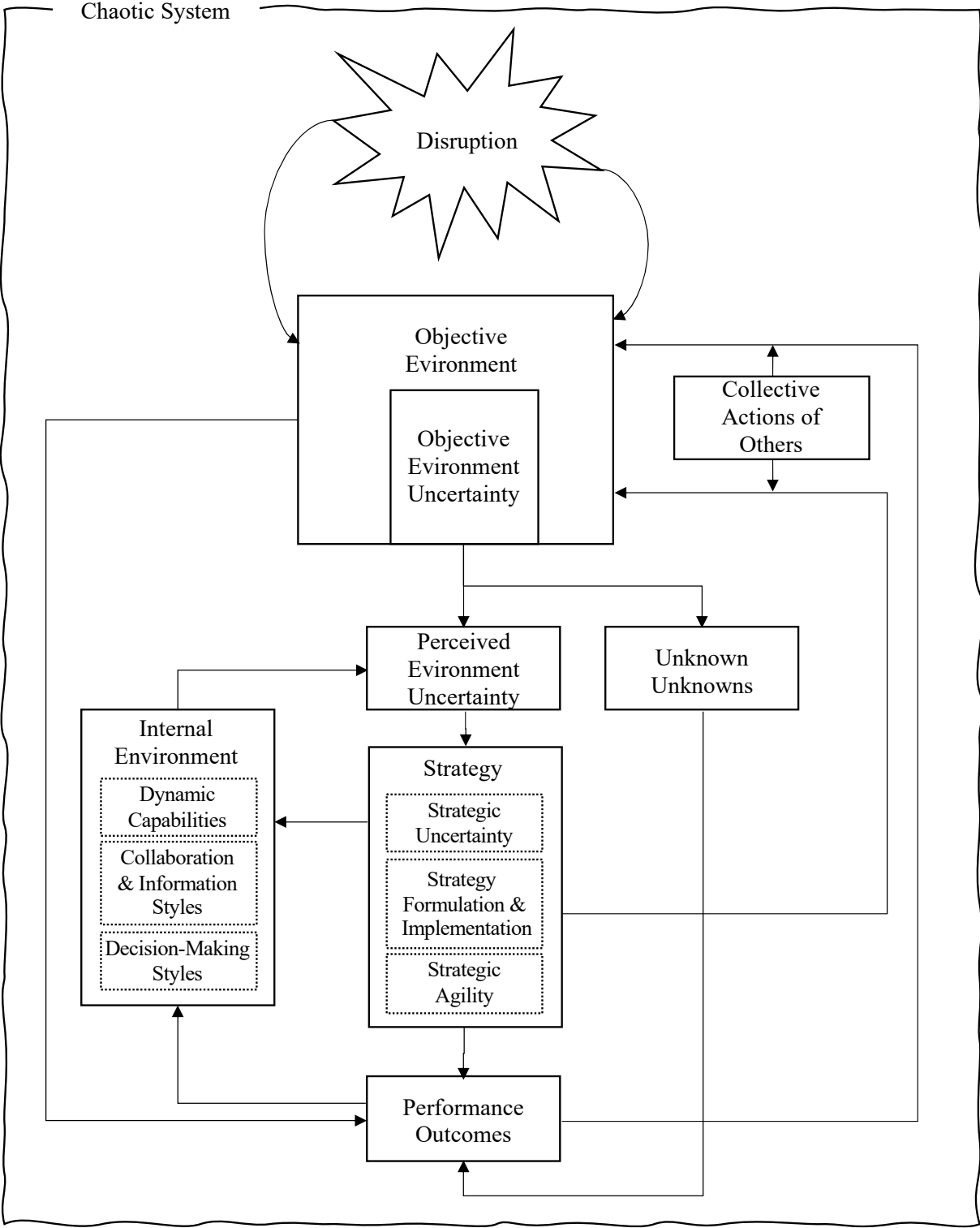
This dissertation begins by exploring academic contributions related to how economic disruptions such as COVID-19 are perceived. The aim is to assess whether Black Swan events do raise awareness of known and unknown unknowns. The structure of the literature survey relies on Jauch and Kraft’s (1986) work on environmental uncertainty. Discussions of COVID-19 will frame the phenomenon as a Black Swan. Next, the qualitative research methodology is presented, followed by an analysis and discussion of the results and their managerial implications. The thesis concludes with the empirical limitation of this work and points towards potential areas of future research related to COVID-19 and other Black Swans.



## 2. Literature Review

A variety of domains in the academic literature discuss uncertainty. The concept influences organizational strategies, structures, behaviors, and performances (Meinhardt *et al.*, 2018). The influence of uncertainty as a non-linear phenomenon changes due to organizational and non-organizational actors inside and outside the organization (Thiétart & Forgues, 1995). Jauch and Kraft (1986) attempted to model these dynamics as a decision sequence (Appendix 1). Although a static model cannot truly represent the complex interplay of all relevant factors, we propose the event sequence as a useful framework for thinking about uncertainty. To fit the COVID-19 case, we have extended and reorganized the framework, incorporating modern strategy concepts as well as chaos and disruption theories (Figure 5). To acknowledge Taleb's (2007) distinction between perceived and unknown uncertainties, a distinction harking back to Frank Knight (1921), the element of unknown unknowns is added as a core element.

**Figure 5: Revised Model of Environmental Uncertainty**



Source: Modified representation; based on Jauch and Kraft (1986)

## 2.1. Chaos Theory

Chaos theory was developed initially in the context of the physical sciences (Lorenz, 1963). Psychologists and economists, among others, have noted that organizations and individuals also operate in systems bound by invisible structures of interdependencies (Butler, 1990; Radzicki, 1990). Cartwright (1991) proposes the study of non-linear dynamic systems (i.e., chaos theory) as a useful conceptual framework that reconciles the randomness of industry dynamics. Through chaos theory, we can view the whole global economy as a single system where each component influences others. With the continuous development of globalization, the economy is even more interconnected than in the past (Ghoshal, 1987; Teece *et al.*, 2016). The butterfly flapping its wings metaphor is used in chaos theory to illustrate the compounding impact of small changes that can cause problems for the entire system (Mandelbrot & Hudson, 2010). This perspective is critical for analyzing uncertainties related to COVID-19. Most investigations of unforeseen impactful events focus on examining isolated parts of the system (Senge, 2004). However, to fully grasp uncertainty in the context of COVID-19, it is critical to acknowledge that organizations and individuals interact in a chaotic system. Our revised model of environmental uncertainty acknowledges this with a fuzzy line that surrounds the examined research areas in this study (Figure 5).

## 2.2. Disruption

Continuous economic optimization has fostered economic growth and global industrialization but has also amplified the system's fragility (Teece *et al.*, 2016). Black Swan events, as conceptualized by Taleb (2007), are rare phenomena that have extreme unexpected impacts. Despite of its outlier character, human nature makes us create explanations for its occurrence after the fact, often pretending it would have been explainable and predictable.

These kinds of disruptions have caused critical effects on the global economy in the past (Li & Tallman, 2011). Tushman and Romanelli (1985) distinguish between two modes of disorderly change. "*Convergence*" classifies incremental change processes that evolve with a system's contemporary activities. For instance, the development of cryptocurrencies or the incorporation of artificial intelligence are convergent change processes since they occur alongside current economic operations. In contrast, irregular shifts that transform a system's structures and control mechanisms are categorized as "*Reorientations*" (Tushman & Romanelli,

1985). Wars, terror attacks, and uncontrollable diseases, such as COVID-19, are examples of exogenous “*Reorientations*” that force a system to transform and adjust.

Management and strategy literature mostly frames disruption in terms of innovation (e.g., Christensen, 1997; Christensen *et al.*, 2018). In this context, “*disruption describes a process whereby a smaller company with fewer resources is able to successfully challenge established incumbent businesses*” (Christensen *et al.*, 2015). Incumbents tend to emphasize the improvement of existing products for their large customer base, outstripping the needs of some segments and disregarding the needs of others. Simultaneously, disruptive entrants begin by targeting overlooked niche segments, thus gaining a foothold in the market (Christensen *et al.*, 2015). Disruption is, therefore, a strategy and marketing problem (Christensen, 2006).

This definition of disruption does not appear applicable to COVID-19 at first glance. It also is not consonant with the “*Reorientation*” classification of Tushman and Romanelli (1985). However, COVID-19 is a disruption insofar as it has imposed new paradigms upon business activity. One example is the mass global migration to digital communication (Neeley, 2020). Whether this remains after the pandemic subsides is yet to be determined. This dynamic falls within the parameters of the revised model of environmental uncertainty (Figure 5).

### **2.3. The External Environment**

As pointed out above, COVID-19 is disrupting the global environment of all industries and firms (McKinsey & Company, 2020). Linking a firm’s strategic behavior to its environmental conditions is typical in strategy and organization theory (Thompson, 1967). Duncan (1972) identified that the environment incorporates all relevant physical and social factors outside the boundary of the organization that directly or indirectly stimulate its actions. All those factors are critical sources of information for a firm’s strategic processes (Ansoff, 1965; Sawyer, 1993). Although the impact of environmental disruptions, such as COVID-19, varies across countries (Carrière-Swallow, & Céspedes, 2013), the environment contains highly strategically relevant information for all organizations during uncertainty shocks (Courtney *et al.*, 1997).

However, the relationship between the environment and organizations is not a one-way street. Executives and the actions of their organizations influence the environment as well

(Jauch & Kraft, 1986). This reciprocity is particularly significant for examining future uncertainties triggered by events such as COVID-19. By reacting to COVID-19, managers at all organizational levels adapt their strategic and operational courses of action. Thus, we expect that managing COVID-19 uncertainties will create new uncertainties. Our interviews will seek to elaborate first and second-order uncertainties as they evolve. The empirical context section of the literature survey presents a first indication of immediate uncertainties associated with the outbreak of the disease.

## 2.4. Uncertainty

Managing an environmental disruption of the magnitude of COVID-19 requires acknowledging uncertainty. Generally, connotations of the unknown, the improbable, or the uncertain implicate an absence or limitation of knowledge (Gans, 2016). Uncertainty has been distinguished from risk, which is associated with identifiable outcomes that occur with assignable probabilities that can be managed or mitigated (Knight, 1921). The timing and pattern of resource commitments can be adjusted according to executives' risk appetites, but uncertainty, on the other hand, can be neither controlled nor eliminated (Collis, 1992). Elements of risk can be observed in a game of chess, whereas uncertainty has more in common with mixed material arts (Teece *et al.*, 2016).

Various scholars through the 1960s to 1980s have discussed uncertainty as a construct (Downey *et al.*, 1975; Downey & Slocum, 1975; Milliken, 1987). However, previous attempts to define, observe, or measure uncertainty lack consistency (Rasheed & Prescott, 1992; Slangen & van Tulder, 2000). There are two significant schools of thought: Uncertainty is posited as the nature of the environment or is framed as individuals' lack of knowledge about the environment (Milliken, 1987). The first definition proposes uncertainty as an ontological environmental feature. Under this view, uncertainty would be homogenous for all executives, irrespective of their perspectives (Lueg & Borisov, 2014). In contrast, the second definition relates to the epistemological understandings of executives about the environment. Thus, uncertainty is heterogeneous across actors and depends upon how it is perceived and understood (Miles *et al.*, 1974; Pondeville *et al.*, 2013).

Uncertainty is not a constant phenomenon. Rapid increases in objective levels of uncertainty are typical with exogenous shocks such as COVID-19 (Burns & Stalker, 1961;

Emery & Trist, 1965). Variance in uncertainty stems from the probability assigned to tail events (Orlik & Veldkamp, 2014). However, often enough, we are not even aware of the existence of these tail events (Taleb, 2007). Hence, objective and subjective uncertainty can diverge significantly (Lueg & Borisov, 2014). Recent literature proposes uncertainty shocks as an explanation for macroeconomic transformations (Basu & Bundick, 2017), business cycles (Bloom *et al.*, 2012; Ilut & Schneider, 2014), investment dynamics (Bachmann & Bayer, 2014), asset prices (Bansal & Shaliastovich, 2010; Pastor & Veronesi, 2012) or banking panics (Bruno & Shin, 2014). In essence, uncertainty shocks cause significant declines in overall real activity (Keynes, 1937; Carrière-Swallow, & Céspedes, 2013). Recovery times depend on various factors, such as the level of complexity and rate of change (Tung, 1979). On average, the recovery from uncertainty shocks, such as COVID-19, is much longer for emerging markets (Carrière-Swallow, & Céspedes, 2013).

This dissertation will engage with conceptions of uncertainty in their various iterations. Various economic analysts, executives, and consumers convert external uncertainties related to COVID-19 into subjective interpretive claims. As displayed in Figure 5, the perceptions and interpretations of COVID-19 uncertainties impact strategic behavior and, ultimately, the performance of corporations. Viewing uncertainty as known and unknown unknowns is associated with a press conference which has been referenced widely within academic literature. In February 2002, the U.S. Secretary of Defense Donald Rumsfeld classified the military threats posed by Iraqi President Saddam Hussein's regime into three categories: Issues we know we know (known knowns), issues we know we do not know (known unknowns) and issues we do not know we do not know (unknown unknowns) (NATO, 2002). In the following analysis, we adopt this line of thought and classify perceived uncertainties as known unknowns and refer to unknown unknowns as the environmental uncertainties that remain unnoticed.

#### **2.4.1. Unknown Unknowns**

Mental models and perceptual biases cause significant divergences between known and unknown unknowns (Bogner & Barr, 2000). While one executive perceives significant uncertainty about a specific subject, another one may not even be familiar with the particular theme. While the known unknown can be anything that a specific decision-maker imagines, an unknown unknown represents a hypothetical event that he/she does not even consider (Feduzi & Runde, 2014). In the field of engineering and project management research, the notion of

unknown unknowns is comparatively conventional (Wideman, 1992). Recently, strategy and organizational studies have increasingly built on the phenomenon (Snowden & Boone, 2007). Taleb *et al.* (2009) assert that ignoring the existence of unknown unknowns inevitably leads to organizational failure. Since antiknowledge is at the core of the definition, there is limited research on this novel concept. As per definition, one can only report unknown unknowns *ex ante*. However, retrospective perspective analysis presents concerns about the objectivity of backward-looking recalled perceptions. Due to individuals' tendency to overestimate their knowledge, examining antiknowledge *ex ante* perception is often biased (Taleb, 2007). Feduzi and Runde (2014) make a distinction between knowable unknown unknowns and unknowable unknown unknowns. Following their classification, the former describes sources of unknown unknowns that “*could have been transformed into known unknowns at some point in time in absence of epistemic constraints.*” In contrast, unknowable unknown unknowns refer to sources of antiknowledge that are emergent and thus could not have been perceived by any individual at any point in time. The degree to which the Coronavirus may be classified as knowable or unknowable is discussed in the empirical section of this thesis.

#### **2.4.2. Perceived Uncertainty**

In contrast to unknown unknowns, known unknowns are perceived spheres of antiknowledge. A variety of strategy scholars consider perceived environmental uncertainties as a severe influence on strategic decision-making (e.g., Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989a; Hough & White, 2003; Kaplan, 2008). Related constructs such as complexity (Tung, 1979) and dynamism (Mitchell *et al.*, 2011) have also gained traction. Although these concepts explain significant changes in the external environment, they fail to incorporate executives' cognitive abilities as a constraint (Cyert & March, 1963; Bogner & Barr, 2000). It is inherent to acknowledge that uncertainty is not only the state of the system but is also about a state of mind to understand the nature and bearing of COVID-19 uncertainties (Wilkin & Sutton, 1986). The psychological effects (i.e., fear) of an unknown deadly virus are comparable to cognitive responses to terrorist threats. Those cause high levels of stress and, in turn, change cognitive and behavioral patterns (Hyams *et al.*, 2002).

Known Unknowns can exist in the form of absence of information (Daft *et al.*, 1988), lack of confidence about decision-making, or inability to assign probabilities to future scenarios (Milliken, 1987). Hence, particularly under high uncertainty, bounded rationality prevents

decision-makers from making rational sense of their environments (Daft & Weick, 1984; Fiske & Taylor, 1991). Mental models that people use to understand reality are developed over time and shaped by several factors such as cultural backgrounds (Schneider & De Meyer, 1991; Miller, 1993), social networks (Badura, 1986), and learning experiences (Nadkarni & Barr, 2008). Due to variations of these cognitive models, decision-makers are naturally heterogeneous in the way they cope with uncertainty (Helfat & Peteraf, 2015). Consequently, poor firm performance often links to decisions-making based on perceptual consensus (i.e., groupthink) or a single point of view (Bourgeois, 1985; Wilkin & Sutton, 1986).

Nevertheless, only perceiving unknowns related to Black Swans does not lead to effective managerial responses. Managers tend to pay only minor attention to these events unless they evaluate Black Swans, such as COVID-19, as being critical for firm performance (Pfeffer & Salancik, 1978). For instance, although the existence of a potential global spread of COVID-19 was common knowledge throughout January 2020, stock markets only started plunging significantly after the WHO declared the epidemic a global health emergency (Figure 6). Perception of Black Swan events thus influences decision-makers more than the reality itself.

**Figure 6: Stock Market Reaction to WHO Declaring COVID-19 a Global Emergency**



Source: Jones, Brown, and Palumbo (2020)



## **2.5. Strategy**

Studies find that executives tend to ignore uncertainty associated with exogenous events (March, 1981; March & Feldmann, 1981), assuming them to be irrelevant (Nutt, 1984), or attributing them to matters beyond their control (Bobbitt & Ford, 1980; Ford & Hegarty, 1984). However, in a globalized economy where competitive advantage is easily eroded (Wiggins & Ruefli, 2005; Raynor, 2007), uncertainty is not eliminable but requires managerial attention (Wilkin & Sutton, 1986). If executives fail to observe uncertainty surges and their implications or misinterpret their strategic relevance, they fail to undertake critical strategic or structural adjustments (Pfeffer & Salancik, 1978). Hence, underestimating uncertainty can lead to inappropriate strategies that harm or erode competitive advantages (Courtney *et al.*, 1997).

### **2.5.1. Strategic Uncertainty**

Perceived environmental uncertainty leads to strategic uncertainty when deemed to be strategically relevant (Daft *et al.*, 1988). Corporations do not monitor or follow exogenous events, except they categorize them as imperative to organizational performance (Aaker, 1983). Accordingly, organizational attentiveness positively correlates with the degree of perceived uncertainty (Ebrahimi, 2000). Strategic uncertainty also occurs in situations where key actors, lack knowledge about objectives and event probabilities (Van Huyck *et al.*, 1990). In the case of COVID-19, uncertainty demands that executives assign resources for environmental scanning. This research demonstrates that uncertainties associated with COVID-19 are strategic uncertainties since they reshape most organizations and their competitive environments.

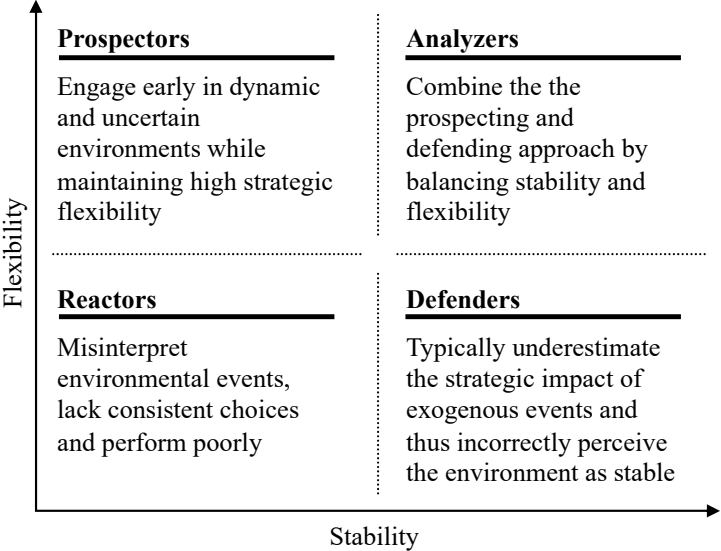
### **2.5.2. Strategy Formulation and Implementation**

Due to the heterogeneous nature of perceptions, strategic actions demonstrated by top management are interpretations of the environment (Prahalad & Bettis, 1986; Lyles & Schwenk, 1992; Thomas *et al.*, 1993). Thus, uncertainty perceptions play a central role in the formulation and execution of strategy (Helfat & Peteraf, 2015). Environmental alignment is taken to be a core purpose of strategic management (Ansoff, 1965; Andrews, 1987), along with strategy also defined as an arrow of goals, intentions, guidelines, and plans that, taken together, state the scope of all operations (Rumelt, 1980). Porter (1996, p. 20) proposes that “*the essence*

of strategy is choosing what not to do.” Strategic uncertainty adds two critical trade-offs for organizations.

Firstly, executives have to decide whether to act promptly (i.e., being proactive) or ex post facto (i.e., being reactive) (Wernerfelt & Karnani, 1987). There is significant support for Miles and Snow’s (1978) proposal to categorize strategic reactions in the face of environmental uncertainty into four notable classifications shown below (Meyer, 1982; Hambrick 1983; McDaniel & Kolari, 1987; Ruekert & Walker, 1987; Conant *et al.*, 1990). Since organizational responses to Black Swan events diverge, discrepancies between firms’ reactions create unique sets of strategic (second-order) uncertainties.

**Figure 7: Organizational Strategies to Cope with Uncertainty**



Source: Miles and Snow (1978)

Secondly, under strategic uncertainty, competitive strategy contains a trade-off between concentrating core resources on one scenario or dispersing them across various scenarios (Wernerfelt & Karnani, 1987). This decision links to the strategy paradox, which proposes that strategies with the highest probability of success simultaneously incorporate the most considerable chance of failure (Raynor, 2007). By betting all resources on one option, an organization can succeed if the expected scenario occurs, and the strategy has efficacy but may also fail drastically if another development takes place. Alternatively, spreading resources across different scenarios predominantly results in weak performance (Raynor, 2007). Additionally, merely imitating market leaders prompts achieving mediocre results (Giachetti &

Torrise, 2018). When strategic uncertainty is high, organizations tend to pursue imitation strategies to gain legitimacy based on conformity to industry norms (Barreto & Baden-Fuller, 2006). Hence, industry leaders who others imitate are intriguing points of observation when considering strategic responses to COVID-19.

A successful strategy creates highly intertwined activities that all serve a common purpose (Porter, 1996). Various institutional, societal and managerial pressures impact how strategic trade-offs are resolved (DiMaggio & Powell, 1983; Scott, 1987). Furthermore, a strategist aims to ensure a fit between these choices and all other firm activities. Most studies note that strategy should fit with organizational and environmental paradigms (Covin 1991; Hamilton & Shergill, 1992; Neilsen, 1992). However, as previously suggested, executives' cognitive constraints and perceptual biases limit the ability to measure resource appropriateness or general competitiveness accurately. Thus, to be adopted, a strategy must also fit with the psychological boundaries of the executive strategist (Parnell *et al.*, 2000). Black Swans such as COVID-19 diminish previously existing competitive advantages, so firms' notions of fit must be adjusted continuously (Levy, 1994).

### **2.5.3. Strategic Agility**

It seems evident that managers can handle unexpected game-changing events by minimizing the lead time required to adjust to novel strategic contexts (Allaire & Firsirot, 1989). Past Black Swans have brought about novel ways of thinking about strategy (Courtney *et al.*, 1997). Raynor (2007) contends that in highly competitive environments, organizations face challenges managing different rates of change occurring at the same time. They must develop capacities to redeploy resources and core competencies as internal and external conditions warrant (Doz & Konsonen, 2008; Weber & Tarba, 2014). Several authors argue that organizations should strive to be agile, irrespective of any externalities (e.g., Hamel, 2000). However, strategic agility is a non-constant factor and, therefore, sensitive to particular circumstances (Teece *et al.*, 2016). In essence, if strategic agility is the way to address fluctuating levels of uncertainty, such as with COVID-19, then it needs to be executed dynamically, a notion built into the concept of agility itself.

## **2.6. The Internal Environment**

Recognizing the importance of an organization's internal environment to create and execute a strategy is critical (Bartlett & Goshal, 1995). Top-level managers need to ensure that individuals can develop dynamic capabilities to implement and enhance strategy in an agile manner. Collaboration, information, and decision-making styles need to support the ability to leverage crucial internal resources.

### **2.6.1. Dynamic Capabilities**

The concept of strategic agility as an organizational resource is closely related to the notion of dynamic capabilities that build the fundamentals of competitive competence (Worley *et al.*, 2014). Resources and capabilities are created, shaped, and deployed by managerial decision-makers based on their perceptions of uncertainty (Barney, 1991; Teece, 2009). Extending the well-established resource-based view of the firm (Barney, 1986a, 1991; Teece *et al.*, 1997), dynamic capabilities constitute the firm's capacity to "*systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base*" (Barreto, 2010). With COVID-19 transforming the global economy, superior dynamic capabilities enable organizations to understand how and when efficiency needs to be sacrificed for agility. Agility can be classed as a dynamic capability and must be coherent with the overarching strategic purposes of the organization (Teece *et al.*, 2016).

### **2.6.2. Collaboration and Information Styles**

Although dynamic capabilities and agile environments are inherent to managing unknowns, rising levels of uncertainty are negative phenomena in relation to organizational learning mechanisms (Ellis & Shpielberg, 2003; Matusik & Fitza, 2012). Thus, executives need to expand internal organizational flexibility regarding learning, particularly in periods of high uncertainty (Amabile & Conti, 1999). Currently, several strategy consulting firms advise organizations to leave room for quick trial-and-error processes to foster creative problem solving to manage the impact of COVID-19 (McKinsey & Company, 2020; Roland Berger, 2020). Developing a firm setting that promotes "*imagination – the capacity to create, evolve, and exploit mental models of things or situations that do not yet exist – is the crucial factor*"

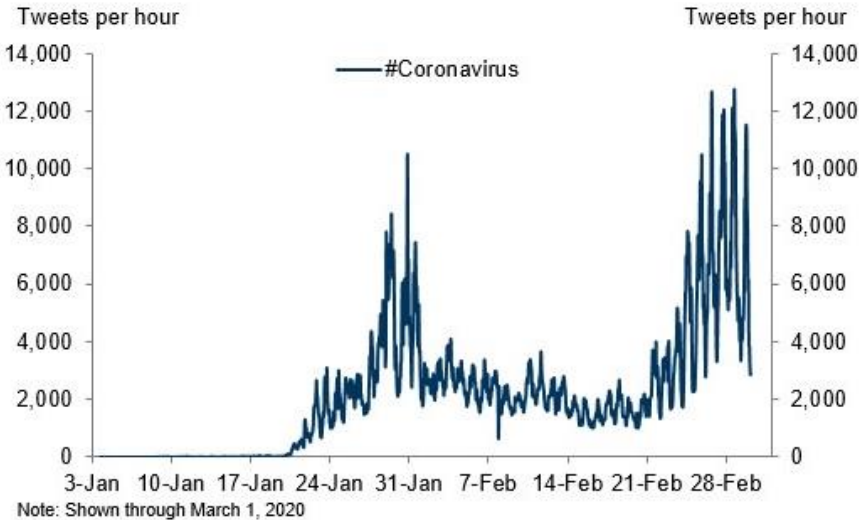
for businesses to survive a pandemic (Reeves & Fuller, 2020). Similar to the findings of Ellis and Shpielberg (2003), Martin Reeves, Chairman of the BCG Henderson Institute, highlights that imagination is also one of the most challenging organizational values to “*keep alive under pressure*” (Reeves & Fuller, 2020). Nevertheless, increased perceived uncertainty has been found to strengthen positive associations between internal team diversity and performance (Cannella *et al.*, 2008). Also, on average, women tend to manage dynamic conditions better, and personnel turnover is lower for women during Black Swan situations (Krishnan, 2009). Diverse teams consider a more cultivated set of variables and are less prone to perceptual biases. Therefore, organizations should not compromise on nudging creative thinking during the Coronavirus crisis.

Even the most uncertain business circumstances signal a vast amount of strategically relevant information (Courtney *et al.*, 1997). Executives have access to far more information than their cognition can process (Mintzberg, 1973; Hambrick, 1982). Numerous authors have proposed environmental scanning as an effective method to derive critical information during uncertainty sparks (e.g., Aguilar, 1967; Fahey & King, 1977). By collecting information about various events and changes external to the organization, environmental scanning aims to reduce strategic uncertainty (Hambrick, 1982; Culnan, 1983). *Ex ante*, appropriate interpretation of environmental data can lead to temporary competitive advantage (Elenkov, 1997). Nonetheless, strategic decision-makers have limited mental and physical resources for environmental scanning (Ebrahimi, 2000).

If uncertainty is perceived to be high, organizations tend not only to increase environmental scanning but also forecasting efforts (Milliken, 1987). Some authors assert the effectiveness of various prediction, control and foresight techniques (Mintzberg, 1990; Porter 1980; Quinn, 1980; Ansoff, 1991; Levy, 1994). Others, like Christensen (1997), hold that the only thing predictable is that any predictions are wrong. In contrast, Allaire and Firsirout (1989) compare forecasting to jogging: “*It is not an efficient way to get anywhere, nor is it intended to be, but if practiced regularly, it will make us feel better.*” Thereby, supporters of the ‘planning school’ respond to criticism by positioning the role of predictions not as exact anticipation of the future, but rather as constant learning (De Geus, 1997; Vecchiato, 2012). Independently of an organization’s applying foresight tools, employees at various levels must develop skills to continually work with uncertainties and probabilities (Spender, 2014).

Part of this skillset is working with enormous amounts of data. Information emerges from a continuum of sources, including personal, impersonal, internal, or external modes (Aguilar, 1967). If strategic uncertainty levels rise, executive decision-makers tend to rely on more personal sources (Daft & Weick, 1984). Today’s hyperconnected social media society means that individuals create and extend massive amounts of data (Figure 8). Information overload and credibility are critical challenges (Kapoor *et al.*, 2018). In a study analyzing information exchange on Twitter during three different extreme events, Oh *et al.* (2013) found rumors to be prevalent, spreading information without any apparent source. During crises such as COVID-19, lack of credible information coupled with enormous amounts of misinformation on social media are a problem (Alexander, 2014).

**Figure 8: Intensity of Information Published on Twitter with the Hashtag ‘Coronavirus’**



Source: Nathan, Galbraith, and Grimberg (2020)

**2.6.3. Decision-Making Styles**

Ambiguities and misinformation stymie an organization’s learning processes (Christensen, 1997). Perceptions of environmental factors impact decision-making on all levels (Achrol & Stern, 1988; Meinhardt *et al.*, 2018). Strategic decisions are choices that set precedents and steer an organization’s purpose (Fredrickson, 1984; Judge & Miller, 1991). In highly uncertain periods, decision-makers, nudged purely by quantitative metrics, may delay critical decisions, which limits the ability to achieve competitive advantages (D’Aveni, 1994;

Eisenhardt & Martin, 2000; Christensen *et al.*, 2018). Organizations operating with flexible structures that foster fast decision-making are more resilient when Black Swans occur (Judge & Miller, 1991; Davis *et al.*, 2009).

## **2.7. Performance Outcomes**

Performance effects are also relevant for discussing Black Swan events (Parnell *et al.*, 2000). Academia has extensively debated the impact of strategy on firm performance (e.g., Schmalensee, 1985; Rumelt, 1991). McGahan and Porter (1997) found evidence that firm effects account for approximately one-third of the variance in profitability, while industry effects account for 19 percent. Nonetheless, by eliminating outliers and applying more appropriate measurements of dependent variables, Hawawini *et al.* (2003) found that industry effects outweigh firm effects for mediocre companies. Consequently, it is difficult to pinpoint the exact effectiveness of the strategy as a whole. Yet, both environmental conditions and strategy influence performance (Hambrick *et al.*, 1982).

Some authors contend that uncertainty always induces negative performance (Miller, 1992; Michel, 2007), while others claim that optimizing strategic responses can mitigate uncertainty shocks for organizations (Audia *et al.*, 2000). Other studies relate superior performance to prospector, analyzer, and defender strategies, as outlined in the Miles and Snow (1978) typology (Snow & Hrebiniak, 1980; Wright, 1987). Bourgeois (1985) suggests that the relationship between perceived uncertainty and environmental volatility determines economic outcomes for firms. International diversification also bears upon performance (Li & Tallman, 2011). Halebian and Finkelstein (1993) advocate that CEO dominance negatively affects performance in volatile environments. Finally, a line of research claims that luck plays a role in favoring winning outcomes (Barney, 1986b; Parnell & Dent, 2009). These studies add other dimensions to performance effects related to Black Swans such as COVID-19.

## **2.8. Collective Actions of Others**

Performance outcomes result from variables associated with the external environment as well as the behavior of other actors (Jauch & Kraft, 1986). Although interfirm behavior has been formally modeled in economics and using game theory (e.g., Camerer, 1991), these models tend to presume equilibria and may not reflect actual industry dynamics. As Porter

(1990) emphasizes, evaluating industries is path-dependent and dynamic. Augmented perceived uncertainty sparks herd behavior (Bikhchandani *et al.*, 1998). In highly ambiguous circumstances, rivals are likely to imitate market leaders to gain legitimacy by conforming to industry norms (Barreto & Baden-Fuller, 2006; Giachetti & Torrissi, 2018). Beyond competitors, other industry forces such as suppliers, buyers, and supplementary product/service providers also influence organizations (Porter, 2008). Highly diversified organizations, both functionally and internationally, must respond to multidimensional changes and uncertainties in their economic environments.

In sum, theories aiming to increase our understanding of uncertainty, strategy, internal organization, and competitive behavior are complementary. Understanding the dynamic path dependencies modeled in Figure 5 allows investigating Black Swan events such as COVID-19 through the lens of strategic thinkers. Organizations' reactions to external events uncover degrees of uncertainty and point to domains of antiknowledge (Jauch & Kraft, 1986). For instance, during the outbreak of the Severe Acute Respiratory Syndrome (SARS) in 2002-2003, the Chinese government banned non-essential retail commerce (Peiris *et al.*, 2004). Alibaba, a nascent e-commerce platform at that time, benefited from the internet becoming increasingly needed as businesses and consumers migrated to online platforms (Kim, 2018). In a nutshell, the Black Swan event helped Alibaba's business development and revealed the digitalization potential of the Chinese economy. Is COVID-19 causing similar phenomena to occur?



### **3. Empirical Context: 2020's Black Swan COVID-19**

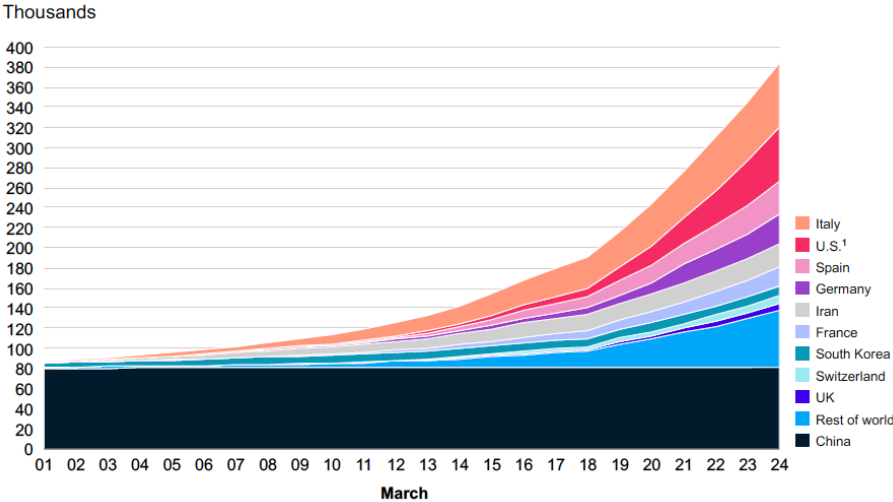
This research proceeds by discovering the medical and economic developments of the novel Coronavirus to introduce the empirical context. Subsequently, we discuss why categorizing COVID-19 as a Black Swan is appropriate for our research purpose. The paper outlines some early indications of uncertainty dimensions related to the pandemic before conveying the precise research design.

#### **3.1. The Global Spread of a Novel Coronavirus**

The biological roots of the SARS-CoV-2 virus go back to the common cold in 1966. With their morphology and surface projections the virions resemble a solar corona (Latin: corona = crown) and thus were labeled coronaviruses (Tyrrell, & Bynoe, 1966). COVID-19 has been traced allegedly to Chinese seafood market in Wuhan, with secondary cases occurring among hospital staff members who had extensive contact with initial patients. Although not entirely confirmed, medical research suggests that the virus was initially transmitted to humans via contaminated living bats (Peeri *et al.*, 2020). On 30. January 2020, the WHO announced a global health emergency based on the exponentially growing number of verified COVID-19 cases inside and outside of China (Velavna & Meyer, 2020).

Despite numerous academic publications, there is limited reliable information regarding the transmission of COVID-19 and the future development of the disease remains unknown (Lees, 2020). The rate of officially confirmed cases fluctuates daily, and one can follow the further spread of the disease in almost real-time on various research platforms (Velavna & Meyer, 2020). In mid-March, the global spread accelerated while the number of officially declared cases in China allegedly began to decline (Figure 9).

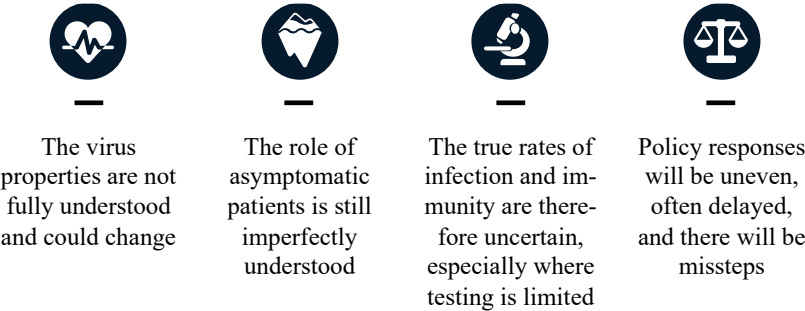
**Figure 9: Cumulative Number of COVID-19 Cases (March 1st – March 24th)**



*Source: McKinsey & Company (2020)*

As with many infectious diseases, there is extensive underreporting for various reasons, including infrastructural problems or political and economic brinksmanship (Salazar *et al.*, 2020). Therefore, official case counts may be capturing only a fraction of the actual totals (McKinsey & Company, 2020). Information distributed on media platforms and social networks undermine the confidence of decision-makers. COVID-19 also highlights how individual behavior has a significant impact for the collectivity and vice versa. An individual’s risk rises if all others are infected. Thus, small individual risk becomes amplified through contagion effects creating exponential system-wide impacts (Taleb, & Norman, 2020). There is considerable uncertainty about future health and welfare management issues as the virus mutates, along with how policymakers should respond and how individuals will behave (Figure 10).

**Figure 10: Unknowable Disease-Related Aspects that Drive Uncertainty**



*Source: Carlsson-Szlezak, Reeves, and Swartz (2020)*

### 3.2. From a Medical Crisis to an Economic Recession?

Infectious disease outbreaks influence various economic dimensions. Scholars have examined the fiscal bearing of influenza (Schoenbaum, 1987; Meltzer *et al.*, 1999), forecasted the economic impact of mutations of the avian flu (Bloom *et al.*, 2005), and created different future pandemic development scenarios (McKibbin & Sidorenko, 2006). Based on these studies, McKibbin and Fernando (2020) predicted global GDP declining between \$283 and \$9,170 billion because of the decreased supply of labor, rising costs of doing business, reduced overall consumption, and rising equity and country risk premia. Similarly, IMF scenario analysis (2014) has projected that a severe pandemic would result in a 4.8% reduction in global GDP.

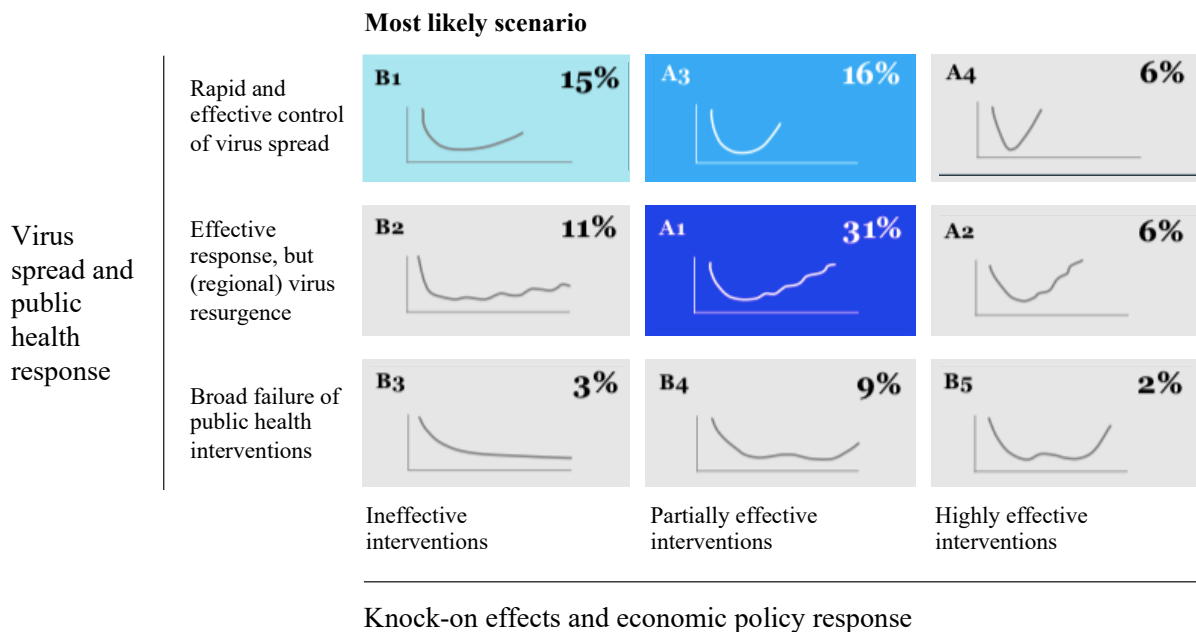
Nonetheless, the actual economic impact is not predictable (Carlsson-Szlezak *et al.*, 2020). The U.S. 10-year treasury has reached an all-time low (Appendix 2), stock indices have dropped sharply and new unemployment claims have risen dramatically (Appendix 3), hinting at the beginning of a major global recession. Governments have activated drastic public health measures such as extreme social distancing. Consequently, “*the economic contagion is now spreading as fast as the disease itself*” (Carlsson-Szlezak *et al.*, 2020).

Parallels can be drawn with previous global disease outbreaks (Appendix 4 & 5). However, there are differences between the Coronavirus and previous epidemics such as SARS (Haren & Simchi-Levi, 2020). Globalization makes industries heavily dependent on the economic operations of other countries. China, in particular, has become increasingly integrated into the global economy, and an adverse shock in that country spills over into the rest of the world (Appendix 6). COVID-19 has not only already surpassed the number of infections and deaths of SARS by far, but also already signals a tremendously larger economic impact (OECD, 2020a). Compared to other prior Black Swans such as the financial crisis of 2008/2009, the Coronavirus crisis exhibits a critical distinguishing characteristic. While former Black Swans often compressed either the demand or the supply side of the economic system, the current situation immensely impacts both sides simultaneously (Carlsson-Szlezak *et al.*, 2020).

It is worth emphasizing that an improving disease trajectory does not automatically translate into a recovery and a return to business as usual (WTO, 2020). Instead, current expectations consider that “*once the pandemic ends, countries around the world will probably*

*find themselves more in debt than ever*” (Cadena & Ferrari-Haines, 2020). Thus, COVID-19 poses two key challenges for governments, businesses, and individuals: Safeguarding lives while simultaneously preserving livelihoods. The long-term GDP impact of the current pandemic will therefore depend on the public health responses as well as economic policies. Several recovery scenarios are conceivable. According to McKinsey & Company’s (2020) global survey with 2,079 executives, most professionals expect partially effective economic policy responses to slowly drive economic growth (Figure 11). Nonetheless, other scenarios are also conceivable. Therefore, it remains probable that COVID-19 will lead to an economic recession.

**Figure 11: Executives Expectations of Economic Recovery from the Coronavirus**



Source: Modified representation; based on McKinsey & Company (2020)

### 3.3. Is COVID-19 a Black Swan?

In this research paper, we chose the novel Coronavirus as an empirical context to explore the notion of a recent Black Swan phenomenon. Originally, Taleb (2007) pinpoints three distinctive attributes of Black Swans: “*Rarity, extreme impact, and retrospective (though not prospective) predictability.*” We argue that the Coronavirus crisis can be classified as a Black

Swan phenomenon. Firstly, a global contagion is outside the realm of regular expectations and could not be anticipated. Previous potential pandemics, such as SARS and Ebola, were effectively contained. Secondly, the disease has at least extreme short-term macro and microeconomic effects. Finally, humans will continue to search for explanations of the origin of COVID-19 (such as the existence of live animal markets).

Interestingly, Taleb (2007) who popularized the Black Swan metaphor, insists that the Coronavirus does not qualify as a real Black Swan. In a Bloomberg interview on March 31st, he argues that the notion of a Black Swan event was not meant to provide “*a cliché for any bad thing that surprises us*” (Avishai, 2020). He underlines that well-respected economic leaders, such as Bill Gates, had predicted the occurrence of a pandemic. Moreover, Taleb contends that he and other economists had issued warnings to governmental and corporate organizations in January to “*kill [the virus] in the egg*” (Avishai, 2020).

However, there are several reasons to still think about COVID-19 as a Black Swan occurrence. In his book ‘The Black Swan’ published just before the financial crisis, Taleb (2007) states that “*fads, epidemics, fashion, ideas, the emergence of art genres and schools [...] all follow these Black Swan dynamics.*” It is indisputable that the disease qualifies a pandemic and pandemics are not regular occurrences. While Bill Gates, among others, publicly warned about the possibility of a global pandemic in 2015 (TED, 2015), he did not articulate any details or timing of the event. Similar to known and unknown unknowns, perceptions of Black Swan events are subject to subjectivities (Feduzi & Runde, 2014). In contrast to Gates and Taleb, the majority of individuals did not anticipate a global disease outbreak of the form of COVID-19.

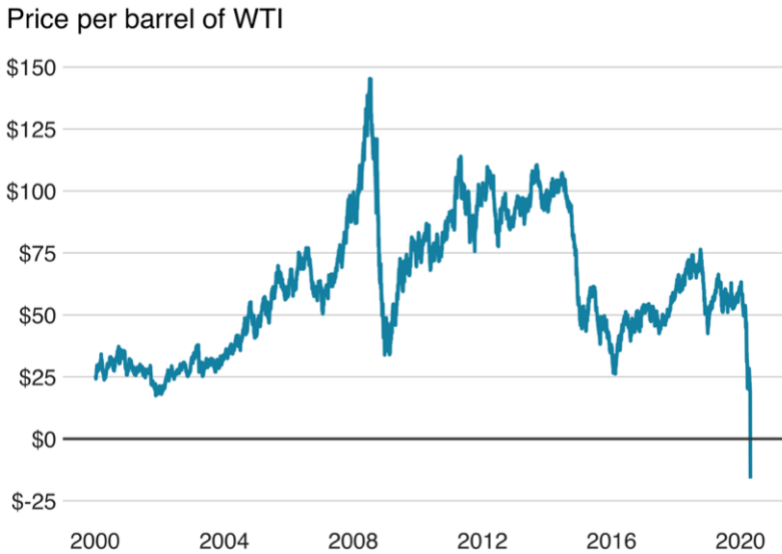
Further, Taleb’s classification criteria do not rule out positing hypothetical Black Swans prior to them actually materializing. For instance, we can plausibly envisage the arrival of an alien on earth. Still, we are neither prepared for this nor have we calculated the risks associated with this event in our daily forecasting models. Just because an event is a possibility does not mean that we necessarily attach a probability to its actual happening. This relates to Knight’s (1921) differentiation of risk and uncertainty. The inability to estimate the probability an epidemic precludes application of risk management to it (Nafday, 2009). So, while the possibility of a deadly disease was imaginable before December 2019, surely nobody incorporated its potential effects in their 2020 risk forecasts and calculations.

Additionally, despite warnings in January, the global consequences of the event were not truly predictable from a long-term perspective. How to identify or classify Black Swans will likely stimulate much future discussion but is beyond the scope of this thesis.

### 3.4. Expected Areas of Uncertainty Associated with the Coronavirus

Various publications and analyses indicate areas of uncertainty potentially accelerated by COVID-19. For example, an economic recession is such phenomenon since Black Swans commonly spark significant declines in private consumption (Carrière-Swallow, & Céspedes, 2013). Nonetheless, individuals’ willingness to pay to avoid death increases for causes perceived as “*bad deaths*,” such as mortality associated with contagion (Sunstein, 1997). Consequently, panic among consumers and firms has distorted usual consumption patterns and created economic anomalies (McKibbin & Fernando, 2020). For instance, in the first quarter of 2020, orange juice commodity assets have skyrocketed due to panic buying at grocery stores (Perez, 2020). In the meantime, oil prices have turned negative for the first time in the U.S. (Figure 12). In the early stages of COVID-19, the Chinese economy ground to a halt, disrupting global supply chains (McKibbin & Fernando, 2020). As the virus spread exponentially to other countries, supply-chain issues shifted to global logistical chaos (McKinsey & Company, 2020). Conclusively, economic development, consumer behavior, and supply chain uncertainties could potentially represent dimensions of amplified uncertainty.

**Figure 12: U.S. Oil Prices Turn Negative**



Source: Walker (2020)

Beyond stalling economic growth and challenging established ways of working, the virus has been positive for the environment. Satellite images of the high-density area between Beijing and Shanghai show an extreme reduction of nitrogen dioxide emissions in February 2020 (Appendix 7.1). The drop in pollution coincides with restrictions imposed by the Chinese government on transportation and economic activities (BBC, 2020). Photos in central Europe report similar improvements during April 2020 (Appendix 7.2). Such spillovers effects exemplify the potential of future uncertainties related to COVID-19 and antiknowledge. For instance, lower air pollution may change mental models regarding the ecological impact of economic activity.

Several scholars have published *ad hoc* strategic advice on how managers should lead corporations through the Coronavirus crisis (e.g., Reeves *et al.*, 2020; Tarki *et al.*, 2020). One of the critical managerial problems concerns the effective coordination of teams in an online environment. Challenges entail a lack of clarity in roles and responsibilities, misunderstandings, and decreased motivation due to individual isolation, lower communication efficiency, and insufficient technological infrastructure (McKinsey & Company, 2020). As these issues resolve, some parts of these new working structures will most likely remain in place even after COVID-19 is under control (Neeley, 2020).

## **4. Methodology**

This study examines whether COVID-19 increases consciousness of unknowns by discovering perceptions of novel uncertainties. Therefore, this research aims to discover what type of uncertainties pertain to the pandemic. By analyzing these uncertainties related to COVID-19, we aim to discern how Black Swan events raise awareness of known and unknown unknowns.

### **4.1. Qualitative Research Design**

Qualitative methods contribute to theory building (Eisenhardt, 1989b; Weick, 2007). Non-standardized (qualitative) research design is useful since COVID-19 is a complex and rapidly developing phenomenon. Due to its novelty the boundaries between the phenomenon and the context are not well-defined yet (Yin, 2003). Although reliability, biases, and generalizability are common concerns about qualitative research (Easterby-Smith *et al.*, 2008), non-standardized interviews allow for exploring perceptions and interpretation of specific incidents (Bluhm *et al.*, 2011). Findings reflect reality at the time they were collected about a situation which is subject to change (Marshall & Rossman, 1999). This study aims to connect single observations to existing theory, to demonstrate broader significance, and to advance theoretical propositions that open the way for future research (Cooper & Schindler, 2008).

### **4.2. Data Collection**

Our primary data set in the form of semi-structured interviews connects a Black Swan event and perception of uncertainties. The purpose of these qualitative interviews is to elicit experiences, perceptions, and interpretations of the COVID-19 phenomenon. The semi-structured interview format offers a generic structure while simultaneously providing space for exploring each interview context individually (Saunders *et al.*, 2009; Edwards & Holland, 2013). The semi-structured interview guide minimizes biases by incorporating open-ended questions formulated in a non-theoretical jargon (Easterby-Smith *et al.*, 2008) and allows participants to describe their subjective interpretation of the COVID-19 case (Appendix 8). Each participant received an interview preview with the list of open-end questions. In a first trial interview, we observed that the results were of higher research value if the interview was conducted in the mother langue of the interviewee. Consequently, the following interviews

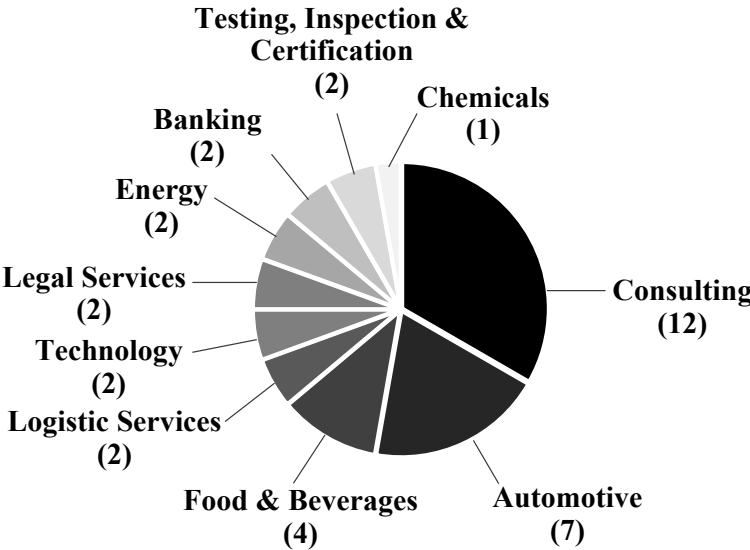


were predominantly conducted in German except for interviews with Danish, English, and Portuguese native speakers. Since the research process took place during the COVID-19 lockdown, we conducted the majority of interviews via Skype, WebEx, or Zoom. These virtual tools offered a valuable interview method despite their inability to convey non-verbal communication factors (Hanna, 2012).

The participants may be considered experts in their domains. Experts differ from novices to the extent that they perceive domain information more accurately and quickly. Consequently, their responses included intriguing interpretations since they rely on skilled intuition and controlled mental processing that is less prone to heuristics and judgment biases (Kahneman & Klein, 2009; Heerkens & van Heijden, 2011; Helfat & Peteraf, 2015; Tetlock, 2017). In total, 36 interviews were conducted over four weeks with experts from various functional and sectoral backgrounds (Figure 13, Appendix 9). Although one-third of participants have professional backgrounds in consulting, their perspectives diverge as they consult clients in various industries, including, among others, the healthcare and insurance sectors.

All 36 interviews have been fully transcribed, translated, and categorized (Appendix 10). To further validate claims, additional secondary data was collected for each uncertainty area discovered in the primary data set. This secondary data provides further insight into the perceptions of unknowns related to the economic impact of the Coronavirus.

**Figure 13: Industry Background of Research Participants**

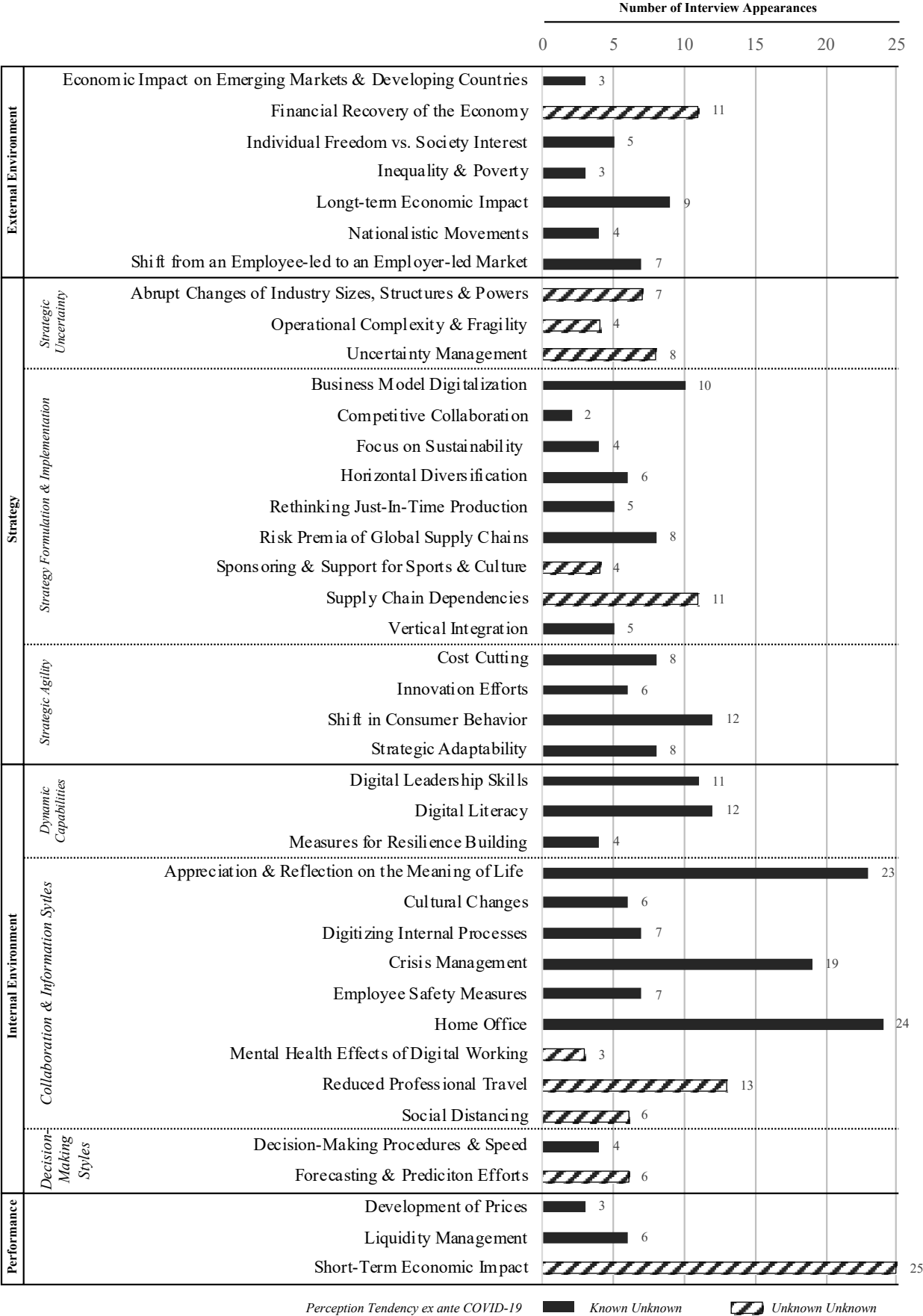


## 5. Analysis & Results

Constant comparison analysis for all sets of qualitative data searched systematically for underlying patterns of meaning. This analysis included the organization and interrogation of the data to identify themes, discover relationships, and make interpretations (Hatch, 2002). Due to the novelty and complexity of the research context, we applied an inductive approach to cluster the interview responses. Thus, denotation codes from the primary data set co-evolved alongside the analytic process (Leech & Onwuegbuzie, 2007). All relevant interviewee statements were chunked and labeled with a descriptive code. After all sets of data had been coded, the codes were grouped by similarity. In total, 40 different themes surrounding uncertainty were identified (Figure 14). These themes represent dimensions of uncertainty showing that within each dimension, research participants perceived different scenarios as possible future developments. The results do not imply that one of these scenarios may take place. However, the findings suggest that within each of the 40 areas, various discussions and examinations are likely to occur.

Figure 14 presents an overview of all identified uncertainty dimensions and shows the number of research participants who commented on which respective topic within the interview. Further, the color-codes of the bar charts represent whether study participants categorized the theme as a known or an unknown uncertainty area *ex ante* COVID-19. Before examining the connotations of these antiknowledge clusters in the discussion, we briefly introduce each uncertainty area. All subjects are grouped according to the framework elements of the revised model of environmental uncertainty surveyed in the literature review (Figure 5).

**Figure 14: Dimensions of Uncertainty Associated with COVID-19**



Perception Tendency ex ante COVID-19    ■ Known Unknown    ▨ Unknown Unknown

## **5.1. Uncertainty Dimensions Related to External Environment**

Our results identify several drivers of uncertainty related to the economic impact of the Coronavirus (Appendix 10.1). Various research participants expect the high degrees of uncertainty to have a *Long-term Economic Impact*. Moreover, current surges of unemployment and hiring freezes prompt the expectation of a *Shift from an Employee-led to an Employer-led Job Market*. In line with the findings of Carrière-Swallow and Céspedes (2013), three interviewees pointed out that they expect an asymmetric distribution of economic problems, particularly more drastic *Economic Impact on Emerging Markets and Developing Countries* accelerating *Inequality and Poverty*. Participants proposed that these effects will propel *Nationalistic Movements* further. Expectations of economic crises combined with activities undertaken by governments and institutions to manage the COVID-19 crisis, create uncertainty around the issue of the *Financial Recovery of the Economy*. In essence, participants perceived considerable ambiguity about the question of who eventually pays for contagion management measures. We observed a significant amount of uncertainty around efforts to contain the virus. While some individuals perceived social distancing as highly appropriate, others articulated that they “*will not let any minister take away [their] freedom rights*” (Int.: Anonymous 5, 2020). The variance in opinion points to controversy surrounding *Individual Freedom vs. Society Interests*. Overall, as suggested by Courtney *et al.* (1997), these results confirm the premise that the external environment contains valuable information during uncertainty shocks.

## **5.2. Uncertainty Dimensions Related to Strategy**

Numerous strategic components appear in the observed areas of uncertainty (Appendix 10.2, 10.3 & 10.4). We refine these discoveries for each previously determined sub-field of strategy in the sections below.

### **5.2.1. Uncertainty Dimensions Related to Strategic Uncertainty**

Our findings support the proposition that uncertainty is not eliminable but requires managerial attention, particularly in a globalized economy where competitive advantage is easily eroded (Raynor, 2007). Nevertheless, several executives interviewed in this study were surprised about the possibility of an *Abrupt Change of Industry Sizes, Structures and Powers*. This observation underlines that perceived environmental uncertainty leads to strategic

uncertainty when deemed to be strategically relevant (Daft, Sormunen & Park, 1988). Underestimating uncertainty can lead to inappropriate strategies that harm competitive advantages (Courtney *et al.*, 1997). Several interviewees suggested that the concept and practice of *Uncertainty Management* will gain traction in future research and management studies. Additionally, some managers address the importance of understanding *Operational Complexity and Fragility*. For instance, Anthony Dickinson, the Chief Revenue Officer of 2MC, proposed that management techniques currently in use were developed during the first and second industrial revolution and are not suitable anymore for “a *complex interdependent world with many moving parts*.” This vindicates the hypothesis animating this work that uncertainty about methodologies of analyzing unknowns translates into strategic uncertainty.

### 5.2.2. Uncertainty Dimensions Related to Strategy Formulation and Implementation

The perception of uncertainties plays a central role in the formulation and execution of strategy (Helfat & Peteraf, 2015). Alibaba developed due to the SARS virus in the 2000s, and, similarly, governmental measures to manage the contagion have accelerated digitalization of many business practices (Candelon *et al.*, 2020b). The interviewees anticipated further advancements of *Business Model Digitalization*. Additionally, they observed strengthening of *Competitive Collaboration*, particularly during the peak times of the crisis. However, they were uncertain if this will remain in the long run.

Various participants expressed that they “*tend to react rather than act during this crisis*” (Int.: Anonymous 12, 2020). However, the strategic uncertainty response framework (Figure 7), developed initially by Miles and Snow’s (1978) articulates that reactive strategies inhibit flexibility and stability and consequently lead to poor firm performance. To manage future crises more proactively, managers are currently *Rethinking Just-In-Time Production* and analyzing if the *Risk Premia for Global Supply Chains* are adequately understood. Niels Heyer, CEO of Wiesenhof International, attributes the company’s current temporary competitive advantage to a high level of *Vertical Integration* that reduces *Supply Chain Dependencies*. Other interviewees, furthermore, pointed out that governments are probably likely to examine whether their national supply systems of critical resources are “*too reliant on one [or several] outside source[s]*” (Int.: Steven van Houten, 2020). New strategies will likely not only re-evaluate the vertical supply chain but also examine the advantages of greater *Horizontal*

*Diversification*. In summary, the choice of “*what not to do*,” as outlined by Porter (1996), will receive a novel set of decision-making boundaries.

Since organizational responses to new sets of choices vary, there are discrepancies between firms’ reactions which create new sets of strategic uncertainties (Levy, 1994). These can take a variety of forms. For instance, participants noted a potential change of strategic *Focus on Sustainability* or effects on *Sponsoring and Support for Sports and Culture*. How specific scenarios transpire will depend upon future interactions between firms, governments, and other institutions. Nevertheless, we observed exponential intensifications of uncertainty within these scenarios.

### **5.2.3. Uncertainty Dimensions Related to Strategic Agility**

Clearly, managing sudden game-changing events needs swift adjustment to novel circumstances (Allaire & Firsirotu, 1989). Hence, the results illustrate the importance of *Strategic Adaptability* and strategic agility for organizations to adapt to a *Shift in Consumer Behavior*. “*People will reduce spending on cars and other things. This is a short- and a long-term effect*” (Int.: Dr. Clemens Schwerdtfeger, 2020). Consumer’s attitudes will likely change in light of general uncertainty about future income. Wilfried von Rath, member of the board at Volkswagen, stated that the corporation has “*started programs and measures worldwide that have the specific goal of securing liquidity. That means we are actually looking into every area.*” He underlined the urgency of *Cost Cutting* and suggested that these measures also create uncertainties about the *Innovation Efforts* of the Volkswagen Group. Although the corporation is “*trying to avoid endangering our future fields as much as possible,*” he said the company plans “*to leave out everything that is unnecessary.*” However, innovative products and services that enable incumbents to defend competitive advantages are often not directly identifiable (Johnson *et al.*, 2008; Li *et al.*, 2008). Hence, increasing levels of uncertainty compound the problem of how organizations can implement effective strategic agility that balances cost-cutting, innovation processes and changing consumer needs.

### **5.3. Uncertainty Dimensions Related to Internal Environment**

Formulating and executing a strategy is predicated on the internal ecosystem of an organization (Bartlett & Ghosal, 1995). Three dimensions embed unknowns in the internal firm

environment: Dynamic capabilities (Appendix 10.5), collaboration and information styles (Appendix 10.6), and decision-making styles (Appendix 10.7).

### **5.3.1. Uncertainty Dimensions Related to Dynamic Capabilities**

To effectively manage strategic uncertainties, corporations and individuals must deploy dynamic capabilities (Teece, 2009). Several research participants commented on the importance of applying *Measures for Resilience Building* during crisis management. But how resilience management techniques will be enhanced and implemented in the future remains unclear. The professionals interviewed agreed that *Digital Literacy*, i.e., the ability to communicate and work virtually, is a critical capability for the future. A Senior IT Auditor of DHL, a global leader of the postal and logistic industry, pointed out that “*guidelines and best practices are currently being developed that will make it easier to exchange information virtually*” (Int.: Anonymous 3, 2020). Yet, it remains ambiguous how individuals will acquire skillsets to work digitally. Besides, interviewees perceived increasing uncertainty towards *Digital Leadership Skills*. Johnny Sørensen, CEO of a Danish consulting firm, observed “*that managers just take everything that they have done yesterday, and copy paste that into virtual reality.*” As the role of the manager faces novel challenges in a digital work environment, he argued that professionals need to develop a novel virtual management skillset. Several other study participants made similar remarks. The manner in which digital management diverges from face-to-face organizational management has yet to be explored.

### **5.3.2. Uncertainty Dimensions Related to Collaboration and Information Styles**

The dynamic capabilities relating to digital work depends on how extensively managers drive *Digitizing Internal Processes* after the pandemic crisis is over. Connected to digitalization efforts, the concept of *Home Office* gained increasing attention. Twenty-four participants categorized remote working as a significant point about the future. Although the majority of respondents elaborated on surprisingly positive experiences with mobile working (e.g., Int.: Anonymous 20, 2020), some underlined that it is just a means of ad hoc crisis management and will not be a focus after the crisis (e.g., Int.: Anonymous 5, 2020). Nevertheless, for most companies, digitized communication techniques have been effective for collaboration while simultaneously saving costs through *Reduced Professional Travel*. Minimizing travel was already an efficiency enhancement before COVID-19. Nevertheless, Gregory Glanzmann,

Digital Transformation Manager at a leading automotive corporation, articulated that now doing virtual meetings is “*perceived as a real alternative and not as a second choice.*” Despite its numerous benefits, a few participants raised concerns about the *Mental Health Effects of Digital Working*. They proposed that the set of novel uncertainties sparked by the Coronavirus causes anxiety and stress (Int.: Anonymous 10, 2020).

The general area of *Crisis Management* also received considerable attention. Managing information overload and credibility is critical during emergency scenarios (Kapoor et al., 2018), as even the most uncertain circumstances entail strategically relevant information (Courtney et al., 1997). Hence, a clear information policy that provides transparent data and prevents misinformation is needed. Some participants projected that these crisis information policies would remain in place in the long run (e.g., Int.: Anonymous 21). Besides this, the crisis has put a focus on overall *Employee Safety Measures*. Protective policies, such as *Social Distancing* will potentially have a lasting impact on individual and group behavior. The HR Director of a beer brewing company forecasted that there will not be events where “*500 or 1000 people are coming together in a small event hall*” within the next year (Int.: Anonymous 7, 2020). This example demonstrates that current crisis organization measures implicate uncertainty as well as produce novel sets of unknowns.

Professionals’ private experiences of COVID-19 pointed out another feature. The majority of interviewees made remarks about *Appreciation and Reflection on the Meaning of Life*. This transformational process about personal values is likely to generate *Cultural Changes* in organizational settings. Katrine Brusgaard, Head of HR at MAN Energy Solutions Denmark, affirmed that “*this has been the biggest cultural change [for our organization] and it was done by a stupid virus.*” In a nutshell, uncertainty has grown in several dimensions that influence organizational behavior.

### **5.3.3. Uncertainty Dimensions Related to Decision-Making Styles**

Along with transforming organizational culture, research participants also observed changing *Decision-Making Procedures and Speed*. “*I believe this will speed us up enormously. We would have discussed [these change processes] over the next ten years, sent it through dozen committees, and now it just happened,*” stated Wilfried von Rath, member of the board



of Volkswagen. Implicitly, perceptions of environmental changes impact decision-making at all organizational levels (Meinhardt *et al.*, 2018).

Although some uncertainties related to COVID-19 have nudged faster decision-making, decision-makers focused purely on quantitative metrics may delay critical decisions (Christensen *et al.*, 2018). MAN Energy Solution's Head of HR said that any planning is exceptionally challenging as the company "*cannot do a financial forecast the same way [it] did just two months ago*" (Int.: Katrine Brusgaard, 2020). Generally, the purpose and application of *Forecasting and Prediction Efforts* were found to carry great insecurity. While cultural changes may speed up decision-making, increased uncertainty may impede it.

#### **5.4. Uncertainty Dimensions Related to Performance Outcomes**

In line with Parnell *et al.* (2000) performance effect scheme, most participants commented on the *Short-Term Economic Impact*. However, the direction of argument varied between the interviews (Appendix 10.8). For instance, while individuals with a background in the technology sector perceived the COVID-19 situation as a demand booster, representatives of the automotive industry expected a drastic decline in demand. Moreover, some participants noted rising uncertainty about the *Development of Prices*. Taken together, these anticipated impacts on firm performance produce serious challenges of *Liquidity Management*. A partner at a leading consulting firm reported a reduction of 3 billion euros in EBIT for a global corporation in Q1 2020 (Int.: Anonymous 8, 2020). He questioned: "*How long can companies keep up with this?*" Further, Anonymous 19, Purchasing Manager at BMW, underlined that liquidity constraints are not only a problem for survival this year but will also hinder future global competitiveness.

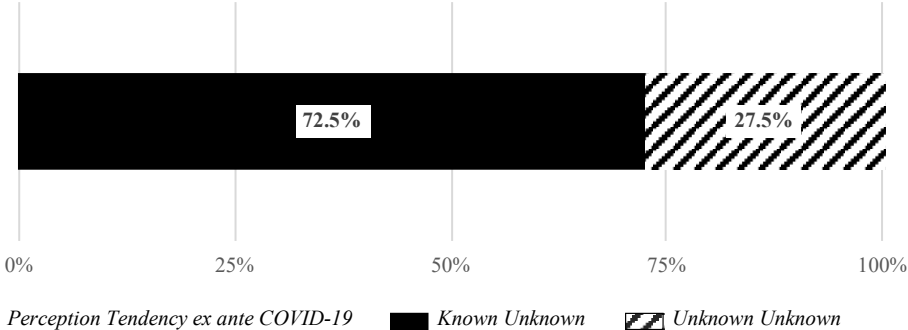
**6. Discussion**

The objective of this research was to examine whether Black Swan events increase awareness of known and unknown unknowns by discovering perceptions of existing and novel uncertainties. By analyzing the case of COVID-19, we identified 40 uncertainty dimensions that could potentially shape future management research and practice. To guide the analysis, we categorized all areas of uncertainty into the revised model of environmental uncertainty (Figure 5). The model builds on Jauch and Kraft’s (1986) strategic decision-making sequence for managing environmental uncertainty. We note that the uncertainty dimensions that were articulated are inter-related and have influences beyond their respective frameworks.

Besides investigating uncertainties related to the Coronavirus crisis (RQ #3), this study analyzed how Black Swan events alter mental models pertaining to known uncertainties (RQ #2) and how they raise awareness of unknown unknowns (RQ#1). The color-codes in Figure 14 display whether respondents classified uncertainty dimensions as known or unknown unknowns *ex ante* COVID-19. Obviously, these are perceptual determinations that are individual and idiosyncratic (Feduzi & Runde, 2014). Nevertheless, we can meaningfully generalize from the presented discoveries.

We asked participants to indicate their familiarity with the identified topic before the Coronavirus. In this part, an average of 72.5% of unknowns were perceived as familiar uncertainties, and 27.5% were categorized as previously unknown unknowns (Figure 15).

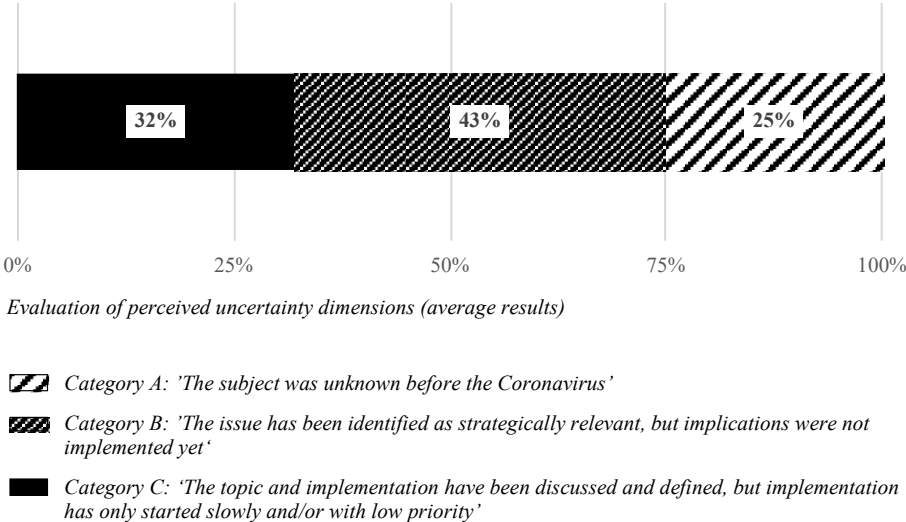
**Figure 15: Observed Known vs. Unknown Uncertainty Areas Connected to COVID-19**



Additionally, all participants were requested to assign percentages to three uncertainty evaluation criteria at the end of the interview (Figure 16). Precisely, we asked the professionals

to make an overall guess on how extensively they recognized uncertainty areas related to COVID-19 before the event. This generic indication was independent of the specific areas of uncertainties discussed in the main body of the interview. We asked participants to distribute percentages between unknown unknowns (Category A) and known unknowns (Category B & C), and also asked them to differentiate the degree of awareness attached to previously perceived uncertainties. Category B refers to unknowns that the professionals recognized before the Coronavirus, but where recognition did not lead to any specific measures or strategic changes. In contrast, Category C classified perceived uncertainties that prompted specific strategy implementations. Figure 16 shows the overall results. Interestingly, the two different uncertainty assessments (Figure 15 & 16) yield similar results. Jointly, the categories of known unknowns (B & C) represent 75% of observed uncertainties.

**Figure 16: Participants’ Assessment on Known vs. Unknown Unknowns**



The more in-depth segmentation presents compelling insights on how Black Swan events modify mental models of existing uncertainties. The professionals interviewed estimated that from the previously identified uncertainties, about 62% of the themes did not lead to any specific implementation measures (Category B). For about 42% of uncertainties classified as known unknowns, they specified that they already started some implementation mechanisms before the pandemic.

These results show that Black Swans events such as COVID-19 do change managers’ mental models. Not only do they raise awareness of new uncertainty dimensions, but they also

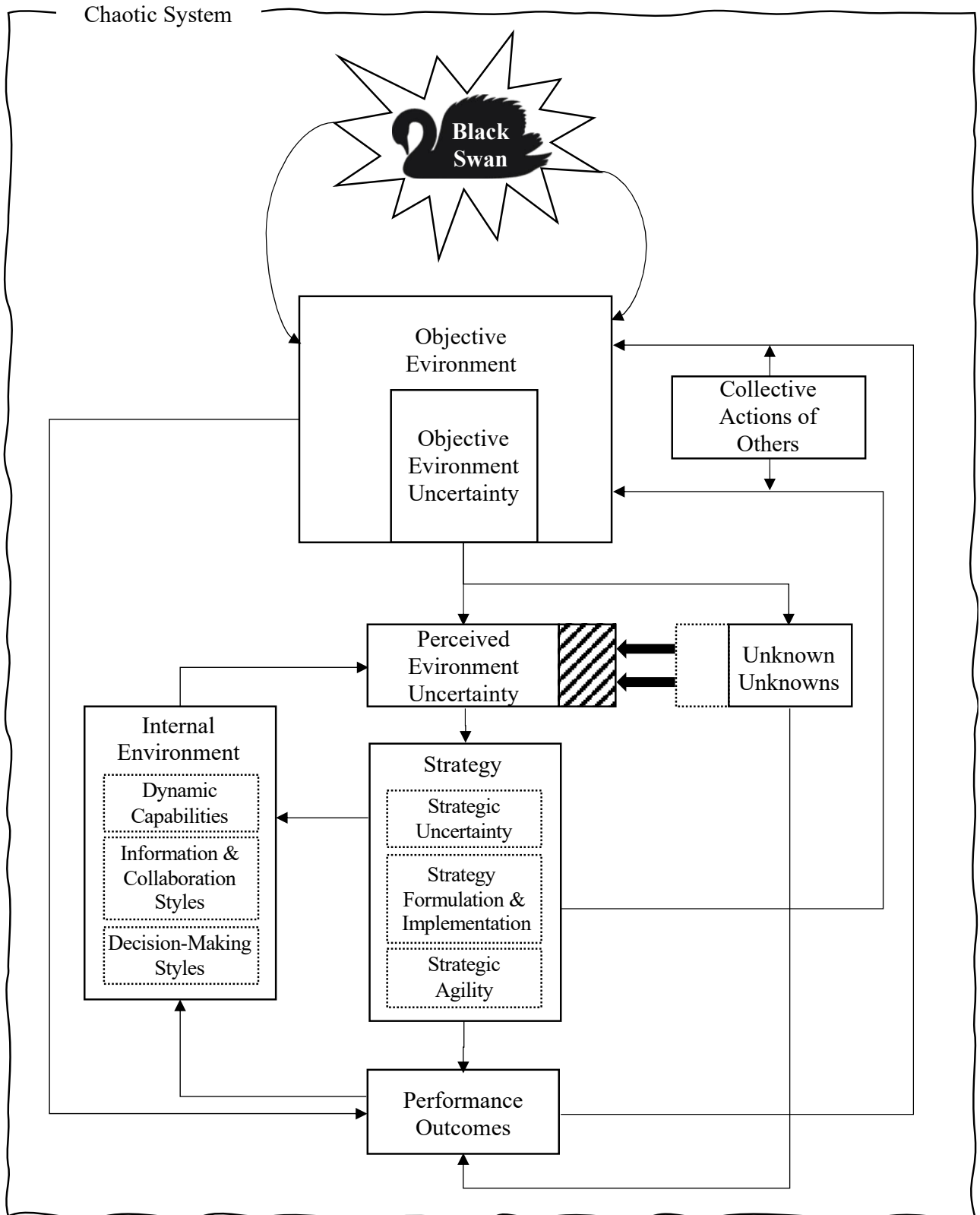
change perspectives on previously identified issues. The outcomes are in line with Helfat and Peteraf's (2015) finding that decision-makers are naturally heterogeneous in the way they cope with uncertainty.

Although the research participants categorize the majority of the observed and assessed uncertainties as previously known, we discovered several unknown unknowns. Again, these are subject to cognitive constraints and hence naturally vary between individuals or organizations (Feduzi & Runde, 2014). These unknown unknowns are not necessarily new phenomena as they could have both a knowable and unknowable nature. Nonetheless, our results cause us to conclude that Black Swan events heighten perceptions of unknown unknowns (Figure 17). These newly perceived uncertainty areas have an impact on strategic decision-making. Thus, we hypothesize that managers' reactions to these uncertainty dimensions creates novel sets of unknown unknowns.

These findings support the conclusions of Allaire and Firsirotu (1989) and underline the importance of strategic thinking under conditions of uncertainty. If Black Swan events amplify the amount of perceived uncertainties (Figure 17), then the strategic relevance of the number of uncertainties also rises and this leads to augmented strategic uncertainty (Daft *et al.*, 1988). If managers fail to observe rising uncertainty or misinterpret their strategic relevance, they may fail to defend competitive advantages (Raynor, 2007). For instance, incumbents' exposure to disruptors could be exacerbated by Black Swan events that cause significant changes in consumer behavior.

Figure 17 revises the previously developed model of environmental uncertainty. It takes into account the finding of this study by visualizing that Black Swan events raise awareness of known and unknown unknowns. Thus, we adapted the model specifically for the context of Black Swan disruption. Whether this effect also applies to other types of disruption needs to be explored in future research.

**Figure 17: New Model of Black Swan Uncertainties**



*Source: Modified representation; based on Jauch and Kraft (1986)*

## 7. Managerial Implications

The research has significant implications for current and future management practices. Firstly, the observed uncertainties associated with the Coronavirus crisis will potentially reshape future ways of doing business. Accordingly, Wilfried von Rath, a member of the board of Volkswagen, states: “*This is a brutal access to the future that has happened here now.*” It is beyond the scope of this report to analyze the specific implications of each uncertainty dimension. We recommend management practitioners to examine how existing or novel uncertainties impact strategic practices.

Secondly, the results of this study underline the importance of increasing awareness about the existence of unknown unknowns. By understanding industries as complex systems that comprise known and unknown factors, managers can improve strategic decision-making (Levy, 1994). A partner of a leading strategic consulting firm asserted that “*the only thing that is certain is that it will not be the same as before*” (Int.: Anonymous 14, 2020). The events around COVID-19 demonstrate that sustaining competitive advantage in the future relates to Senge’s (2004) “*ability to learn faster than your competitors*”. Hence, executives must acknowledge that succeeding includes embracing uncertainty. Also, as innovations such as remote working gain traction, managers need to ensure that they do not miss out on implementing ‘the new normal’ even if there are uncertainties about how the phenomenon will work out.

## 8. Limitations and Directions for Future Research

Our research purpose was to provide academic practitioners and executives with indications about current and novel uncertainties caused by the Coronavirus. This study has uncovered a variety, but these uncertainties are by no means exhaustive. Further, the primary data collection presents only a snapshot of uncertainty perceptions and does not take into account time-specific variables. As the empirical context evolved during the time of the study, the research is contingent upon where matters stood at the time of writing.

Generalizing the results across other environmental disruption phenomena may have limitations since there are many elements specific to the case of COVID-19. As outlined in the methodology section, qualitative data originates from participant perceptions of experience and is subject to the interpretation of the researcher (Bluhm *et al.*, 2011). For example, in the interview, participants were asked to compare their level of knowledge *ex ante* COVID-19 at the interview date. Responses include perceptual biases as individuals tend to overrate their knowledge (Taleb, 2007). Nonetheless, the theoretical model and the findings of this paper significantly advance academic concepts related to uncertainty.

Future studies can build on this examination in several ways. Firstly, further research could challenge the theoretical claims derived from this specific empirical context in different research settings. Secondly, future researchers could use the case of COVID-19 for other investigations in the field of strategic uncertainty. Thirdly, it would be interesting to compare actual future firm developments to the 40 uncertainty dimensions that we formulated in this paper. Results could potentially yield insights on how far perceptions stated during a Black Swan event are relevant for the mid- and long-term steering of organizations. Fourthly, deep dives within each of the 40 dimensions would potentially add value for management executives and researchers. Moreover, forthcoming studies could examine how uncertainties created by Black Swan events interrelate and reinforce each other. Overall, Black Swans not only enable us to understand the impact of tail events but also help our strategic thinking, particularly with regard to gaining more nuance about known and unknown uncertainty variables.

## 9. Conclusion

Black Swan logic reduces the relevance of knowledge and elevates the significance of *what one does not know*. The dynamics of these tail events primarily stem from their unpredictability. Conventional methods of management analysis focus on gaussian distributions to envision future developments. These methods are inherently problematic as bell curves tend to ignore large deviations and provide a false sense of confidence about the future (Taleb, 2007). In fact, they fail to meaningfully incorporate uncertainty. This dissertation has shown that Black Swan events increase awareness of *known and unknown unknowns* by expanding perceptions of existing and novel uncertainties. By incorporating recent findings and applying the model of environmental uncertainty developed by Jauch and Kraft (1986) to the context of Black Swan events, we provide another dimension within management theory.

2020's Black Swan, COVID-19, triggered strategic-decision makers to reconsider current relations and interdependencies to mitigate potential harms from other future exogenous shocks. Executives, strategists, and innovation managers are challenged to think more closely about strategic choices. The virus has changed the rules of the game. Our examination of COVID-19 as a Black Swan phenomenon yields several relevant insights. All 36 research participants interviewed in this study stressed the strategic power of known and unknown unknowns in the Coronavirus context. In sum, we identified 40 different themes surrounding uncertainty related to the economic impact of the pandemic. Although the vast majority of uncertainty dimensions were already perceived *ex ante*, our findings show that Black Swan events also reveal *unknown unknowns*. Additionally, we discovered that mental models pertaining to various *known unknowns* have shifted significantly due to novel experiences and circumstances.

From a meta-thinking perspective, we find that the perception of uncertainties sparked by COVID-19 essentially created new uncertainties. As cognitive perception varies, interpretations and reactions to novel uncertainties diverged across individuals and organizations. Consequently, the different strategic responses to this Black Swan event created a domain of strategic uncertainties associated with the existence of *known and unknown unknowns*.



The findings and propositions regarding Black Swan events, as well as the COVID-19 empirical context, open the way for substantial potential for future research. Our new model of Black Swan Uncertainties could be amplified by new avenues of research to increase the reliability of the model. Further, the long-term consequences of COVID-19 offers a fertile terrain for further exploration of the (un)known.

## 10. References

- Aaker, D. A. (1983). Organizing a strategic information scanning system. *California Management Review*, 25(2), 76-83. <https://doi.org/10.2307/41165007>
- Academy of Management. (2018). Call for papers: The implications of uncertainty for management and organization theories. *Academy of Management Review*. [https://aom.org/uploadedFiles/Publications/AMR/Uncertainty\\_Call\\_for\\_Papers.pdf](https://aom.org/uploadedFiles/Publications/AMR/Uncertainty_Call_for_Papers.pdf)
- Accenture. (2020, May 14). Outmaneuver uncertainty: Navigating the human and business impact of COVID-19. *Accenture*. <https://www.accenture.com/fi-en/about/company/coronavirus-business-economic-impact>
- Achrol, R. S. & Stern, L. W. (1988). Environmental determinants of decision-making uncertainty in marketing channels. *Journal of Market Research*, 25(1), 36-50. <https://doi.org/10.2307/3172923>
- Aguilar, F. J. (1967). *Scanning the business environment*. Macmillan Company.
- Alatovic, T., Chhaya, M., Juneja, S., Smaje, K. & Sukharevsky, A. (2020, April 20). Driving digital change during a crisis: The chief digital officer and COVID-19. *McKinsey & Company*. <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/driving-digital-change-during-a-crisis-the-chief-digital-officer-and-covid-19>
- Alexander, A., De Smet, A. & Weiss, L. (2020, March 24). Decision making in uncertain times. *McKinsey & Company*. <https://www.mckinsey.com/business-functions/organization/our-insights/decision-making-in-uncertain-times>
- Alexander, D. E. (2014). Social media in disaster risk reduction and crisis management. *Science and Engineering Ethics*, 20, 717-733. <https://doi.org/10.1007/s11948-013-9502-z>
- Alkadiri, R., Fitz R., Webster J. & Dewar, A. (2020, April 7). Oil producers feel the pain of falling prices. *Boston Consulting Group*. <https://www.bcg.com/publications/2020/covid-19-causes-collapse-in-crude-oil-prices.aspx>
- Allaire Y. & Firsirotu, M. E. (1989). Coping with strategic uncertainty. *Sloan Management Review*, 30(3), 7-16.
- Altman, S. A. (2020, May 20). Will COVID-19 have a lasting impact on globalization?. *Harvard Business Review*. <https://hbr.org/2020/05/will-covid-19-have-a-lasting-impact-on-globalization>

- Amabile, T. M. & Conti, R. (1999). Changes in the work environment for creativity during downsizing. *Academy of Management Journal*, 42(6), 630-640. <https://doi.org/10.5465/256984>
- Andrews, K. R. (1987). *The concept of corporate strategy*. Irwin.
- Ansoff, H. I. (1965). *Corporate strategy: An analytic approach to business policy for growth and expansion*. McGraw-Hill.
- Ansoff, H. I. (1991). Critique of Henry Mintzberg's 'the design school: Reconsidering the basic premises of strategic management'. *Strategic Management Journal*, 12(6), 449-461. <https://doi.org/10.1002/smj.4250120605>
- Apple. (2020, April 10). Apple and Google partner on COVID-19 contact tracing technology. *Apple*. <https://www.apple.com/newsroom/2020/04/apple-and-google-partner-on-covid-19-contact-tracing-technology/>
- Atmar, H., Begley, S., Fuerst, J., Rickert, S., Slelatt, R., Pian Gi, M. T. (2020, April 24). The next normal: Retail M&A and partnerships after COVID-19. *McKinsey & Company*. <https://www.mckinsey.com/business-functions/m-and-a/our-insights/the-next-normal-retail-m-and-a-and-partnerships-after-covid-19>
- Audia, P. G., Locke, E. A. & Smith, K. G. (2000). The paradox of success: An archival and laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal*, 43(5), 837-853. <https://doi.org/10.5465/1556413>
- Avishai, B. (2020, April 21). The pandemic isn't a Black Swan but a portent of a more fragile global system. *The New Yorker*. <https://www.newyorker.com/news/daily-comment/the-pandemic-isnt-a-black-swan-but-a-portent-of-a-more-fragile-global-system>
- Bachmann, R. & Bayer, C. (2013). Wait-and-see business cycles?. *Journal of Monetary Economics*, 60(6), 704-719. <https://doi.org/10.1016/j.jmoneco.2013.05.005>
- Bansal, R. & Shaliastovich, I. (2010). Confidence risk and asset prices. *American Economic Review*, 100(2), 537-541. <https://doi.org/10.1257/aer.100.2.537>
- Barney, J. B. (1986a). Types of competition and the theory of strategy: Toward an integrative framework. *Academy of Management Review*, 11(4), 91-98. <https://doi.org/10.5465/amr.1986.4283938>

- Barney, J. B. (1986b). Strategic factor markets: Expectations, luck, and business strategy. *Management Science*, 32(10), 1231-1241. <https://doi.org/10.1287/mnsc.32.10.1231>
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120. <https://doi.org/10.1177/014920639101700108>
- Barreto, I. & Baden-Fuller, C. (2006). To conform or to perform: Mimetic behavior, legitimacy-based groups and performance consequences. *Journal of Management Studies*, 43(7), 1559-1581. <https://doi.org/10.1111/j.1467-6486.2006.00620.x>
- Barreto, I. (2010). Dynamic capabilities: A review of past research and an agenda for the future. *Journal of Management*, 36(1), 256-280. <https://doi.org/10.1177/0149206309350776>
- Bartlett, C. A. & Goshal, S. (1995). Changing the role of top management: Beyond systems to people. *Harvard Business Review*.
- Basu, S., & Bundick, B. (2017). Uncertainty shocks in a model of effective demand. *Econometrica*, 85(3), 937-958. <https://doi.org/10.3982/ecta13960>
- BBC. (2020, February 29). Coronavirus: Nasa images show China pollution clear amid slowdown. *BBC News*. <https://www.bbc.com/news/world-asia-51691967>
- BCG. (2020). How COVID-19 is reshaping industries. *Boston Consulting Group*. <https://www.bcg.com/featured-insights/coronavirus.aspx#industries>
- Beckman, C. M., Haunschild, P. R. & Phillips, D. J. (2004). Friends or strangers? Firm-specific uncertainty, market uncertainty, and network partner selection. *Organization Science*, 15(3), 259-275. <https://doi.org/10.1287/orsc.1040.0065>
- Berman, M. & Thurkow, T. (2020, April 1). COVID-19 creates a moment of truth for corporate culture. *Bain & Company*. <https://www.bain.com/insights/covid-19-creates-a-moment-of-truth-for-corporate-culture/>
- Bharadwaj, A., Sanghi, K., Jain, N., Azevedo, D., Chen, C., Kotov, I., Koslow, L. & Witschi, P. (2020, April 21). COVID-19 and the emerging-market consumer. *Boston Consulting Group*. <https://www.bcg.com/de-de/publications/2020/covid-19-impact-emerging-market-consumers.aspx>
- Bhargava, S., Buzzell, C., Sexauer, C., Charm, T., Das, R., Heller, C., Fradin, M., Grimmelt, A., Robinson, K., Jain, A., Pflumm, S., Tewari, A. & Seid, C. (2020, June 5). Consumer sentiment evolves as countries around the world begin to reopen. *McKinsey & Company*.

<https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/a-global-view-of-how-consumer-behavior-is-changing-amid-covid-19>

- Bikhchandani, S., Hirshleifer, D. & Welch, I. (1998). Learning from the behavior of others: Conformity, fads, and informational cascades. *Journal of Economic Perspectives*, 12(3), 151-170. <https://doi.org/10.1257/jep.12.3.151>
- Bloom, E., Wit, V. d. & Carangal-San Jose, M. J. F. (2005). Potential economic impact of an Avian Flu pandemic on Asia. ERD Policy Brief Series No. 42. *Asian Development Bank*. <https://www.adb.org/publications/potential-economic-impact-avian-flu-pandemic-asia>
- Bloom, N., Floetotto, M., Jaimovich, N., Sapora-Eksten, I. & Terry, S. (2012). Really uncertain business cycles. *NBER working paper 13385*.
- Bluhm, D. J., Harman, W., Lee, T. W. & Mitchell, T. R. (2011). Qualitative research in management: A decade in progress. *Journal of Management Studies*, 48(8), 1866-1891.
- Blumberg, S., Peters, P., Richter, G. & Stürer, C. (2020, April 25). A practical way for CIOs to manage IT costs through the COVID-19 crisis. *McKinsey & Company*. <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/a-practical-way-for-cios-to-manage-it-costs-through-the-covid-19-crisis>
- Bobbitt, H. R. & Ford, J. D. (1980). Decision-maker choice as a determinant of organizational structure. *Academy of Management Review*, 5(1), 13-23. <https://doi.org/10.5465/amr.1980.4288839>
- Bogner, W. C. & Barr, P. S. (2000). Making sense in hypercompetitive environments: A cognitive explanation for the persistence of high velocity competition. *Organization Science*, 11(2), 212-226. <https://doi.org/10.1287/orsc.11.2.212.12511>
- Bourgeois, L. J. (1985). Strategic goals, perceived uncertainty, and economic performance. *Academy of Management Journal*, 28(3), 548-573. <https://doi.org/10.5465/256113>
- Bourgeois, L. J. & Eisenhardt, K. M. (1988). Strategic decision processes in high velocity environments: Four cases in the microcomputer industry. *Management Science*, 34(7), 816-835. <https://doi.org/10.1287/mnsc.34.7.816>
- Brotschi, A., Christof, D., Dertouzos, J., Kempf, S. & Vaze, P. (2020, May 01). Beyond Coronavirus: The road ahead for the automotive aftermarket. *McKinsey & Company*. <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/beyond-coronavirus-the-road-ahead-for-the-automotive-aftermarket>

- Bruno, V. & Shin, H. (2014). Capital flows, cross-border banking and global liquidity. *Princeton University working paper*.
- Burns, T. & Stalker, G. M. (1961). *The management of innovation*. Tavistock Publications.
- Butler, A. (1990). A methodological approach to chaos: Are economists missing the point? *Federal Reserve Bank of St. Louis*, 72(13), 36-48.
- Byrne, J. (2020, March 29). How COVID-19 is crashing on the class of 2020: Job offers already disappearing. *Forbes*. <https://www.forbes.com/sites/poetsandquants/2020/03/29/how-covid-19-is-crashing-on-the-class-of-2020-job-offers-already-disappearing/#32acf0503ffb>
- Cadena, A. & Ferrari-Haines, F. (2020, April 19). Saving our livelihoods from COVID-19: Toward an economic recovery. *McKinsey & Company*. <https://www.mckinsey.com/industries/public-sector/our-insights/saving-our-livelihoods-from-covid-19-toward-an-economic-recovery>
- Caimi, G., Anderson, J. & Hoppe, F. (2020, April 20). COVID-19: Building a digital bridge to the new normal: Technology and analytics are key to weathering the Coronavirus pandemic and emerging stronger. *Bain & Company*. <https://www.bain.com/insights/covid-19-building-a-digital-bridge-to-the-new-normal/>
- Callaway, E., Cyranoski, D., Mallapaty, S., Stoye, E. & Tollefson, J. (2020). Coronavirus by the numbers. *Nature*, 579, 482-483. <https://doi.org/10.1038/d41586-020-00758-2>
- Camerer, C. F. (1991). Does strategy research need game theory? *Strategic Management Journal*, 12(52), 137-153. <https://doi.org/10.1002/smj.4250121010>
- Candelon, F., Aguiar, M. Hsu, J., Lee, K., Meyer, M., Lacanna, S. & De Bondt, M. (2020a, May 06). The role of trust in the COVID-19 economic recovery: Lessons from Asia. *Boston Consulting Group*. <https://www.bcg.com/de-de/publications/2020/lessons-from-asia-economic-recovery-post-covid-19.aspx>
- Candelon, F., Reichert, T., Duranton, S., Charme di Carlo, R. & De Bondt, M. (2020b, April 02). The rise of the AI-powered company in the postcrisis world. *Boston Consulting Group*. <https://www.bcg.com/publications/2020/business-applications-artificial-intelligence-post-covid.aspx>
- Cannella, A. A., Park, J. & Lee, H. (2008). Top management team functional background diversity and firm performance: Examining the roles of team member collocation and

- environmental uncertainty. *Academy of Management Journal*, 51(4), 768-784. <https://doi.org/10.5465/amr.2008.33665310>
- Carlsson-Szlezak, P., Reeves, M. & Swartz, P. (2020, March 27). Understanding the economic shock of Coronavirus. *Harvard Business Review*. <https://hbr.org/2020/03/understanding-the-economic-shock-of-coronavirus>
- Cartwright, T. J. (1991). Planning and chaos theory. *Journal of the American Planning Association*, 57(1), 44-56. <https://doi.org/10.1080/01944369108975471>
- Carrière-Swallow, Y. & Céspedes, L. F. (2013). The impact of uncertainty shocks in emerging economies. *Journal of International Economics*, 90(2), 316-325. <https://doi.org/10.1016/j.jinteco.2013.03.003>
- Carson, S. J., Madhok, A. & Wu, T. (2006). Uncertainty, opportunism, and governance: The effects of volatility and ambiguity on formal and relational contracting. *Academy of Management Journal*, 49(5), 1058-1077. <https://doi.org/10.2307/20159816>
- Chen, H., Xu, W., Paris, C., Reeson, A. & Li, X. (2020). Social distance and SARS memory: Impact on the public awareness of 2019 novel coronavirus (COVID-19) outbreak. *Working Paper*. <https://doi.org/10.1101/2020.03.11.20033688>
- Choi, T. Y., Rogers, D. & Vakil, B. (2020, March 27). Coronavirus is a wake-up call for supply chain management. *Harvard Business Review*. <https://hbr.org/2020/03/coronavirus-is-a-wake-up-call-for-supply-chain-management>
- Christensen, C. M. (1997). The innovator's dilemma: When new technologies cause great firms to fail. *Harvard University Press*.
- Christensen, C. M. (2006). The ongoing process of building a theory of disruption. *Journal of Product Innovation Management*, 23(1), 39-55. <https://doi.org/10.1111/j.1540-5885.2005.00180.x>
- Christensen, C. M., Raynor, M. & McDonald, R. (2015). What is disruptive innovation?. *Harvard Business Review*.
- Christensen, C. M., Raynor, M., Altman, E. J. & Palmer, J. E. (2018). Disruptive innovation: An intellectual history and directions for future research. *Journal of Management Studies*, 55(7), 1043-1078. <https://doi.org/10.1111/joms.12349>

- Chou, J. N. & Kuo, F. (2004). Potential impacts of the SARS outbreak on Taiwan's economy. *Asian Economic Papers*, 3(1), 84-112. Potential impacts of the SARS outbreak on Taiwan's economy. <https://doi.org/10.1162/1535351041747969>
- Collis, D. (1992). The strategic management of uncertainty. *European Management Journal*, 10(2), 125-135. [https://doi.org/10.1016/0263-2373\(92\)90060-H](https://doi.org/10.1016/0263-2373(92)90060-H)
- Conant, J. S., Mokwa, M. P. & Varadarajan, P. R. (1990). Strategic types, distinctive marketing competencies and organizational performance: A multiple measures-based study. *Strategic Management Journal*, 11(5), 365-383. <https://doi.org/10.1002/smj.4250110504>
- Cooper, D. R. & Schindler, P. S. (2008). *Business research methods* (10<sup>th</sup> edition). McGraw-Hill.
- Cooper, T., Marcontell, D., Martin, C. G. & Reagan, I. (2020, May 14). COVID-19 impact on commercial aviation maintenance. *Oliver Wyman*. <https://www.oliverwyman.com/our-expertise/insights/2020/mar/COVID-19-Impact-On-Commercial-Aviation-Maintenance.html>
- Courtney, H., Kirkland, J. & Viguerie, P. (1997). Strategy under uncertainty. *Harvard Business Review*.
- Covin, J. G. (1991). Entrepreneurial versus conservative firms: A comparison of strategies and performance. *Journal of Management Studies*, 28(5), 439-462. <https://doi.org/10.1111/j.1467-6486.1991.tb00763.x>
- Cuddington, J. T., Hancock, J. D. & Rogers, C. A. (1994). A dynamic aggregate model of the AIDS epidemic with possible policy interventions. *Journal of Policy Modeling*, 16(5), 473-496.
- Culnan, M. J. (1983). Environmental scanning: The effects of task complexity and source accessibility on information gathering behavior. *Decision Science*, 14(2), 194-206. <https://doi.org/10.1111/j.1540-5915.1983.tb00180.x>
- Cyert, R. M. & March, J. G. (1963). *A behavioral theory of the firm*. Prentice-Hall.
- D'Aveni, R. A. (1994). *Hypercompetition: Managing the dynamics of strategic maneuvering*. Free Press.
- Daft, R. L. & Weick, C. E. (1984). Toward a model of organizations as interpretation systems. *Academy of Management Review*, 9(2), 284-295. <https://doi.org/10.2307/258441>



- Daft, R. L., Sormunen, J. & Parks, D. (1988). Chief executive scanning, environmental characteristics, and company performance: An empirical study. *Strategic Management Journal*, 9(2), 123-139. <https://doi.org/10.1002/smj.4250090204>
- Daly, E. (2020, April 30). How can the economies of emerging Asia respond to COVID-19?. *McKinsey & Company*. <https://www.mckinsey.com/industries/public-sector/our-insights/how-can-the-economies-of-emerging-asia-respond-to-covid-19>
- Davis, J. P., Eisenhardt, K. M. & Bingham, C. B. (2009). Optimal structure, market dynamism, and the strategy of simple rules. *Administrative Science Quarterly*, 54(3), 413-452. <https://doi.org/10.2189/asqu.2009.54.3.413>
- Davis-Peccoud, J. & van der Branden, J. (2020, April 17). COVID-19 gives sustainability a dress rehearsal. *Bain & Company*. <https://www.bain.com/insights/covid-19-gives-sustainability-a-dress-rehearsal/>
- De Geus, A. (1997). *The living company*. Harvard Business School Press.
- Deloitte. (2020a). COVID-19: Confronting uncertainty through & beyond the crisis: The power of scenario-thinking to enhance decision-making. *Deloitte*. <https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/covid-19-confronting-uncertainty-through-beyond-the-crisis-.html>
- Deloitte. (2020b). Addressing the financial impact of COVID-19: Liquidity. *Deloitte*. <https://www2.deloitte.com/ch/en/pages/financial-advisory/articles/addressing-the-financial-impact-of-covid-19-liquidity.html>
- Díaz Gutiérrez, L. (2020, April 23). Can your culture support your people in COVID-19 isolation? *Accenture*. <https://talentorganizationblog.accenture.com/financialservices/can-your-culture-support-your-people-in-covid-19-isolation>
- DiMaggio, J. P. & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147-160. <https://doi.org/10.2307/2095101>
- Downey, H. K., Hellriegel, D. & Slocum, J. W. (1975). Environmental uncertainty: The construct and its application. *Administrative Science Quarterly*, 20(4), 613-629. <https://doi.org/10.2307/2392027>

- Downey, H. K. & Slocum, J. W. (1975). Uncertainty: Measures, research, and sources of variation. *Academy of Management Journal*, 18(3), 562-578. <https://doi.org/10.5465/255685>
- Doz, Y. & Kosonen, M. (2008). *Fast strategy: How strategic agility will help you stay ahead of the game*. Pearson/Longman.
- Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. *Administrative Science Quarterly*, 17(3), 313-327. <https://doi.org/10.2307/2392145>
- Easterby-Smith, M., Thorpe, R., Jackson, P. & Lowe, A. (2008). *Management Research* (3rd edition). Sage.
- Ebrahimi, B. P. (2000). Perceived strategic uncertainty and environmental scanning behavior of Hong Kong Chinese executives. *Journal of Business Research*, 49(1), 67-77. [https://doi.org/10.1016/S0148-2963\(98\)00120-9](https://doi.org/10.1016/S0148-2963(98)00120-9)
- Edwards, R. & Holland, J. (2013). *What is qualitative interviewing?*. Bloomsbury.
- Eisenhardt, K. M. (1989a). Making fast strategic decisions in high-velocity environments. *Academy of Management Journal*, 32(3), 543-576. <https://doi.org/10.2307/256434>
- Eisenhardt, K. M. (1989b). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550. <https://doi.org/10.2307/258557>
- Eisenhardt, K. M. & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 22(10), 1105-1121. [https://doi.org/10.1002/1097-0266\(200010/11\)21:10/11<1105::AID-SMJ133>3.0.CO;2-E](https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E)
- Elenkov, D. S. (1997). Strategic uncertainty and environmental scanning: The case for institutional influences on scanning behavior. *Strategic Management Journal*, 18(4), 287-302. [https://doi.org/10.1002/\(SICI\)1097-0266\(199704\)18:4<287::AID-SMJ865>3.0.CO;2-B](https://doi.org/10.1002/(SICI)1097-0266(199704)18:4<287::AID-SMJ865>3.0.CO;2-B)
- Ellis, S. & Shpielberg N. (2003). Organizational learning mechanisms and managers' perceived uncertainty. *Human Relations*, 56(10), 1233-1254. <https://doi.org/10.1177/00187267035610004>
- Emery, F. E. & Trist, E. L. (1965). The causal texture of organizational environments. *Human Relations*, 18(1), 21-32. <https://doi.org/10.1177/001872676501800103>

- Fahey, L. & King, W. R. (1977). Environmental scanning for corporate planning. *Business Horizons*, 20(4), 61-71. [https://doi.org/10.1016/0007-6813\(77\)90010-6](https://doi.org/10.1016/0007-6813(77)90010-6)
- Fastenroth, K. M. & Jochmann, W. (2020, March 30). Managing the crisis with digital leadership skills. *Kienbaum*. <https://www.kienbaum.com/en/blog/managing-the-crisis-with-digital-leadership-skills/>
- Feduzi, A. & Runde, J. (2014). Uncovering unknown unknowns: Towards a Baconian approach to management decision-making. *Organizational Behavior and Human Decision Processes*, 124(2), 268-283. <https://doi.org/10.1016/j.obhdp.2014.04.001>
- Financial Times. (2020, April 22). Companies should shift from ‘just in time’ to ‘just in case’. *Financial Times*. <https://www.ft.com/content/606d1460-83c6-11ea-b555-37a289098206>
- Fiske, S. T. & Taylor, S. E. (1991). *Social cognition*. McGraw-Hill.
- Fitzpatrick, M., Gill, I., Libarikian, A., Smaje, K. & Zimmel, R. (2020, April 20). The digital-led recovery from COVID-19: Five questions for CEOs. *McKinsey & Company*. <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/the-digital-led-recovery-from-covid-19-five-questions-for-ceos>
- Ford, J. D. & Hegarty, W. H. (1984). Decision makers’ beliefs about the causes and effects of structure: An explanatory study. *Academy of Management Journal*, 27(2), 271-291. <https://doi.org/10.5465/255925>
- Frankiewicz, B. & Chamorro-Premuzic, T. (2020, May 06). Digital transformation is about talent, not technology. *Harvard Business Review*. <https://hbr.org/2020/05/digital-transformation-is-about-talent-not-technology>
- Fredrickson, J. W. (1984). The comprehensiveness of strategic decision processes: Extension, observations, future directions. *Academy of Management Journal*, 27(3), 445-466. <https://doi.org/10.5465/256039>
- Freire, S. (2004). Impact of HIV/AIDS on saving behavior in South Africa. African development and poverty reduction: The macro-micro linkage. *Development Policy Research Unit Cornell University*. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.562.805&rep=rep1&type=pdf>
- Frisch, B. & Greene, C. (2020, March 05). What it takes to run a great virtual meeting. *Harvard Business Review*. <https://hbr.org/2020/03/what-it-takes-to-run-a-great-virtual-meeting>

- Gans, J. (2016). *The disruption dilemma*. The MIT Press.
- Gates, W. H. (2015). The next outbreak? We're not ready. *TED*. [https://embed.ted.com/talks/bill\\_gates\\_the\\_next\\_disaster\\_we\\_re\\_not\\_ready](https://embed.ted.com/talks/bill_gates_the_next_disaster_we_re_not_ready)
- Gave, C. (2020). The fragility of a complex world. *Gavekal Research*.
- Greeven, M. J. & Yu, H. (2020, April 23). In a crisis, ecosystem businesses have a competitive advantage. *Harvard Business Review*. <https://hbr.org/2020/04/in-a-crisis-ecosystem-businesses-have-a-competitive-advantage>
- Ghose, S. (2020, April 21). Crisis as catalyst: The COVID-19 impact on innovation. *Sutardja Center for Entrepreneurship & Technology, Berkeley University of California*. <https://scet.berkeley.edu/crisis-as-catalyst-the-covid-19-impact-on-innovation/>
- Ghoshal, S. (1987). Global strategy: An organizing framework. *Strategic Management Journal*, 8(5), 425-440. <https://doi.org/10.1002/smj.4250080503>
- Giachetti, C. & Torrisi, S. (2018). Following or running away from the market leader? The influences of environmental uncertainty and market leadership. *European Management Review*, 15(3), 445-463. <https://doi.org/10.1111/emre.12130>
- Gupta, R., Schmidt, C. T., Hrishikesh, H. & Li, N. (2020, May 15). Reduce IT cost, not talent, at a time of disruption. *Boston Consulting Group*. <https://www.bcg.com/publications/2020/reduce-information-technology-cost-not-talent.aspx>
- Haacker, M. (2002). Modeling the macroeconomic impact of HIV/AIDS. *IMF Working Papers*, 195. <https://www.imf.org/external/pubs/ft/wp/2002/wp02195.pdf>
- Haghani, S. (2020, April 3). Improved earnings in crisis situations like Corona. *Roland Berger*. <https://www.rolandberger.com/en/Point-of-View/Improved-earnings-in-crisis-situations-like-Corona.html>
- Haleblian, J. & Finkelstein, S. (1993). Top management team size, CEO dominance, and firm performance: The moderating role of environmental turbulence and discretion. *Academy of Management Journal*, 36(4), 844-863. <https://doi.org/10.2307/256761>
- Hambrick, D., MacMillan, I. & Day, D. (1982). Strategic attributes and performance in the BCG matrix - a PIMS-based analysis of industrial product businesses. *Academy of Management Journal*, 25, 510-531. <https://doi.org/10.5465/256761>

- Hambrick, D. C. (1982). Environmental scanning and organizational strategy. *Strategic Management Journal*, 3(2), 159-172. <https://doi.org/10.1002/smj.4250030207>
- Hambrick, D. C. (1983). Some tests of the effectiveness and functional attributes of Miles and Snow's strategic types. *Academy of Management Journal*, 26(1), 5-26. <https://doi.org/10.5465/256132>
- Hamel, G. (2000). *Leading the revolution*. Harvard Business School Press.
- Hamilton, R. T. & Shergill, G. S. (1992). The relationship between strategy-structure fit and financial performance in New Zealand: Evidence of generality and validity with enhanced controls. *Journal of Management Studies*, 29(1), 95-113. <https://doi.org/10.1111/j.1467-6486.1992.tb00654.x>
- Hanna, P. (2012). Using internet technologies (such as Skype) as a research medium: A research note. *Qualitative Research*, 12(2), 239-242. <https://doi.org/10.1177/1468794111426607>
- Haren, P. & Simchi-Levi, D. (2020, February 28). How Coronavirus could impact the global supply chain by mid-March. *Harvard Business Review*. <https://hbr.org/2020/02/how-coronavirus-could-impact-the-global-supply-chain-by-mid-march>
- Hatch, J. A. (2002). *Doing qualitative research in education settings*. SUNY Press.
- Hawawini, G., Subramanian, V. and Verdin, P. (2003). Is performance driven by industry-or firm-specific factors? A new look at the evidence. *Strategic Management Journal*, 24(1), 1-16. <https://doi.org/10.1002/smj.278>
- Heerkens, C. N. & van der Heijden, B. (2011). Importance of assessment decision attributes: A qualitative study comparing experts and laypersons. *Management Decision*, 49(5), 748-761. <https://doi.org/10.1108/00251741111130832>
- Helfat, C. E. & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal*, 36(6), 831-850. <https://doi.org/10.1002/smj.2247>
- Hough, J. R. & White, M. A. (2003). Environmental dynamism and strategic decision-making rationality: An examination at the decision level. *Strategic Management Journal*, 24(5), 481-489. <https://doi.org/10.1002/smj.303>

- Hsu, L. Y., Chia, P. Y. & Lim, J. F. Y. (2020). The novel coronavirus (SARS-CoV-2) epidemic. *National University of Singapore, Working Paper*. [http://www.annals.edu.sg/pdf/special/01ED20051\\_HsuLY\\_1.pdf](http://www.annals.edu.sg/pdf/special/01ED20051_HsuLY_1.pdf)
- Hyams, K. C., Murphy, F. M. & Wessely, S. (2002). Responding to chemical, biological or nuclear terrorism: The indirect and long-term health effects may present the greatest challenge. *Journal of Health Politics, Policy and Law*, 27(2), 273-291. <https://doi.org/10.1215/03616878-27-2-273>
- ILO. (2020, May 18). A policy framework for tackling the economic and social impact of the COVID-19 crisis. *International Labour Organization*. [https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/briefingnote/wcms\\_745337.pdf](https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/briefingnote/wcms_745337.pdf)
- Ilut, C. & Schneider, M. (2014). Ambiguous business cycles. *American Economic Review*, 104(8), 2368-2399. <https://doi.org/10.1257/aer.104.8.2368>
- IMF. (2014). Global health threats of the 21<sup>st</sup> century. *Finance & Development*, 51(4), 16-19.
- Jauch, L. R. & Kraft, K. L. (1986). Strategic management of uncertainty. *Academy of Management Review*, 11(4), 777-790. <https://doi.org/10.2307/258396>
- John Hopkins University. (2020, June 11). COVID-19 dashboard by the center for systems science and engineering. *John Hopkins University*. <https://coronavirus.jhu.edu/map.html>
- Johnson, M. W., Christensen, C. M. & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*.
- Jones, L. Brown, D. & Palumbo, D. (2020, April 30). Coronavirus: A visual guide to the economic impact. *BBC News*. <https://www.bbc.com/news/business-51706225>
- Judge, W. Q. & Miller, A. (1991). Antecedents and outcomes of decision speed in different environmental contexts. *Academy of Management Journal*, 34(2), 449-463. <https://doi.org/10.5465/256451>
- Kahneman, D. & Klein, G. (2009). Conditions for intuitive expertise. *American Psychologist*, 64(6), 515-526. <https://doi.org/10.1037/a0016755>
- Kahneman, D. & Tversky, A. (1982). Variants of uncertainty. *Cognition*, 11(2), 143-157. [https://doi.org/10.1016/0010-0277\(82\)90023-3](https://doi.org/10.1016/0010-0277(82)90023-3).
- Kaizer, F. (2020, May 3). COVID-19 pandemic exposes global frailties and inequalities. *UN News*. <https://news.un.org/en/story/2020/05/1063022>

- Kaplan, S. (2008). Framing contests: Strategy making under uncertainty. *Organization Science*, 19(5), 729-752. <https://doi.org/10.1287/orsc.1070.0340>
- Kapoor, K. K., Tamilmani, K., Rana, N. P. Patil, P., Dwivedi, Y. K. & Nerur, S. (2018). Advances in social media research: Past, present and future. *Information System Frontiers*, 20, 531-558. <https://doi.org/10.1007/s10796-017-9810-y>
- Kelp, R. & Becker, H. (2020). Managing costs in times of COVID-19. *Oliver Wyman*. <https://www.oliverwyman.com/our-expertise/insights/2020/apr/managing-costs-in-times-of-covid-19.html>
- Keienburg, G., Kengelbach, J., Neumann, L. & Thomas, K. (2020, May 13). Navigating merger clearance during crisis. *Boston Consulting Group*. <https://www.bcg.com/publications/2020/navigating-merger-clearance-during-covid-19-crisis.aspx>
- Keynes, J. M. (1937). The general theory of employment. *The Quarterly Journal of Economics*, 51(2), 209-223. <https://doi.org/10.2307/1882087>
- Kim, Y. C. (2018). Alibaba: Jack Ma's unique growth strategy and the future of its global development in the Chinese digital business industry. In: Kim, Y. C. & Chen, P. C. *The digitization of business in China*. Palgrave Macmillan.
- Knight, F. (1921). *Risk, uncertainty, and profit*. Houghton Mifflin.
- KPMG. (2020a, May 14). Government and institution measures in response to COVID-19. *KPMG*. <https://home.kpmg/xx/en/home/insights/2020/04/oecd-government-and-institution-measures-in-response-to-covid.html>
- KPMG. (2020b, April 8). Supply chain's new world order: COVID-19 and the acceleration of economic nationalism. *KPMG*. <https://advisory.kpmg.us/content/dam/advisory/en/pdfs/2020/economic-nationalism-supply-chain-covid-19.pdf>
- Krishnan, H. A. (2009). What causes turnover among women on top management teams?. *Journal of Business Research*, 62(11), 1181-1186. <https://doi.org/10.1016/j.jbusres.2008.09.001>
- Larson, B. Z., Vronman, S. R. & Makarlus, E. E. (2020, March 18). A guide to managing your (newly) remote workers. *Harvard Business Review*. <https://hbr.org/2020/03/a-guide-to-managing-your-newly-remote-workers>

- Lawrence, P. R. & Lorsch, J. W. (1967). *Organization and environment*. Harvard Business School.
- Lee, J. & McKibbin, W. (2004). Estimating the global economic costs of SARS. In Knobler, S., Mahmoud, A., Lemon, S., Mack, A. Sivitz, L. & Oberholtzer, K. *Learning from SARS: Preparing for the next outbreak*. The National Academics Press.
- Leech, N. L. & Onwuegbuzie, A. J. (2007). An array of qualitative data analysis tools: A call for data analysis triangulation. *School of Psychology Quarterly*, 22(4), 557-584. <https://doi.org/10.1037/1045-3830.22.4.557>
- Lees, N. (2020, May 07). Scientific research on the Coronavirus is being released in a torrent. *The Economist*. <https://www.economist.com/science-and-technology/2020/05/07/scientific-research-on-the-coronavirus-is-being-released-in-a-torrent>
- Levere, J. L. (2020, April 20). Business travel has stopped. No one knows when it will come back. *The New York Times*. <https://www.nytimes.com/2020/04/20/business/business-travel-coronavirus.html>
- Levy, D. (1994). Chaos theory and strategy: Theory, application, and managerial implications. *Strategic Management Journal*, 15(2), 167-178. <https://doi.org/10.1002/smj.4250151011>
- Li, S. & Tallman, S. (2011). MNC strategies, exogenous shocks, and performance outcomes. *Strategic Management Journal*, 32(10), 1119-1127. <https://doi.org/10.1002/smj.918>
- Li, Y., Vanhaverbeke, W. & Schoenmakers, W. (2008). Exploration and exploitation in innovation: Reframing the interpretation. *Creativity and Innovation Management*, 17(2), 107-126. <https://doi.org/10.1111/j.1467-8691.2008.00477.x>
- Lorenz, E. N. (1963). Deterministic nonperiodic flow. *Journal of the Atmospheric Sciences*, 20(2), 130-141. [https://doi.org/10.1175/1520-0469\(1963\)020<0130:DNF>2.0.CO;2](https://doi.org/10.1175/1520-0469(1963)020<0130:DNF>2.0.CO;2)
- Luedi, T. & Liu, H. (2020, March 04). Coronavirus accelerates the transformation of China's meat supply chain. *Bain & Company*. <https://www.bain.com/insights/the-coronavirus-is-accelerating-the-transformation-of-chinas-meat-supply-chain/>
- Lueg, R. & Borisov, B. G. (2014). Archival or perceived measures of environmental uncertainty? Conceptualization and new empirical evidence. *European Management Journal*, 32(4), 658-671. <https://doi.org/10.1016/j.emj.2013.11.004>



- Luo, H. & Galasso, A. (2020, May 07). The one good thing caused by COVID-19: Innovation. *Harvard Business School Working Knowledge*. <https://hbswk.hbs.edu/item/the-one-good-thing-caused-by-covid-19-innovation>
- Lyles, M. A. & Schwenk, C. R. (1992). Top management, strategy and organizational knowledge structures. *Journal of Management Studies*, 29(2), 155-174. <https://doi.org/10.1111/j.1467-6486.1992.tb00658.x>
- Mance, H. (2020, March 06). Will Coronavirus change how we live?. *Financial Times*. <https://www.ft.com/content/8044788c-5e05-11ea-b0ab-339c2307bcd4>
- Mandelbrot, B. B. & Hudson, R. L. (2010). *The (mis)behaviour of markets: A fractal view of risk, ruin and reward*. Profile Books.
- Mani, M. M. (2020, March 19). Cutting costs in the current crisis: Is it the right time and how far do we go? *Strategy&*. <https://www.strategyand.pwc.com/de/de/implications-of-covid-19/cutting-costs.html>
- March, J. G. (1981). Footnotes to organizational change. *Administrative Science Quarterly*, 26(4), 563-577. <https://doi.org/10.2307/2392340>
- March, J. G. & Feldman, M. S. (1981). Information in organizations as signals and symbols. *Administrative Science Quarterly*, 26(2), 171-186. <https://doi.org/10.2307/2392467>
- Markman, A. (2020, March 15). Slow down to make better decisions in crisis. *Harvard Business Review*. <https://hbr.org/2020/03/slow-down-to-make-better-decisions-in-a-crisis>
- Marshall, C. & Rossman, G. B. (1999). *Designing qualitative research* (3<sup>rd</sup> edition). Sage.
- Matusik, S. F. & Fitza, M. A. (2012). Diversification in the venture capital industry: Leveraging knowledge under uncertainty. *Strategic Management Journal*, 33(4), 407-426. <https://doi.org/10.1002/smj.1942>
- McAllister, C., Steffensen, D. J., Perrewé, P. L., Brooks, C. D. & Wang, G. (2020, May 21). How to cope with that ‘always-on’ feeling. *Harvard Business Review*. <https://hbr.org/2020/05/how-to-cope-with-that-always-on-feeling>
- McDaniel, S. W. & Kolari, J. W. (1987). Marketing strategy implications of the Miles and Snow strategic typology. *Journal of Marketing*, 51(4), 19-30. <https://doi.org/10.2307/1251245>

- McGahan, A. M. & Porter, M. E. (1997). How much does industry matter, really?. *Strategic Management Journal*, 18(51), 15-30. [https://doi.org/10.1002/\(SICI\)1097-0266\(199707\)18:1+<15::AID-SMJ916>3.0.CO;2-1](https://doi.org/10.1002/(SICI)1097-0266(199707)18:1+<15::AID-SMJ916>3.0.CO;2-1)
- McKibbin, W. & Fernando, R. (2020). The global impacts of COVID-19: Seven scenarios. *CAMA working paper series*. [https://www.brookings.edu/wp-content/uploads/2020/03/20200302\\_COVID19.pdf](https://www.brookings.edu/wp-content/uploads/2020/03/20200302_COVID19.pdf)
- McKibbin, W. & Sidorenko, A. (2006). Global macroeconomic consequences of pandemic influenza. *Lowy Institute Analysis*. <https://cama.crawford.anu.edu.au/pdf/working-papers/2006/262006.pdf>
- McKinsey & Company. (2020, June 01). COVID-19: Briefing materials: Global health and crisis response. *McKinsey & Company*. <https://www.mckinsey.com/~media/McKinsey/Business%20Functions/Risk/Our%20Insights/COVID%2019%20Implications%20for%20business/COVID%2019%20May%2027/COVID-19-Facts-and-Insights-June-1-vF.ashx>
- Meinhardt, R., Junge, S. & Weiss, M. (2018). The organizational environment with its measures, antecedents, and consequences: A review and research agenda. *Management Review Quarterly*, 68, 195-235. <https://doi.org/10.1007/s11301-018-0137-7>
- Meltzer, M. I., Cox, N. J. & Fukuda, K. (1999). The economic impact of pandemic influenza in the United States: Prioritizes for intervention. *Emerging Infectious Diseases*, 5(5), 659-671. <https://doi.org/10.3201/eid0505.990507>
- Meyer, A. D. (1982). Adapting to environmental jolts. *Administrative Science Quarterly*, 27(4), 515-537. <https://doi.org/10.2307/2392528>
- Michel, A. A. (2007). A distributed cognition perspective on newcomers' change processes: The management of cognitive uncertainty in two investment banks. *Administrative Science Quarterly*, 52(4), 507-557. <https://doi.org/10.2189/asqu.52.4.507>
- Miles, R. E., Snow, C. C. & Pfeffer, J. (1974). Organization-environment: Concepts and issues. *Industrial Relations*, 13(3), 244-264. <https://doi.org/10.1111/j.1468-232X.1974.tb00581.x>
- Miles, R. E. & Snow, C. C. (1978). *Organizational strategy, structure, and process*. West.

- Miller, K. D. (1992). A framework for integrated risk management in international business. *Journal of International Business Studies*, 23(2), 311-331. <https://doi.org/10.1057/palgrave.jibs.8490270>
- Miller, K. D. (1993). Industry country effects on managers' perceptions of environmental uncertainty. *Journal of International Business Studies*, 24(4), 693-794. <https://doi.org/10.1057/palgrave.jibs.8490251>
- Milliken, F. J. (1987). Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. *Academy of Management Review*, 12(1), 133-143. <https://doi.org/10.2307/257999>
- Mintzberg, H. (1973). *The nature of managerial work*. Harper & Row.
- Mintzberg, H. (1990). The design school: Reconsidering the basic premises of strategic management. *Strategic Management Journal*, 11(3), 171-195. <https://doi.org/10.1002/smj.4250110302>
- Mitchell, J. R., Shepherd, D. A. & Sharfman, M. P. (2011). Erratic strategic decisions: When and why managers are inconsistent in strategic decision making. *Strategic Management Journal*, 32(7), 683-704. <https://doi.org/10.1002/smj.905>
- Moll, N. (2020, April 16). Partnership and collaboration: The new normal in the fight against COVID-19. *European Federation of Pharmaceutical Industries and Associations*. <https://www.efpia.eu/news-events/the-efpia-view/blog-articles/partnership-and-collaboration-the-new-normal-in-the-fight-against-covid-19/>
- Nadkarni, S. & Barr, P. S. (2008). Environmental context, managerial cognition, and strategic action: An integrated view. *Strategic Management Journal*, 29(13), 1395-1427. <https://doi.org/10.1002/smj.717>
- Nafday, A. M. (2009). Strategies for managing the consequences of Black Swan events. *American Society of Civil Engineers*, 9(4), 191-197. [https://doi.org/10.1061/\(ASCE\)LM.1943-5630.0000036](https://doi.org/10.1061/(ASCE)LM.1943-5630.0000036)
- Nathan, A., Galbraith, G. L. & Grimberg, J. (2020). 2020's Black Swan: Coronavirus. *Goldman Sachs Global Investment Research*.
- NATO. (2002). Press conference by US secretary of defense Donald Rumsfeld. *NATO HQ*. <https://www.nato.int/docu/speech/2002/s020606g.htm>

- Neeley, T. (2020, March 16). 15 questions about remote work, answered. *Harvard Business Review*. <https://hbr.org/2020/03/15-questions-about-remote-work-answered>
- Neilsen, A. (1992). A new metaphor for strategic fit: All that jazz. *Leadership & Organization Development Journal*, 13(5), 3-6. <https://doi.org/10.1108/01437739210016222>
- Nutt, P. C. (1984). Types of organizational design processes. *Administrative Science Quarterly*, 29(3), 414-450. <https://doi.org/10.2307/2393033>
- OECD (2020a, March 02). OECD economic outlook: Interim report March 2020. *OECD Publishing*. <https://doi.org/10.1787/16097408>
- OECD. (2020b, April 29). COVID-29, crises and fragility. *OECD*. [https://read.oecd-ilibrary.org/view/?ref=131\\_131938-b9ys3suiav&title=COVID-19-Crises-and-Fragility](https://read.oecd-ilibrary.org/view/?ref=131_131938-b9ys3suiav&title=COVID-19-Crises-and-Fragility)
- OECD. (2020c, May 15). Coronavirus (COVID-19) and cultural and creative sectors: Impact, innovations and planning for post-crisis. *OECD*. <https://www.oecd.org/cfe/leed/culture-webinars.htm>
- OECD. (2020d, April 28). A systemic resilience approach to dealing with COVID-19 and future shocks. *OECD*. <http://www.oecd.org/coronavirus/policy-responses/a-systemic-resilience-approach-to-dealing-with-covid-19-and-future-shocks-36a5bdfb/>
- OECD. (2020f). Regulatory quality and COVID-19: Managing the risks and supporting the recovery. *OECD*. <http://www.oecd.org/regreform/regulatory-policy/regulatory-quality-and-covid-19-managing-the-risks-and-supporting-the-recovery.pdf>
- Oh, O., Agrawal, M. & Rao, H. R. (2013). Community intelligence and social media services: A rumor theoretic analysis of tweets during social crises. *MIS Quarterly*, 37(2), 407-426. <https://doi.org/10.25300/MISQ/2013/37.2.05>
- Orlik, A. & Veldkamp, L. (2014). Understanding uncertainty shocks and the role of Black Swans. NBER Working Papers 20445, National Bureau of Economic Research, Inc.
- Parnell, J. A. & Dent, E. B. (2009). The role of luck in the strategy-performance relationship. *Management Decision*, 47(6), 1000-1021. <https://doi.org/10.1108/00251740910966703>
- Parnell, J. A., Lester, D. L. & Menefee, M. L. (2000). Strategy as a response to organizational uncertainty: An alternative perspective on the strategy-performance relationship. *Management Decision*, 38(8), 520-530. <https://doi.org/10.1108/00251740010352811>

- Pastor, L. & Versonesi, P. (2012). Uncertainty about government policy and stock prices. *Journal of Finance*, 67(4), 1219-1264. <https://doi.org/10.1111/j.1540-6261.2012.01746.x>
- Peeri, N., Shrestha, N., Rahman, M. S., Zaki, R., Tan, Z., Bibi, S., Baghbanzadeh, M., Aghamohammadi, N., Zhang, W. & Haque, U. (2020). The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: What lessons have we learned? *International Journal of Epidemiology*, 1-10. <https://doi.org/10.1093/ije/dyaa033>
- Peiris, J. S., Guan, Y. & Yuen, K. Y. (2004). Severe acute respiratory syndrome. *Nature Medicine*, 10(12), 88-97. <https://doi.org/10.1038/nm1143>
- Perez, M. G. (2020, March 24). Orange juice is back in fashion with biggest rally since 2015. *Bloomberg*. <https://www.bloomberg.com/news/articles/2020-03-24/orange-juice-is-back-in-fashion-with-biggest-rally-since-2015>
- Pfeffer, J. & Salancik, G. R. (1978). *The external control of organizations*. Harper & Row.
- Pondeville, S., Swaen, V. & De Rongé, Y. (2013). Environmental management control systems: The role of contextual and strategic factors. *Management Accounting Research*, 24(4), 317-332. <https://doi.org/10.1016/j.mar.2013.06.007>
- Porsche Consulting. (2020). How the COVID-19 pandemic is changing the consumer goods landscape. *Porsche Consulting*. [https://www.porsche-consulting.com/fileadmin/docs/01\\_Leistungen/COVID-19/How\\_the\\_COVID19\\_pandemic\\_is\\_changing\\_the\\_consumer\\_goods\\_landscape.pdf](https://www.porsche-consulting.com/fileadmin/docs/01_Leistungen/COVID-19/How_the_COVID19_pandemic_is_changing_the_consumer_goods_landscape.pdf)
- Porter, M. E. (1980). *Competitive strategy*. Free Press.
- Porter, M. E. (1990). *The competitive advantage of nations*. Free Press.
- Porter, M. E. (1996). What is strategy?. *Harvard Business Review*, 74 (6), 61-78.
- Porter, M. E. (2008). The five competitive forces that shape strategy. *Harvard Business Review*.
- Prahalad, C. K. & Bettis, R. A. (1986). The dominant logic: A new linkage between diversity and performance. *Strategic Management Journal*, 7(6), 485-501. <https://doi.org/10.1002/smj.4250070602>
- Priem, R. L., Love, L. G. & Shaffner, M. A. (2002). Executives' perceptions of uncertainty sources: A numerical taxonomy and underlying dimensions. *Journal of Management*, 28(6), 725-746. <https://doi.org/10.1177/014920630202800602>

- PWC. (2020a, April 14). COVID-19: Protecting and nurturing organizational culture among your workforce. *PWC*. <https://www.pwc.ie/issues/covid-19/protecting-nurturing-organisational-culture-work-force.html>
- PWC. (2020b). COVID-19: Finance and liquidity: Managing cash pressures due to Coronavirus disruptions. *PWC*. <https://www.pwc.com/us/en/library/covid-19/finance-liquidity.html>
- Quinn, J. B. (1980). *Strategies for change: Logical incrementalism*. R. D. Irwin.
- Rachman, G. (2020, March 23). Nationalism is a side effect of Coronavirus. *Financial Times*. <https://www.ft.com/content/644fd920-6cea-11ea-9bca-bf503995cd6f>
- Radzicki, M. J. (1990). Institutional dynamics, deterministic chaos, and self-organizing systems. *Journal of Economic Issues*, 24(1), 57-102. <https://doi.org/10.1080/00213624.1990.11505001>
- Rajagopal, R. (2015). *The butterfly effect in competitive markets: Driving small changes for large differences*. Springer.
- Rasheed, A. M. A. & Prescott, J. E. (1992). Towards an objective classification scheme for organizational task environments. *British Journal of Management*, 3(4), 197-206. <https://doi.org/10.1111/j.1467-8551.1992.tb00045.x>
- Raynor, M. (2007). *The strategy paradox: Why committing to success leads to failure (and what to do about it)*. Doubleday.
- Reeves, M., Carlsson-Szlezak, P., Whitaker, K. & Abraham, M. (2020, April 03). Sensing and shaping the post-COVID era. *Boston Consulting Group*. <https://www.bcg.com/publications/2020/8-ways-companies-can-shape-reality-post-covid-19.aspx>
- Reeves, M. & Fuller, J. (2020, April 10). We need imagination now more than ever. *Harvard Business Review*. <https://hbr.org/2020/04/we-need-imagination-now-more-than-ever>
- Reeves, M., Lang, N. & Carlsson-Szlezak, P. (2020, February 27). Lead your business through the Coronavirus crisis. *Harvard Business Review*. <https://hbr.org/2020/02/lead-your-business-through-the-coronavirus-crisis>
- Rehberg, B., Danoesastro, M., Kaul, S. & Stutts, L. (2020, March 24). How to remain remotely agile through COVID-19. *Boston Consulting Group*. <https://www.bcg.com/de-de/publications/2020/remaining-agile-and-remote-through-covid.aspx>

- Renjen, P. (2020, April 22). The essence of resilient leadership: Business recovery from COVID-19. *Deloitte*. <https://www2.deloitte.com/global/en/insights/economy/covid-19/guide-to-organizational-recovery-for-senior-executives-heart-of-resilient-leadership.html>
- Rivera, S., Robu, K., Simmons, V. & Singhal, S. (2020, May 29). Reopening safely: Sample practices from essential businesses. *McKinsey & Company*. <https://www.mckinsey.com/business-functions/risk/our-insights/reopening-safely-sample-practices-from-essential-businesses>
- Roland Berger. (2020a, April 01). Flying with the black swans: Operational contribution to the way through and out of the coronavirus crisis. *Roland Berger*. <https://www.rolandberger.com/de/Point-of-View/An-Operational-Response-To-The-Coronavirus-Crisis.html>
- Roland Berger. (2020b, April 02). Digital workplace in the era of COVID-19: How the current crisis will change the culture of our work. *Roland Berger*. <https://www.rolandberger.com/en/Point-of-View/Digital-workplace-in-the-era-of-Covid-19.html>
- Ronda, W. C., Varughese, M. B., Han, D. & Li, M. Y. (2020). Why is it difficult to accurately predict the COVID-19 epidemic?. *Infectious Disease Modelling*, 5, 271-281. <https://doi.org/10.1016/j.idm.2020.03.001>
- Rothe, C., Schunk, M., Sothmann, P., Bretzel, G., Froeschl, G., Wallrauch, C., Zimmer, T., Thiel, V. & Janke, C. (2020). Transmission of 2019-nCoV infection from an asymptomatic contact in Germany, *New England Journal of Medicine*, 382, 970-971. <https://doi.org/10.1056/NEJMc2001468>
- Ruekert, R. W. & Walker, O. C. (1987). Interactions between marketing and R&D departments in implementing different business strategies. *Strategic Management Journal*, 8(3), 233-248. <https://doi.org/10.1002/smj.4250080303>
- Rumelt, R. P. (1980). The evaluation of business strategy. In Glueck, W., *Business policy and strategic management*. McGrawHill Publishing.
- Rumelt, R. P. (1991). How much does industry matter?. *Strategic Management Journal*, 12(3), 167-185. <https://doi.org/10.1002/smj.4250120302>

- Saenz, H. & O’Keeffe, D. (2020, April 10). COVID-19: Protect, recover and retool. *Bain & Company*. <https://www.bain.com/insights/covid-19-protect-recover-and-retool/>
- Saenz, H., O’Keeffe, D., Harris, K., van Biesen, T., Hazan, J., Ledingham, D. & Anderson, N. (2020, May 21). Back to work: Recovery from COVID-19 will require resilience as companies advance, retreat, adapt and repeat as necessary. *Bain & Company*. <https://www.bain.com/insights/covid-19-back-to-work-advance-retreat-adapt-repeat/>
- Salazar, P. M., Niehus, R., Taylor, A., Buckee, C. O. & Lipstich, M. (2020). Using predicted imports of 2019-nCoV cases to determine locations that may not be identifying all imported cases. *medRxiv*. <https://doi.org/10.1101/2020.02.04.20020495>
- Sandhu, M. (2020, March 19). Decision-making in the time of a pandemic. *Financial Times*. <https://www.ft.com/content/c614480f-9a04-49fa-9ad2-bd9481493eb0>
- Saunders, M., Lewis, P. & Thornhill, A. (2009). *Research methods for business students*. Financial Times Prentice Hall.
- Sawyer, O. O. (1993). Environmental uncertainty and environmental scanning activities of Nigerian manufacturing executives: A comparative analysis. *Strategic Management Journal*, 14 (4), 287-299. <https://doi.org/10.1002/smj.4250140405>
- Schatteman, O., Woodhouse, D. & Terino, J. (2020, April 27). Supply chain lessons from COVID-19: Time to refocus on resilience. *Bain & Company*. <https://www.bain.com/insights/supply-chain-lessons-from-covid-19/>
- Schmalensee, R. (1985). Do markets matter much? *The American Economic Review*, 75(3), 341-351.
- Schneider, S. C. & De Meyer, A. (1991). Interpreting and responding to strategic issues: The impact of national culture. *Strategic Management Journal*, 12(4), 307-320. <https://doi.org/10.1002/smj.4250120406>
- Schoenbaum, S. C. (1987). Economic impact of influenza. The individual’s perspective. *American Journal of Medicine*, 92(6), 26-30. [https://doi.org/10.1016/0002-9343\(87\)90557-2](https://doi.org/10.1016/0002-9343(87)90557-2)
- Scott, W. R. (1987). The adolescence of institutional theory. *Administrative Science Quarterly*, 32(4), 493-511. <https://doi.org/10.2307/2392880>
- Senge, P. (2004). *The art and practice of the learning organization*. Doubleday.



- Shiller, R. J. (2020, May 29). Why we can't foresee the pandemic's long-term effects. *The New York Times*. <https://www.nytimes.com/2020/05/29/business/coronavirus-economic-forecast-shiller.html>
- Slangen, A. H. L. & van Tulder, R. J. M. (2009). Cultural distance, political risk, or governance quality? Towards a more accurate conceptualization and measurement of uncertainty in foreign entry mode research. *International Business Review*, 18(3), 276-291. <https://doi.org/10.1016/j.ibusrev.2009.02.014>
- Smith, S., Hirt, M., Buehler, K., Lund, S., Greenberg, E. & Govindarajan, A. (2020, March 23). Safeguarding our lives and our livelihoods: The imperative of our time. *McKinsey & Company*. <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/safeguarding-our-lives-and-our-livelihoods-the-imperative-of-our-time>
- Snow, C. C. & Hrebiniak, L. G. (1980). Strategy, distinctive competence and organizational performance. *Academy of Management Review*, 25(2), 317-336. <https://doi.org/10.2307/2392457>
- Snowden, D. J. & Boone, M. (2007). A leader's framework for decision making. *Harvard Business Review*, 85, 69-76.
- Sooklal, J., Rahuman, A. & Franzl, F. (2020). COVID-19: A treasurer's liquidity management action plan. *Oliver Wyman*. [https://www.oliverwyman.com/content/dam/oliverwyman/v2/publications/2020/March/COVID-19\\_A\\_Treasurer%27s\\_Liquidity\\_Management\\_Action\\_Plan\\_Final.pdf](https://www.oliverwyman.com/content/dam/oliverwyman/v2/publications/2020/March/COVID-19_A_Treasurer%27s_Liquidity_Management_Action_Plan_Final.pdf)
- Spender, J. C. (2014). *Business strategy: Managing uncertainty, opportunity, & enterprise*. Oxford University Press.
- Staufen. (2020, May 14). Lessons from the COVID-19 pandemic: 55% of industrial companies are looking for new suppliers / emerging from the crisis with supply chain network management. *Staufen*. <https://www.staufen.ag/company/news-events/news/newsdetail/2020/05/lessons-from-the-covid-19-pandemic-55-of-industrial-companies-are-looking-for-new-suppliers-emer/>
- Strack, R., Kugel, J., Dyrchs, S. & Tauber, M. (2020, May 07). Leadership in the new now. *Boston Consulting Group*. <https://www.bcg.com/de-de/publications/2020/leadership-post-covid-19.aspx>

- Sui, A. & Wong, Y. C. R. (2004). Economic impact of SARS: The case of Hong-Kong. *Asian Economic Papers*, 3(1), 62-83. <https://doi.org/10.1162/1535351041747996>
- Sunstein, C. R. (1997). Bad deaths. *Journal of Risk and Uncertainty*, 14(3), 259-282. <https://doi.org/10.1023/A:1007792209554>
- Taleb, N. N. & Norman, J. (2020). Ethics of precaution: Individual and systemic risk. *New York University, working paper*.
- Taleb, N. N., Goldstein D. G. & Spitznagel, M. W. (2009). The six mistakes executives make in risk management. *Harvard Business Review*, 87, 78-81.
- Taleb, N. N. (2007). *The Black Swan: The impact of the highly improbable*. Random House Trade Paperbacks.
- Taneja, V., Morgan, H., Ganguly, R., Langione, M. & Dong, C. (2020, June 01). Ten tactics for ‘growth techs’ to survive, thrive and inspire. *Boston Consulting Group*. <https://www.bcg.com/de-de/publications/2020/growth-techs-develop-solutions-for-customer-needs.aspx>
- Tarki, A., Levy, P. & Weiss, J. (2020, March 20). The Coronavirus crisis doesn’t have to lead to layoffs. *Harvard Business Review*. <https://hbr.org/2020/03/the-coronavirus-crisis-doesnt-have-to-lead-to-layoffs>
- Teece, D. J. (2009). *Dynamic capabilities & strategic management: Organizing for innovation and growth*. Oxford University Press.
- Teece, D. J. & Leih, S. (2016). Uncertainty, innovation, and dynamic capabilities: An introduction. *California Management Review*, 58(4), 5-12. <https://doi.org/10.1525/cmr.2016.58.4.5>
- Teece, D. J., Peteraf, M. & Leih, S. (2016). Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. *California Management Review*, 58(4), 13-35. <https://doi.org/10.1525/cmr.2016.58.4.13>
- Teece, D. J., Pisano, G. & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7%3C509::AID-SMJ882%3E3.0.CO;2-Z)
- Tetlock, P. E. (2017). *Expert political judgement: How good is it? How can we know?*. Princeton University Press.

- The New York Times. (2020, April 24). When life felt normal: Your pre-pandemic moments. *The New York Times*. <https://www.nytimes.com/2020/04/24/world/coronavirus-before-pandemic-memories.html>
- The World Bank. (2006). Socioeconomic impact of HIV/AIDS in Ukraine. *The World Bank and The International HIV/AIDS Alliance in Ukraine*. [http://siteresources.worldbank.org/INTUKRAINE/Resources/328335-1147812406770/ukr\\_aids\\_eng.pdf](http://siteresources.worldbank.org/INTUKRAINE/Resources/328335-1147812406770/ukr_aids_eng.pdf)
- The World Bank. (2020, April 16). Poverty and distributional impacts of COVID-19: Potential Channels of impact and mitigating policies. *The World Bank*. <http://pubdocs.worldbank.org/en/980491587133615932/Poverty-and-distributional-impacts-of-COVID-19-and-policy-options.pdf>
- Thiéart, R. A. & Forgues, B. (1995). Chaos Theory and Organization. *Organization Science*, 6(1), 19-31. <https://doi.org/10.1287/orsc.6.1.19>
- Thomas, J. B., Clark, S. M. & Gioia, D. A. (1993). Strategic sensemaking and organizational performance: Linkages among scanning, interpretation, action, and outcomes. *Academy of Management Journal*, 36(2), 239-270. <https://doi.org/10.5465/256522>
- Thompson, J. D. (1967). *Organizations in action*. McGraw-Hill.
- Tordjman, K. L., Stein, J. Walus, S., Langkamp, D. & Manuelli, N. (2020, May 06). How to avoid the auto industry's looming price war. *Boston Consulting Group*. <https://www.bcg.com/publications/2020/avoid-auto-industry-price-war.aspx>
- Tung, R. L. (1979). Dimensions of organizational environments: An exploratory study of their impact on organizational structure. *Academy of Management Journal*, 22(4), 672-693. <https://doi.org/10.5465/255808>
- Tushman, M. & Romanelli, E. (1985). Organizational evolution: A metamorphosis model of convergence and reorientation. In Cummings, L. & Staw, B. *Research in organization behavior*. Elsevier.
- Tyrrell, D. A. & Bynoe, M. L. (1966). Cultivation of viruses from a high proportion of patients with colds. *The Lancet*, 287 (7428), 76-77. [https://doi.org/10.1016/S0140-6736\(66\)92364-6](https://doi.org/10.1016/S0140-6736(66)92364-6)
- UN. (2020a). Shared responsibility, global solidarity: Responding to the socio-economic impacts of COVID-19. *United Nations*. <https://www.un.org/sites/un2.un.org/files/>

sg\_report\_socio-economic\_impact\_of\_covid19.pdf?fbclid=IwAR3m46tjDdV47-Jy6\_h  
WT7nCBrts5p03gM5 qsz78-FtslukJsTWR7DyH\_UE

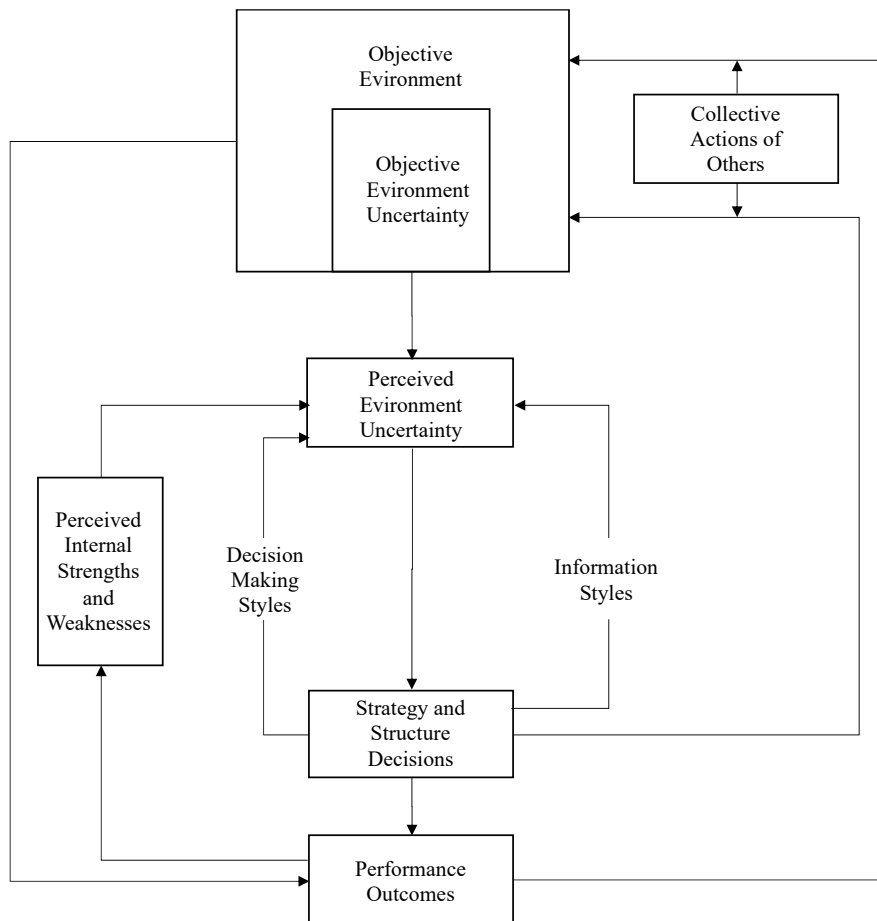
- UN. (2020b, May 15). The impact of COVID-19 on sports, physical activity and well-being and its effects on social development. *United Nations*. <https://www.un.org/development/desa/dspd/2020/05/covid-19-sport/>
- UNESCO. (2020). Fighting COVID-19 through digital innovation and transformation. *UNESCO*. <https://en.unesco.org/covid19/communicationinformationresponse/digitalinnovation>
- U.S. Department of Labor. (2020, June 11). Pandemic Unemployment Assistance Claims. *U.S. Department of Labor*. <https://www.dol.gov/ui/data.pdf>
- Van Huyck, J. B., Battalio, R. C. & Beil, R. O. (1990). Tacit coordination games, strategic uncertainty, and coordination failure. *The American Economic Review*, 80(1), 234-248.
- Vecchiato, R. (2012). Strategic foresight and environmental uncertainty: A research agenda. *Foresight*, 14(5), 387-400. <https://doi.org/10.1080/09537325.2012.715487>
- Velavan, T. P. & Meyer, C. G. (2020). The COVID-19 epidemic. *Tropical Medicine and International Health*, 25(3), 278-280. <https://doi.org/10.1111/tmi.13383>
- Verbeemen, E. & D'Amico, S. B. (2020, April 09). Why remote working will be the new normal, even after COVID-19. *EY*. [https://www.ey.com/en\\_be/covid-19/why-remote-working-will-be-the-new-normal-even-after-covid-19](https://www.ey.com/en_be/covid-19/why-remote-working-will-be-the-new-normal-even-after-covid-19)
- Walker, A. (2020, April 21). US oil prices turn negative as demand dries up. *BBC News*. <https://www.bbc.com/news/business-52350082>
- Weber, Y. & Tarba, S. Y. (2014). Strategic agility: A state of the art. *California Management Review*, 56(3), 5-12. <https://doi.org/10.1525%2Fcmr.2014.56.3.5>
- Weick, K. (2007). The generative properties of richness. *Academy of Management Review*, 50(1), 14-19. <https://doi.org/10.5465/amj.2007.24160637>
- Weidemeyer, F. (2020, April 16). COVID-19 crisis management: Ten better questions to ask. *EY*. [https://www.ey.com/en\\_si/covid-19/covid-19-crisis-management-essential-ten-better-questions-to-ask](https://www.ey.com/en_si/covid-19/covid-19-crisis-management-essential-ten-better-questions-to-ask)
- Wernerfelt, B. & Karnani, A. (1987). Competitive strategy under uncertainty. *Strategic Management Journal*, 8(2), 187-194. <https://doi.org/10.1002/smj.4250080209>

- Wideman, R. M. (1992). *Project and program risk management: A guide to managing project risk and opportunities*. Project Management Institute.
- Wiggins, R. T. & Ruefli, T. W. (2005). Schumpeter's ghost: Is hyper competition making the best times shorter? *Strategic Management Journal*, 26(10), 887-911. <https://doi.org/10.1002/smj.492>
- Wilkin, L. & Sutton, A. (1986). *The management of uncertainty: Approaches, methods and applications*. Martinus Nijhoff Publishers.
- WHO (2020a, January 20). Novel coronavirus (2019-nCoV), situation report 1. *World Health Organization*. [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10\\_4](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4)
- WHO. (2020b). Naming the coronavirus disease (COVID-19) and the virus that causes it. *World Health Organization*. [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it)
- WHO. (2020c, March 11). WHO director-general's opening remarks at the media briefing on COVID-19. *World Health Organization*. <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
- WHO. (2020d, March 18). Coronavirus disease situation 2019 (COVID-19), situation report - 58. *World Health Organization*. [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200318-sitrep-58-covid-19.pdf?sfvrsn=20876712\\_2](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200318-sitrep-58-covid-19.pdf?sfvrsn=20876712_2)
- WHO. [@World Health Organization]. (2020e, May 18). The fragility exposed by the Coronavirus is not limited to our health systems [Tweet]. *Twitter*. <https://twitter.com/WHO/status/1262367478874877954>
- Wolf, M. (2020, April 28). Coronavirus crisis lays bare the risks of financial leverage, again: This time it is capital markets, rather than banks, that have to reform. *Financial Times*. <https://www.ft.com/content/098dcd60-8880-11ea-a01c-a28a3e3fbd33>
- Worley, C. G., Williams, T., Lawler, E. E. & O'Toole, J. (2014). *The agility factor: Building adaptable organizations for superior performance*. Jossey-Bass.
- Woolston, C. (2020, June 02). Junior researchers hit by Coronavirus-triggered hiring freezes. *Nature*. <https://www.nature.com/articles/d41586-020-01656-3>

- Wright, P. (1987). A refinement of Porter's strategies. *Strategic Management Journal*, 8(1), 93-101. <https://doi.org/10.1002/smj.4250080108>
- WTO. (2020, April 08). Trade set to plunge as COVID-19 pandemic upends global economy. *World Trade Organization*. [https://www.wto.org/english/news\\_e/pres20\\_e/pr855\\_e.htm](https://www.wto.org/english/news_e/pres20_e/pr855_e.htm)
- Yin, R. K. (2003). *Case study research: Design and method* (3rd edition). Sage.
- Zanni, T. (2020, April 21). Technology supply chain disruption. *KPMG*. <https://home.kpmg/xx/en/blogs/home/posts/2020/04/technology-supply-chain-disruption.html>
- Zhao, Z. Hai, W., Wang, J. & Hou, Z. (2004). The short-term impact of SARS on the Chinese economy. *Asian Economic Papers*, 3(1), 57-61. <https://doi.org/10.1162/1535351041747905>
- Zhu, N., Zhang, D., Wang, W., Xingwang, L., Yang, B., Song, J., Zhao, X., Huang, B., Shi, W., Lu, R., Niu, P., Zhan, F., Ma, X., Wang, D., Xu, W., Wu, G., Gao, G. F., Tan, W. (2020). A novel coronavirus from patients with pneumonia in China, 2019. *New England Journal of Medicine*, 382, 727-733. <https://doi.org/10.1056/NEJMoa2001017>

# 11. Appendix

## Appendix 1: Model of Environmental Uncertainty



Source: Jauch and Kraft (1986)

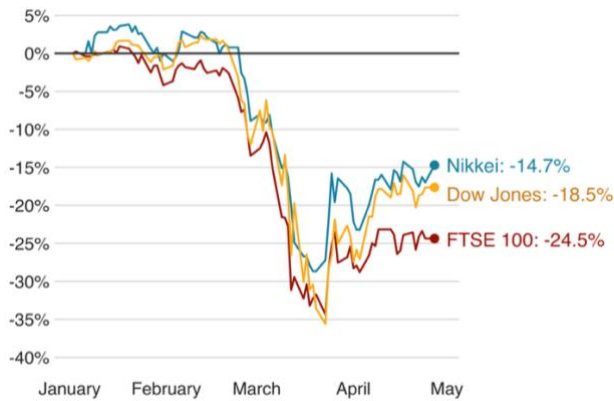
## Appendix 2: US 10-year Treasuries Reaches All-time Low



Source: Nathan, Galbraith, and Grimberg (2020)

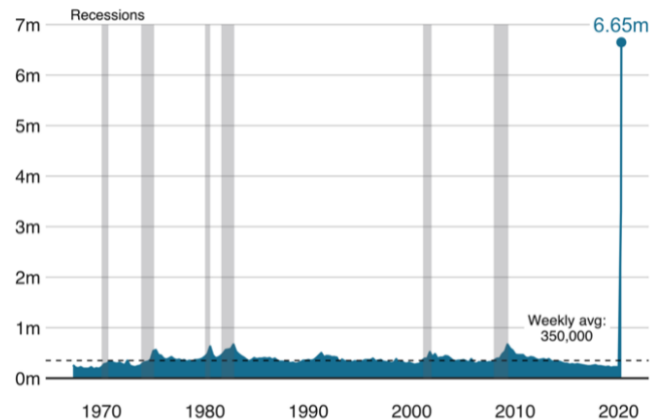
## Appendix 3: Economic Developments During the COVID-19 Crisis

### Appendix 3.1: Development of Stock Markets



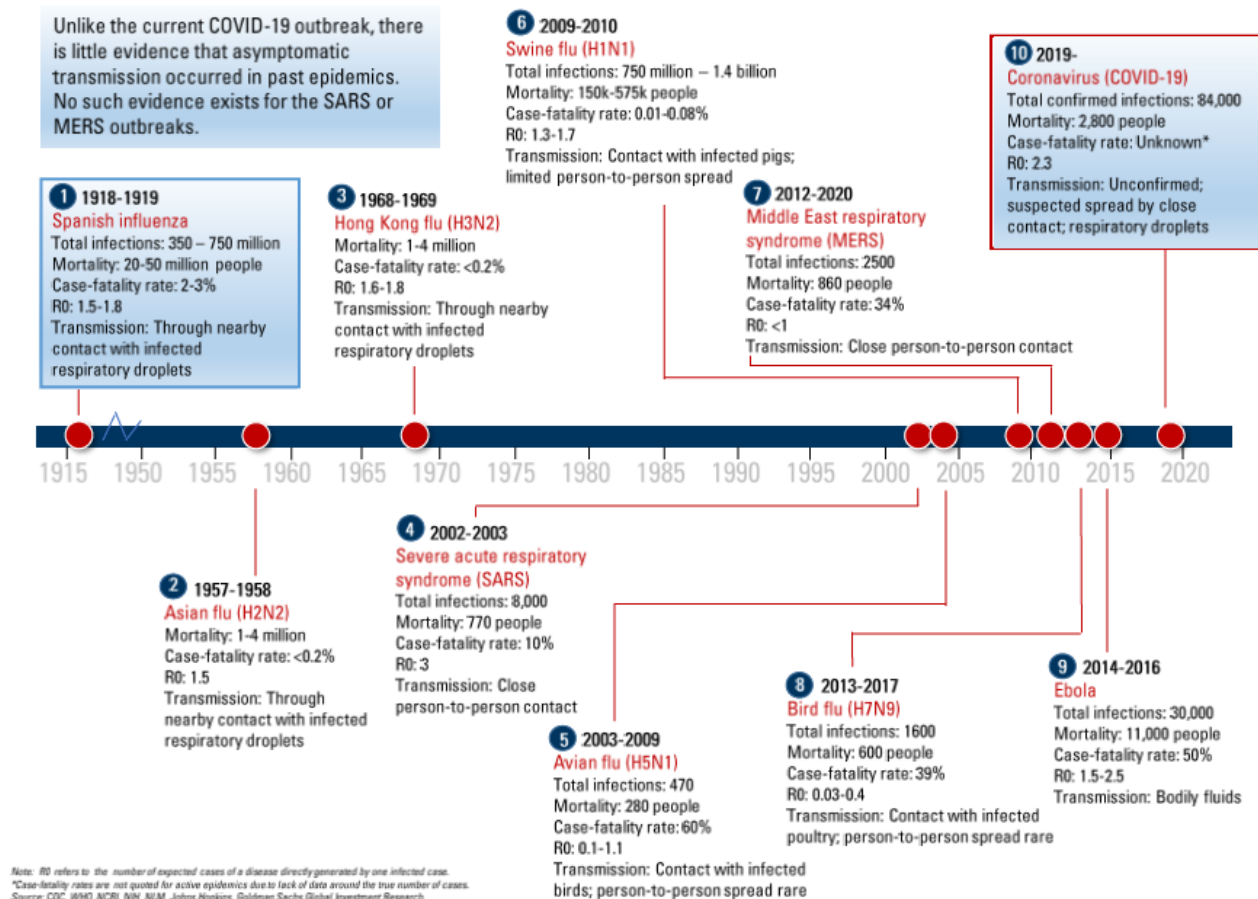
Source: Jones, Brown, and Palumbo (2020)

### Appendix 3.2: Surge in U.S. Unemployment Claims



Source: U.S. Department of Labor (2020)

## Appendix 4: History of Pandemics (COVID-19 Statistics Based on 28th of February)



Source: Nathan, Galbraith, and Grimberg (2020)

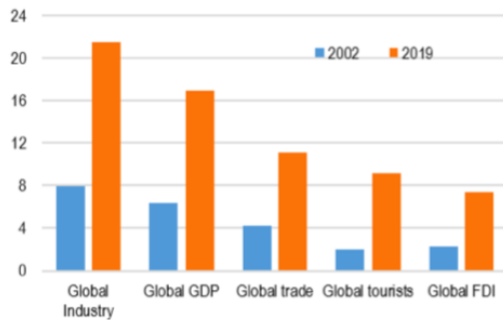


## Appendix 5: Comparison of COVID-19 to Other Global Contaminations

Similarities can be drawn between previous Black Swans in the form of other contagious viruses. Epidemic outbreaks of H5NI influenza in 2001, SARS in 2003, H1N1 influenza in 2009 and Ebola in 2014 have had lasting societal impacts (Chen *et al.* 2020). Several studies have been conducted to discover the macroeconomic effects of high fatality diseases such as HIV/AIDS (Cuddington & Hancock, 1994; Freire, 2004; The World Bank, 2006). Empirical findings propose enormous impacts of households, businesses and governments through reduced supply and efficiency of labor, and increased public expenditures (Haacker, 2002). Due to similar conditions that led to the explosive spread (for instance exposure to live animals at open markets, overcrowded conditions, lack of health infrastructure and general over-population) COVID-19 is often compared to SARS (Peeri, *et al.*, 2020). Academic research has been conducted predominantly with a limited focus on Asian economies as for instance Taiwan (Chou *et al.*, 2004), China, (Zhao, Hai, Wang, & Hou, 2004) and Hong Kong (Sui & Wong, 2004). Despite a small number of infections and deaths, the global economic costs were substantial also for countries not directly affected by the spread of SARS (Lee & McKibbin, 2004). Moreover, COVID-19 is also similar to MERS to the extent that some infected patients remain asymptomatic while still spreading the disease (Rothe *et al.*, 2020). Although health authorities have reacted more rapidly by implementing measures shortly after the first detected case, COVID-19 has spread more rapidly due to increased levels of globalization (Peeri, *et al.*, 2020).

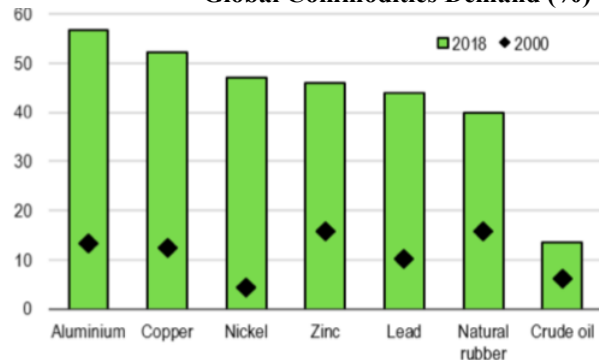
## Appendix 6: Chinas Increasing Share in the Global Economy

### Appendix 6.1: China Accounts for a Rising Share in Global Activity (% of world)



Source: OECD (2020)

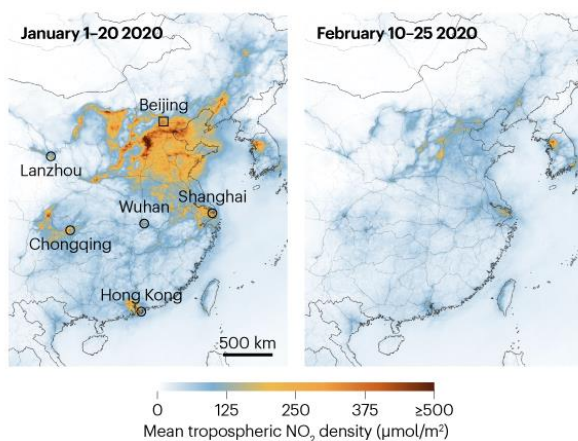
### Appendix 6.2: China Accounts for a Large Share of Global Commodities Demand (%)



Source: OECD (2020)

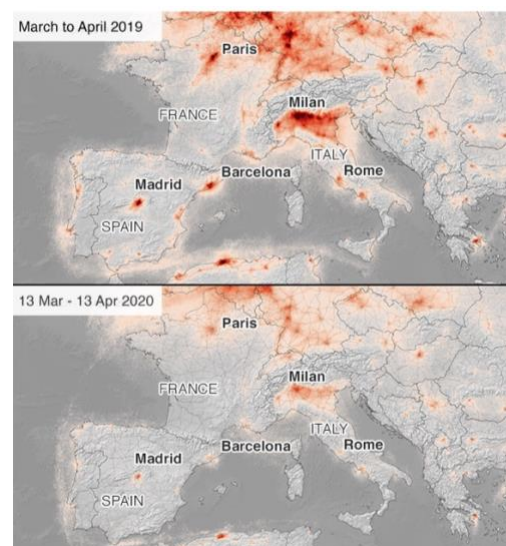
## Appendix 7: Reduction of Nitrogen Dioxide Pollution During COVID-19 Outbreak

### Appendix 7.1: Decreased Pollution Across China



Source: BBC (2020)

### Appendix 7.2: Decreased Pollution Across Europe



Jones, Brown, and Palumbo (2020)

## Appendix 8: Semi-Structured Interview Guide (Table 1)

Part	Academic Subject	Interview Question	Expected Answer
Interview introduction: Greetings, a short introduction of the researcher, explanation of the dissertation project, clarification of the interview structure			
A	Administration	<ul style="list-style-type: none"> <li>Do you wish to remain anonymous about your corporation or yourself?</li> </ul>	-
	Demographics	<ul style="list-style-type: none"> <li>For how long have you worked at [insert organization]?</li> <li>What is your current role in [insert organization]?</li> <li>What are your core responsibilities?</li> </ul>	-
B	Determine the perception of uncertainties related to COVID-19	<ul style="list-style-type: none"> <li>How has COVID-19 impacted your organization?</li> <li>How has [insert organization] responded to COVID-19?</li> </ul>	<p>The Coronavirus impacts operational and strategic firm activities</p> <p>Statements on re-organization &amp; ad-hoc crisis management measures</p>
	Generate further insights on how the COVID-19 crisis alters mental models on uncertainty	<ul style="list-style-type: none"> <li>What other effects do you expect to see due to COVID-19 in the [insert industry]?</li> <li>What matters related to COVID-19 have you noticed outside of your organization in your industry?</li> </ul>	<ul style="list-style-type: none"> <li>Renewal of organizational culture</li> <li>Supply Chain Localization</li> <li>Shifts in consumer behavior</li> <li>Creative solutions</li> </ul>
C	Outline characteristics of previously defined uncertainties	<ul style="list-style-type: none"> <li>Could you please describe your interpretation of [insert uncertainty area]?</li> <li>How do you identify [insert uncertainty area]?</li> <li>Why/ to what extent does this impact the future?</li> </ul>	-
	Derive distinction of first- and second-order uncertainties	<ul style="list-style-type: none"> <li>Over what time-horizon are we talking about?</li> <li>Has this matter already been a concern within your organization before COVID-19?</li> </ul>	All uncertainties are perceived to have long-term implications. But a concrete timeline cannot be determined
	Test whether COVID-19 raises awareness of antiknowledge	<ul style="list-style-type: none"> <li>Has this subject been addressed as a matter of high strategic importance before COVID-19?</li> <li>Has this subject been addressed as a matter of high strategic importance before COVID-19?</li> <li>How has COVID-19 increased your awareness of this issue?</li> </ul>	<p>The topic itself is expected as common knowledge, but direct impact on organizations is unknown or unclear</p> <p>Partially, project teams were engaged to develop the area but mostly separated from the day-to-day business</p> <p>Yes, COVID-19 acted as a 'wake-up' call and we recalled how fast competitive environments can change</p>
D	Detail the extent to which COVID-19 rises awareness of antiknowledge	<p>For a summary – please cluster the points discussed so far according to the following three categories:</p> <p>a) Subject was unknown before Coronavirus</p> <p>b) Subject was previously discussed but implementation has not started (perceived as too risky or not relevant)</p> <p>c) Subject and implementation were previously discussed but implementation has only started slowly</p> <p>How would you distribute percentages?</p>	<p>Majority of percentages attached to part b) as most uncertainties have been defined previously but have not yet been perceived as strategically relevant</p>
	Acquire insights that did not fit within the original research frame	<ul style="list-style-type: none"> <li>Is there anything else your organization learned from COVID-19 ?</li> <li>Besides your professional background, is there something particular you personally learned from the crisis?</li> <li>Any further comments about COVID-19 or about this interview?</li> </ul>	<p>[covered in part B &amp; C]</p> <p>Different prioritization of essentials of life leading to a shift in own consumer behavior</p> <p>-</p>
Conclusion: Thank you, discuss interest in receiving the results of the dissertation project, goodbye			

## Appendix 9: Demographic Overview of Research Participants (Table 2)

Participant	Position	Company	Industry
Alexander Drees	CEO	Walter Lang	Food & Beverages
Anthony Dickinson	Chief Revenue Officer	2MC	TIC (Testing, Inspection & Certification)
Dr. Clemens Schwerdtfeger	CEO	Dr. Schwerdtfeger Personalberatung	Consulting
Dr. Wilfried Kienzle	Global Strategy Officer	TÜV Rheinland	TIC (Testing, Inspection & Certification)
Gregory Glanzmann	Digital Transformation Manager	Anonym	Automotive
Johnny Sørensen	CEO & Founder	Fire & Shield	Consulting
Karen Frisch	Professor / Former Consulting Manager	UCP / McKinsey	Academics / NGO / Consulting
Katrine Brusgaard	Head of HR	MAN Energy Solutions	Engineering
Niels Heyer	CEO	Wiesenhof International	Meat Processing
Orlando Santos	Head of Legal, Tax & Treasury	Anonym	Automotive
Steve van Houten	Self-Employed / Semi-retired	Accord International / General Motors	Consulting / Automotive
Stuart Hardy	Freelance Consultant	New Cannibals	Consulting
Torsten Schneider	HR Director	Luther Rechtsanwaltsgesellschaft	Legal Services
Wilfried von Rath	Member of the Board	Volkswagen Group	Automotive
Anonymous 1	Senior Partner	Goll Consulting	Consulting
Anonymous 2	Senior Consultant	PwC	Consulting
Anonymous 3	Senior IT Auditor	DHL	Postal & Logistic Services
Anonymous 4	Client Relationship Manager	Uber	Transport & Logistic Services
Anonymous 5	CEO	Anonym	Energy (Biogas)
Anonymous 6	Senior Consultant	Boston Consulting Group	Consulting
Anonymous 7	HR Director	Anonym	Alcoholic Beverages
Anonymous 8	Partner	Anonym	Consulting
Anonymous 9	Controlling Manager	Tchibo	Food & Beverages / Retail
Anonymous 10	Personal Development Manager	Anonym	Banking
Anonymous 11	Lawyer (Commercial & Corporate Law)	Anonym	Legal Services
Anonymous 12	Sales Manager	Anonym	Automotive
Anonymous 13	Strategy & Operations Manager	Google	Technology
Anonymous 14	Partner	Anonym	Consulting
Anonymous 15	Deputy CEO	Anonym	Banking
Anonymous 16	Product Manager	Amazon	Technology
Anonymous 17	CEO	Anonym	Consulting
Anonymous 18	Assembly Manager	Volkswagen Autoeuropa	Automotive
Anonymous 19	Purchasing Manager	BMW Group	Automotive
Anonymous 20	HR Director EMEA	Anonym	Chemicals
Anonymous 21	Project Manager Strategy 2030	Anonym	Automotive
Anonymous 22	Assistant Manager	KPMG	Consulting

## Appendix 10: Data Analysis of the Uncertainty Dimensions

### Appendix 10.1: Uncertainty Dimensions Related to External Environment

#### Appendix 10.1.1: Economic Impact on Emerging Markets and Developing Countries (Table 3)

Economic Impact on Emerging Markets and Developing Countries	
Participant	Quote
Dr. Clemens Schwerdtfeger	<i>"Looking at Europe, I think Southern European countries are suffering a lot. They just came back from the crisis of 2008 e.g., Portugal and Spain. They did better the last years but now they are not very stable so I think they will be much more affected."</i>
Karen Frisch	<i>"And then who will suffer the most? The people that do not have savings. [...] Then again here in Portugal you have a social system that helps a little bit more. In Brazil, if that happens it is a total disaster."</i>
Anonymous 16	<i>"[From a medical perspective], I do not think that third world countries or emerging countries suffer more than developed countries, but I think the [economic] inequality is even more present now."</i>
External Data	<p><i>"Pandemics hit the most vulnerable people and societies hardest. COVID-19 is no exception. Emerging Asia is particularly vulnerable to both the public-health challenges of the pandemic and the economic consequences of failing to contain it. The region's countries have large populations, limited hospital capacity, and acute shortages of medical supplies and equipment. [...] The world now faces an inflection point. Governments, policy makers, and the private sector will be judged by their response to this moment of crisis. The informal, cash-based economies of emerging Asia and the unique vulnerabilities of its populations make resolute action more essential now than ever. The well-being of millions of people and of the societies where they live is at stake." (Daly, 2020)</i></p> <p><i>"COVID-19 has raced around the globe without regard for borders or the background of its victims, yet the pandemic is affecting consumers in emerging markets differently from their counterparts in mature markets. Emerging-market consumers are both fearful and guardedly optimistic." (Bharadwaj et al., 2020)</i></p> <p><i>"UN Deputy Secretary-General Amina Mohammed said that [...] COVID-19 is a threat multiplier. We have a health emergency, a humanitarian emergency and now a development emergency. These emergencies are compounding existing inequalities. In advanced economies, we're seeing higher rates of mortality among already marginalized groups. And in developing countries, the crisis will hit vulnerable populations even harder. Weak health systems won't be able to cope. Incomplete social protection systems risk seeing millions fall back into poverty. And governments with little economic firepower will not be able to cushion the impacts or recover quickly." (Kaizer, 2020)</i></p>

#### Appendix 13.1.2: Financial Recovery of the Economy (Table 4)

Financial Recovery of the Economy	
Participant	Quote
Dr. Clemens Schwerdtfeger	<i>"Especially the big firms will go to the government and say, 'we need more money' and of course the taxpayer has to refund that."</i>
Orlando Santos	<i>"Right now, the economies are pumping money in the economy. Lots of money. Money that has never ever been seen in the economy. The question is what is the scrutiny about this political decision? Do we know where the money goes? Well, we do not. That is a big black box."</i>
Steve van Houten	<i>"For societies and governments and tax authorities all this stuff has very major implications. I do not know the exact programs, but I know that many billions and billions of dollars have been spend. And eventually you either pay back the loan or you print money which causes inflation. One way or another this has to be dealt with."</i>
Anonymous 7	<i>"I still wonder, though, who pays the bill at the end of the day. [...] It sounds nice now, these billions and billions that are made available worldwide. But somebody has to pay the bill. And that's why I worry, what's going to happen on January 1st, when the finance minister says, 'now we'll think about how to get the money back'."</i>
Anonymous 9	<i>"At some time, the money must probably be paid back. That is now of course still a huge question that comes to us. This is now just the question from where does one tap it, from the customer, from companies or from rich people? I think this is a huge point."</i>
Anonymous 11	<i>"Let me give you an example: This Corona Act, which came into force at the end of March, suspends the obligation to file for insolvency. You know that a managing director or board of directors of a corporation, if he is unable to pay or over-indebted, has to file for insolvency - otherwise he is liable to prosecution. This provision has been suspended. It is not valid until 30.09.2020. After that there will be a wave of insolvency. I am quite pessimistic about this, because those who want to survive now are taking out loans, so they are only getting more into debt and of course not everything will be better by the deadline."</i>
Anonymous 12	<i>"We have put up a lot of rescue packages, which will have to be paid for at some point. For example, I go into a bar and order beer all evening. At some point I'll have to pay for it. I have a lot of fun, it helps me in the moment, but at some point, the bartender will say 'listen, you have to pay for the 30 beers too'. Then I say 'Wow, I can only pay 20 beers' and that will be our next challenge. After the crisis is before the next crisis. There is something else after it. Blue-eyed to say, 'when we get through this everything is back to normal'. No, that is wrong. We will have many economic issues; we will have financial issues. So, what comes after that will also occupy us for a very long time."</i>
Anonymous 15	<i>"Nobody knows about the recovery at the moment. There are only estimates."</i>
Anonymous 16	<i>"If an economic performance is lost and the salary is compensated by an increased unemployment benefit, then in the end the person does not have more money in his pocket, he only got the money he worked without. Strange signals are sent because normal market economy mechanisms simply do not exist. In my opinion, shares should fall significantly, but are rising precisely because measures are being taken that are even outside the mandates. A FED is actually not authorized to buy shares in the event of a catastrophe. An ECB is not actually authorized to buy unlimited government bonds in the event of a disaster. And yet it promises to do so. And therefore, I can imagine that the whole financial and economic system will become much more fragile."</i>
Anonymous 17	<i>"It will be very important that politics makes policy and sets framework conditions, but also gives the free play of forces in a social and regulated market economy opportunities again. So the social mood we have at the moment, which is being stirred up by politics according to the motto 'we will fix it, there is no upper limit, we will put together the right aid packages', on the one hand sets the right impulse according to the motto 'we care and do what we can' and on the other hand the impulse which is unrealistic. Politics will not be able to fix it."</i>

Anonymous 21	<i>“That means that someone [who was already struggling before the pandemic] can hardly take out a loan in this situation. And that is why I think that the effects that you see on this are, in the long run, already that much, even if the goal of the Federal Government was to avoid insolvencies as best as possible, if they are actually in Corona debt and the business model was not already unsustainable before, I think we will see some anyway.”</i>
External Data	<p><i>“The OECD issued a new report on April 15, 2020, summarizing measures implemented by jurisdictions to date and looking at how tax can be used in recovery efforts. In addition to taking stock of tax responses to the crisis, the OECD also looks at how tax can be used in future recovery efforts, with a focus on multilateral collaboration, while not excluding the introduction of exceptional tax measures.” (KPMG, 2020a)</i></p> <p><i>“To recover from the pandemic’s health and economic consequences, we must uphold the social contract—the implicit relationship between individuals and institutions. The market economy and the social fabric that holds it together will be deeply compromised, or perhaps undermined, if massive numbers of jobs are lost, vendors can’t fulfill their contracts, tenants can’t make their rent, borrowers’ default at scale, and taxes go unpaid.” (Cadena &amp; Ferrari-Haines, 2020)</i></p> <p><i>“Once the pandemic ends, countries around the world will probably find themselves more in debt than ever. If they restructure and innovate, attract investment, and increase their productivity, a new era of human development will begin. But if they spend haphazardly and imprudently, economic and social development might falter for decades to come.” (Cadena &amp; Ferrari-Haines, 2020)</i></p>

### Appendix 10.1.3: Individual Freedom vs. Society Interests (Table 5)

Individual Freedom vs. Society Interests	
Participant	Quote
Orlando Santos	<i>“There are other aspects of this case that I dislike, which is the reduction of society’s life. So, the risk of having measures that are going against your personal freedom is really significant. And I am really reluctant in accepting these measures. One thing is to advise you to stay at home, but the other thing is bringing the police to your house to check if you are leaving or not. That is over everything not acceptable in my opinion. So, personal freedom is something that I can see now, that can be blocked very easily by governments. And this is a risk for the societies as we see it.”</i>
Anonymous 5	<i>“I will not let any minister take away my freedom rights. Personal rights. They have been robbed and restricted.”</i>
Anonymous 6	<i>“It is important that everyone puts collective health above personal interests. I would really like to be outdoors somewhere or go to the mountains, but I just do not do that.”</i>
Anonymous 15	<i>“I get really shocked when I hear people talking. The stricter the measures more people appreciate the decision-makers. In Luxembourg, it is even worse. There they even suspended democracy and everyone thinks that’s great. [...] But in any case, the lockdown was easy to decide at first. The Chinese demonstrated what I did not believe they would actually do something like that. And then there was this herd instinct [to restrict individual freedom].”</i>
Anonymous 16	<i>“What irritates and worries me a bit is that I have the feeling that many debates are going in the wrong direction. So, there are currently many demonstrations against the restriction of certain freedoms. But what many people forget is that you also have a right to integrity. And this is also a fundamental right, and which also has priority over freedom. This is also defined in the same way in the fundamental rights and therefore all these protective measures are all in line with the fundamental rights. That is why politics has the opportunity to take such measures in the first place. Very often I have the feeling that in such debates individual interests are put before overall interests.”</i>
External Data	<i>“Precautionary decisions do not scale. Collective safety may require excessive individual risk avoidance, even if it conflicts with an individual’s own interests and benefits. It may require an individual to worry about risks that are comparatively insignificant. [...] There is a tradeoff short-term vs. long-term for idiosyncratic risk. Over the long run, there is convergence between idiosyncratic and systemic: Your risk rises if all others are infected and the risks of survival from other diseases drop.” (Taleb &amp; Norman, 2020)</i>

### Appendix 10.1.4: Inequality and Poverty (Table 6)

Inequality and Poverty	
Participant	Quote
Karen Frisch	<i>“I think the main thing that we are going to see is increasing poverty that will have immense impacts. It will reduce demand and most important is that we will see people deciding ‘I will risk taking the Coronavirus because otherwise I will definitely die, or my family will die of hunger at the end of the month’.”</i>
Anonymous 15	<i>“The other thing is that we are getting a blow against the middle class. The gap is going to widen even more. That is why I say that we cannot come out of this crisis stronger. That is never the case. The scissors have already come apart and there will [now] be another impediment.”</i>
Anonymous 16	<i>“On the one hand, there are millions of unemployed people and at the same time trillions are being pumped into the market to save some companies that are paying dividends at the same time. [...] For me, I think the biggest [uncertainty area] is [...] social inequality. The issue has always been there somewhere and in this extreme situation, it becomes even clearer. [From a medical perspective], I do not think that third world countries or emerging countries suffer more than developed countries, but I think the [economic] inequality is even more present now.”</i>
External Data	<p><i>“In addition to its immediate impact on health outcomes and, tragically, on lives, it is now clear that the coronavirus (COVID-19) outbreak is likely to have long-lasting economic and social impacts of global proportions stemming from the direct and indirect effects of illness, the preventive behaviors of people and the transmission control policies of governments.” (The World Bank, 2020)</i></p> <p><i>“UN Deputy Secretary-General Amina Mohammed said that [...] COVID-19 is a threat multiplier. We have a health emergency, a humanitarian emergency and now a development emergency. These emergencies are compounding existing inequalities. In advanced economies, we’re seeing higher rates of mortality among already marginalized groups. And in developing countries, the crisis will hit vulnerable populations even harder. Weak health systems won’t be able to cope. Incomplete social protection systems risk seeing millions fall back into poverty. And governments with little economic firepower will not be able to cushion the impacts or recover quickly.” (Kaizer, 2020)</i></p>

	<i>"Without long-term structural changes, the deep-rooted inequalities exposed by the crisis will merely intensify." (ILO, 2020)</i>
--	--

### Appendix 10.1.5: Long-term Economic Impact (Table 7)

Long-term Economic Impact	
Participant	Quote
Anthony Dickinson	<i>"But perhaps the biggest impact I think is in the acquisition of new business. Even though we are fairly well set up to work on existing projects and existing relationships creating new relationships digitally is harder."</i>
Karen Frisch	<i>"Because of the pandemic, I think in a little bit the economic crisis will hit very hard."</i>
Katrine Brusgaard	<i>"The long-term perspective may be more interesting and more unknown at the moment. The long-term consequences are what we are really curious about. At the moment we have still a lot of order handling. [...] So, in the long-term we are looking into many ships will probably not change the engines but instead we will have to repair more. So, in the future, we may have to make more money on the repairment, but we will not sell as many engines. When I look at the financial crisis in 2008, we were not affected for the first 2 years. I think it was not until 2011 that we could see the actual impact. So, we are also suspecting a little bit now that everything looks fine, but how will it look like in a few years if this is the new financial crisis, which it looks like it is."</i>
Torsten Schneider	<i>"Because many things and damages are only just beginning to occur in companies now and the enforcement of rights or even claims for damages, that comes only afterward. That is one thing. And the other, of course, is the loss of mandates and if there is now an economic recession, it can also lead to job losses. Of course, this topic will occupy us for a very long time."</i>
Anonymous 1	<i>"The market for our business will shrink."</i>
Anonymous 12	<i>"One thing is clear: We are going to enter a recession. A pandemic is one thing and the consequences are another."  "We have put up a lot of rescue packages, which will have to be paid for at some point. For example, I go into a bar and order beer all evening. At some point I'll have to pay for it. I have a lot of fun, it helps me in the moment, but at some point, the bartender will say 'listen, you have to pay for the 30 beers too'. Then I say 'Wow, I can only pay 20 beers' and that will be our next challenge. After the crisis is before the next crisis. There is something else after it. Blue-eyed to say, 'when we get through this everything is back to normal'. No, that is wrong. We will have many economic issues; we will have financial issues. So, what comes after that will also occupy us for a very long time."</i>
Anonymous 13	<i>"I honestly believe that it will not influence us that much. I think it's going to affect us more positively because for example, our teams sell video conferencing and stuff like that. All this will be much more accepted now."</i>
Anonymous 16	<i>"A FED is actually not authorized to buy shares in the event of a catastrophe. An ECB is not actually authorized to buy unlimited government bonds in the event of a disaster. And yet it promises to do so. And therefore, I can imagine that the whole financial and economic system will become much more fragile."</i>
Anonymous 21	<i>"That means that someone [who was already struggling before the pandemic] can hardly take out a loan in this situation. And that is why I think that the effects that you see on this are, in the long run, already that much, even if the goal of the Federal Government was to avoid insolvencies as best as possible, if they are actually in Corona debt and the business model was not already unsustainable before, I think we will see some anyway."</i>
External Data	<i>Future trade performance as two distinct scenarios: (1) a relatively optimistic scenario, with a sharp drop in trade followed by a recovery starting in the second half of 2020, and (2) a more pessimistic scenario with a steeper initial decline and a more prolonged and incomplete recovery. Under the optimistic scenario, the recovery will be strong enough to bring trade close to its pre-pandemic trend [...], while the pessimistic scenario only envisages a partial recovery. Given the level of uncertainties, it is worth emphasizing that the initial trajectory does not necessarily determine the subsequent recovery. For example, one could see a sharp decline in 2020 trade volumes along the lines of the pessimistic scenario, but an equally dramatic rebound, bringing trade much closer to the line of the optimistic scenario by 2021 or 2022. [...] A strong rebound is more likely if businesses and consumers view the pandemic as a temporary, one-time shock. In this case, spending on investment goods and consumer durables could resume at close to previous levels once the crisis abates. On the other hand, if the outbreak is prolonged and/or recurring uncertainty becomes pervasive, households and business are likely to spend more cautiously." (WTO, 2020)  "Big events like a pandemic have the potential to leave behind a trail of disruption. They can create social discord, reduce people's willingness to spend and take risks, destroy business momentum and shake confidence in the value of investments. [...] It is too early to tell which narratives will prevail and what path the economy will take after this pandemic subsides. Limited case studies will take us only so far. But we shouldn't be surprised if we see post-pandemic economic weakness over the next decade." (Shiller, 2020)</i>

### Appendix 10.1.6: Nationalistic Movements (Table 8)

Nationalistic Movements	
Participant	Quote
Dr. Clemens Schwerdtfeger	<i>"In Europe, it will be interesting to see if the European community, which had problems before, because there was rising levels of nationalism, drives apart even more."</i>
Karen Frisch	<i>"And I think that countries and companies will be much more nationalistic than before."</i>
Steve van Houten	<i>"There have been discussions to arm the boarder. [Trump] was going to post the military along the border. Why would they want to do that? They have a much bigger problem with the virus in the U.S. than we [Canadians] do."</i>
Anonymous 20	<i>"During this time, a few disputes have arisen between the individual countries. Whether it's the USA with China, or whether it's because of masks that disappear at airports and are then assigned to another country the one or the other issue will certainly remain."</i>
External Data	<i>"The blending of anti-globalization and anti-capitalist movements further complicates the role of business in the public debate about globalization. And leaders of multinational corporations face the special challenge of public and government engagement across national divides." (Altman, 2020)  "When the pandemic passes, the most extreme barriers to travel will be lifted. But it is unlikely that there will be a full restoration of the globalized world, as it existed before Covid-19. The nation-state is making a comeback, fueled by this extraordinary crisis. [...] There are three main reasons for this. First, the pandemic is demonstrating that in times of emergency people fall back on the nation-state — which has financial, organizational and emotional</i>

	<i>strengths that global institutions lack. Second, the disease is revealing the fragility of global supply chains. It is hard to believe that large, developed countries will continue to accept a situation in which they have to import most of their vital medical supplies.” (Rachman, 2020)</i>
--	---

### Appendix 10.1.7: Shift from an Employee-led to an Employer-led Job Market (Table 9)

Shift from an Employee-led to an Employer-led Job Market	
Participant	Quote
Katrine Brusgaard	<i>“We are looking at recruitment being stopped now. [...] Even though we are only a little bit more than 2,000 people we had almost 100 open positions. [...] We already, when this started, asked all manager about which positions are necessary to continue, which positions we can postpone and which we can freeze entirely. And now we just received from the executive board an overall restriction on recruitments. [...] Not full stop but close.</i>
Steve van Houten	<i>“There will be people who are working in the back of a moving van who have a business degree. That is too bad. But I think there is a lot of that. And I do not know how long that will last, but I think that is a big thing.”</i>
Torsten Schneider	<i>“Where there was a job market there will now be an employer market again.”</i>
Wilfried von Rath	<i>“In my department there is a complete hiring freeze except for so-called bottleneck job classes that we absolutely have to hire.”</i>
Anonymous 1	<i>“When the market is so difficult that people are happy to have a job, you do not need [...] retention measures and at the moment, there are not so many jobs on the market.”</i>
Anonymous 13	<i>“We also have a hiring freeze right now [...].”</i>
Anonymous 19	<i>“There is a hiring freeze [...].”</i>
External Data	<p><i>“As supply chains disintegrate, whole sectors collapse and enterprises close, more and more workers face the prospect of unemployment and loss of their incomes and livelihoods, while many micro- and small enterprises are on the verge of bankruptcy.” (ILO, 2020)</i></p> <p><i>“The new reality: Just as the Great Recession wreaked havoc with the MBA job market in 2002, you can now expect the same. Back in 2002, a ton of people had their offers delayed. Internship offers that summer were a disaster. In 2009, many careers just never started, even for some MBA graduates from Harvard Business School. There’s no reason to think that this time will be much different as companies seek to preserve cash, reduce expenses and cut back on hires.” (Byrne, 2020)</i></p> <p><i>“In a matter of months, the COVID-19 pandemic has brought the academic job market close to collapse in many parts of the world. [...] Hiring freezes are the new normal in the United States.” (Woolston, 2020)</i></p>

### Appendix 10.2: Uncertainty Dimensions Related to Strategic Uncertainty

#### Appendix 10.2.1: Abrupt Change of Industry Sizes, Structures and Powers (Table 10)

Abrupt Change of Industry Sizes, Structures and Powers	
Participant	Quote
Steve van Houten	<i>“I think there are some whole industries that will be affected for a long time. Tourism! Sports! Airlines! [...] Hotels! When I talked to my investment advisor, I do not want anything in tourism, I do not want anything in entertainment, I do not want anything in airlines and that sort of thing. Medical research? Absolutely! I think there are some whole industries who are affected. Oh, here is another one: Cruise Ships.”</i>
Anonymous 1	<i>“I think several industries are impacted more than other industries. For example, the aviation or the transport industry and also the whole tourism sector will be impacted dramatically. I think there will be a big, big shift. [...] The luxury industry and all this overpriced entertainment stuff will be highly impacted.”</i>
Anonymous 3	<i>“The exchange of even short-term medicines and the entire medical sector will increase. A sector that has been neglected [...] in recent times.”</i>
Anonymous 7	<i>“Of course, we are already expecting the gastronomy sector to die a not insignificant death. The president of the German Hotel and Restaurant Association DEHOGA said in an interview with ZDF that he expects 30% of the restaurant industry to die due to the Coronavirus.”</i>
Anonymous 14	<i>“The pharmaceutical industry will probably be a big winner. All companies in the protective clothing sector will certainly be a winner. In comparison, the travel industry will collapse completely. It's extremely difficult to predict now what will resonate. The only thing that is certain is that it will not be the same as before.”</i>
Anonymous 18	<i>“I think the sector that is going to be most affected in Portugal is tourism. It will have a huge impact.”</i>
Anonymous 21	<i>“And then it's interesting that there are certain business models that are based on the fact that, for example, there can be no catch-up consumption. So, hospitality and tourism, for example. [...] To be honest, it is quite often smaller owner-managed companies that are heard much less in the political debate than, of course, an automobile industry that has an appointment with the Chancellor's Office to discuss car sales premia.”</i>
External Data	<p><i>“The collapse of international travel, in contrast, stands out against a much steadier growth trend, and its damage is indisputable. Tourism contributes more to global output than automotive manufacturing, and business travel facilitates international trade and investment. As of late April 2020, every country had imposed restrictions on international travel, and 45% of countries had partially or completely closed their borders to foreign visitors. Airlines were flying 90% fewer seats on international flights, as compared to 62% on domestic flights.” (Altman, 2020)</i></p> <p><i>“No industry will be immune to the impact of COVID-19. For some, the crisis poses an existential threat.” (BCG, 2020)</i></p> <p><i>“The contraction of the global commercial in-service fleet is already more pronounced than in any of the prior crises: As of late April, over 65 percent of the pre-COVID fleet of 27,500 commercial aircraft have been parked. The financial uncertainties caused by COVID-19 are also compelling airlines to defer or cancel new aircraft deliveries, and retirements will be four to five times higher than previously forecast. [...] Our baseline scenario does not expect the fleet to return to its pre-COVID size until the end of 2022.” (Cooper et al., 2020)</i></p> <p><i>“Traffic will return to the roads when the Coronavirus pandemic abates, but the automotive aftermarket will be fundamentally changed.” (Brotschi et al., 2020)</i></p>

### Appendix 10.2.2: Operational Complexity and Fragility (Table 11)

Operational Complexity and Fragility	
Participant	Quote
Anthony Dickinson	<i>"We are using management techniques that are based on the first and the second industrial evolution. Adam Taylor or Taylorism is still very much at the core of scientific management. It is still at the core of the way we run our businesses. We are breaking them down into functions and think that if we can manage the parts effectively you get what you are expecting when you integrate those back to the whole. I think that something that COVID shows that actually that is not the world we live in. We live in a complex interdependent world with very many moving parts."</i>
Dr. Clemens Schwerdtfeger	<i>"Maybe everything is on a bit thinner ice than we often like to think."</i>
Anonymous 9	<i>"Although this flexibility is virtually taken away from you now, it will continue to be important in the future to be able to change the space you have quickly and respond quickly to crises. And that nothing is so rigid that small changes require huge re-planning."</i>
Anonymous 16	<i>"I think it has become clear to many people that global supply chains are also extremely fragile. You can see that especially in the manufacturing industry. Sometimes these are really quite banal little issues. For example, I have a number of people who work in the automotive industry, some of whom are now on short time working because they work for a supplier and the supplier cannot deliver because, for example, three special screws are missing. Then perhaps a whole production stands still because a small part is missing."</i> <i>"The lesson I have learned is that many things that are taken for granted are very fragile."</i>
External Data	<i>"Crises reveal fragility. This one is no exception. Among other things, coronavirus has revealed fragilities in the financial system. This is unsurprising." (Wolf, 2020)</i> <i>"The fragility exposed by the #coronavirus is not limited to our health systems. It affects all areas of our world and our institutions" (WHO, 2020e).</i> <i>"Fragile contexts are beginning to be hit by the Covid-19 pandemic. Most of these countries are insufficiently prepared to cope with the spread of the disease and its consequences across the multiple dimensions of fragility". (OECD, 2020b).</i> <i>"The emphasis on efficiency in the operation, management and outcomes of various economic and social systems was not a conscious collective choice, but rather the response of the whole system to the incentives that individual components face. This has brought much of the world to rely upon complex, nested, and interconnected systems to deliver goods and services around the globe. While this approach has many benefits, the Covid-19 crisis shows how it has also reduced the resilience of key systems to shocks, and allowed failures to cascade from one system to others." (OECD, 2020d)</i> <i>"In punctuating a supply-chain equilibrium already under stress, the epidemic has exposed an underlying structural fragility." (KMPG, 2020b)</i>

### Appendix 10.2.3: Uncertainty Management (Table 12)

Uncertainty Management	
Participant	Quote
Katrine Brusgaard	<i>"You never know what will happen so you just off to sort of go with it. I think a lot of people have shown that the change resistance is less. So, people are more change minded. [...] But I also see that the uncertainties make people very insecure. We have some areas where we get so many detailed questions, where we wonder: 'Why do they not just do it, make a decision with it or act as managers?'. This includes questions like 'How do we keep the 2 meters distance? How do we set up Plexiglas? Do I have to bring my own sanitizer to work when we start working?'. We have so many detailed questions, but you know we do not advice anything different than the government, but just so they make sure that we say the same. There is more uncertainty, but the bigger picture is maybe more changeable."</i> <i>"Now the picture is much more uncertain. We cannot do a financial forecast in the same way we could just 2 months ago. It is not like it did not exist, but it exists now with more power and with a different aspect because of the uncertainty. I guess the uncertainty is the really difficult part here."</i>
Stuart Hardy	<i>"Someone described it to me like 'moving ahead in business is a little bit like trying to break your car and stop on ice'. We have started to slide now, there is no point in standing on the breaks, because you will just slide forwards still."</i>
Wilfried von Rath	<i>"I believe that this will speed us up enormously. We would have discussed this [internal digitalization effort] over the next 10 years, sent it through the committees and now it just happened. And I think that will stay. [...] But what I personally learned is how flexible and fast people can adapt to such situations. And with that I mean me, the people in my environment and the organization. How we are suddenly able to do things that we thought were impossible. [...] How such a large company can suddenly change significantly. That is a learning experience for me. When we talk about change management, how do we teach change. It is simply a brutal force, a brutal normative force of the factual, which forces us to understand many things in a new way."</i>
Anonymous 12	<i>"The human component is very large, and the uncertainty is very great, and it is my job to intercept that a little bit, whereby I personally have the same uncertainties and had no answers at all too many things."</i>
Anonymous 15	<i>"As far as the business is concerned, there is of course great uncertainty."</i>
Anonymous 17	<i>"And I notice that this is a quick course, which is no longer dominated by articles and books and evangelists who say, 'the future lies in the home office'. But that everything is now being tried out in a differentiated way [...]"</i> <i>"I think that the word consciousness, awareness, has received another reinforcement. I think I have always been a conscious and reflective thinking person and acting, but this awareness that life is uncertain, the awareness that there is an unbelievable complexity in which we don't make life and the decisions so easy. That means I have an increased awareness of this uncertainty [...]"</i>
Anonymous 20	<i>"We'll have to wait and see what kind of uncertainties we have to deal with. So especially in relation to international supply chains. Is this power still available or do we need to make changes? What will volumes and prices look like for our customers in the future? Will there be any influence there? We don't know all that yet."</i>



Anonymous 22	<i>"I think first of all there is uncertainty in the current situation, that's why many companies that are not sure how their business will develop are not going to make big deals."</i>
External Data	<p><i>"We are now living through the most uncertain moment of our times." (Cadena &amp; Ferrari-Haines)</i></p> <p><i>"The worst and most typical reactions for humans when confronted with high uncertainty are to freeze, or to jump to a simple answer, such as "this problem will go away as quickly as it came, it is just like the annual flu." COVID-19 is particularly challenging in this regard because the majority of those infected will feel only minor symptoms, or none at all. It is an invisible but pernicious enemy. We must try to bound the uncertainty with reason and think about solutions within a limited number of scenarios that could evolve." (Smith et al., 2020)</i></p> <p><i>"Acting in the face of uncertainty has been a defining theme of modern business, even within a context of macroeconomic stability and continuity. But it's becoming harder to shock today's executives. Potential responses to what were considered Black Swan events even a generation ago are today built into most strategic scenarios. By any standard, however, the COVID-19 pandemic qualifies as a true outlier. Embracing this fundamental reframing – widely described as the "next normal" – means confronting uncertainty head-on and building it into your decision-making." (Deloitte, 2020a)</i></p>

### Appendix 10.3: Uncertainty Dimensions Related to Strategy Formulation and Implementation

#### Appendix 10.3.1: Business Model Digitalization (Table 13)

Business Model Digitalization	
Participant	Quote
Gregory Glanzmann	<i>"So, I think whoever has not done that is doing their homework now. Often a part is already pictured, and I think that they are integrating more seamlessly into the digital world. And not only the part visible in front of the customer, but also the part behind, that is also connected."</i>
Stuart Hardy	<i>"I think everything is accelerated, because of the Coronavirus. I mean the world was in a state of paradigm shift because of digital technologies anyways. Perhaps this is the biggest technological shift the planet has ever seen, certainly the fastest."</i>
Anonymous 1	<i>"A certain degree 10% - 20% [of trainings and workshops] is transferred to online. [...] We try to develop certain products, which we can do virtually."</i>
Anonymous 4	<i>"Essentially, the biggest tech accelerator of this century will be a pandemic."</i>
Anonymous 6	<i>"I think that will have led to the fact that many who did not have an online channel are now building one."</i>
Anonymous 9	<i>"We have the hope that people who get used to our online shop will buy online in the future. [...] And of course, we have also adjusted our advertising behavior so that we attract people to our website rather than to the store."</i>
Anonymous 11	<i>"So, digitization will get a boost overall. We've been working on the electronic filing for years. It's all very laborious, but now it will get a clear boost. I would really expect a modernization push."</i>
Anonymous 13	<i>"And interestingly enough, all manufacturing companies see that they have to completely rethink and find all digital solutions rather exciting at the moment. Because this is also a possibility: Let's say that production comes to a complete standstill, then you can re-sort the machines, install new hardware and software and things like that. This means that many people see it as a chance to digitize themselves faster."</i>
Anonymous 14	<i>"Certainly, also in the field of artificial intelligence, stories like the automation of processes will certainly receive an increased demand. So, I believe that as long as there is a reasonable budget available, there will be more emphasis on it, so that companies will change faster. [...] For some companies, digitization is not only the acceleration of processes but also the development of new business models and these are urgently needed. This means that if they don't invest the capital that is still available, they may not be out of the market immediately, but probably within the next 4-5 years. This is ultimately part of the corporate strategy. Digitalization also has a very destructive part, so companies have to react to it."</i>
Anonymous 15	<i>"Home Schooling. Maybe this is another topic that will gain in popularity."</i>
External Data	<p><i>"Lessons from Asia highlight the need for governments and businesses alike to increasingly focus on trust. Fully embracing digital applications will be essential. Indeed, digital is omnipresent: from information access to enable transparency and proximity, to analytics respecting security and privacy, to effective actions enabling reliability and credibility." (Candelon et al., 2020a)</i></p> <p><i>"As their focus shifts to recovery, more companies are likely to deploy AI-enabled solutions to reignite topline growth." (Candelon et al., 2020b)</i></p> <p><i>"As the Covid-19 pandemic disrupts nearly every aspect of life, enterprises are turning to digital technology and analytics to help them weather the crisis and prepare for new ways of operating and serving customers once we reach the other side. [...] That has sparked a sudden economic shift from physical to digital. This is true both for interactions with consumers (online marketing and sales channels, digital products) and the way companies operate (remote working)." (Caimi, Anderson &amp; Hoppe, 2020)</i></p> <p><i>"Beyond the immediate fallout of the crisis, it has become clear that some of these shifts are here to stay: Covid-19 is radically accelerating the digital future." (Caimi, Anderson &amp; Hoppe, 2020)</i></p> <p><i>"Rather than occurring as a normal evolution over a multi-year span, COVID-19 has pushed the virtualization of business upon us with immediate effect. And crucially, not only are business models now being disrupted, business processes are too. [...] Virtualized solutions with human connection built in will work not only for today's socially-distanced COVID-19 populations but, going forward, will also bring some measure of equity to populations currently under-served by healthcare. This innovation was always slated to happen "tomorrow". The exigencies of COVID-19 have brought tomorrow to us today." (Ghose, 2020)</i></p>

#### Appendix 10.3.2: Competitive Collaboration (Table 14)

Competitive Collaboration	
Participant	Quote
Karen Frisch	<i>"Companies that have not worked together in the past, they are competitors, are now working together doing all the best that they can."</i>

Steve van Houten	<i>“One of the interesting things happening here is that the supply chain of the big grocery stores, the supermarkets, is one supply chain. The supply chain for the restaurants is a different supply chain. Yes, it goes back to the farm, but the companies that package it, transport it, warehouse it and everything else are different. The one supply chain, the restaurant supply chain, all those businesses, they are shut down. Whereas the grocery store ones, the shelves are empty. Like people are hoarding and cooking at home. Now these two supply chains have had to find each other.”</i>
External Data	<i>“Across the world, governments and health authorities are working together to find solutions to the COVID-19 pandemic, to protect people and get society back up and running. Software developers are contributing by crafting technical tools to help combat the virus and save lives. In this spirit of collaboration, Google and Apple are announcing a joint effort to enable the use of Bluetooth technology to help governments and health agencies reduce the spread of the virus, with user privacy and security central to the design.” (Apple, 2020)</i>  <i>“Opportunities are emerging as companies and industries work together to keep people working.” (Accenture, 2020)</i>  <i>“Some problems are too big, too complex and the humanitarian need too great – to address alone. And, when time is of the essence, pooling knowledge and specialist skills is vital to success. The COVID-19 pandemic is the public health challenge of our time. It demands a concerted effort and bold, new thinking to find solutions together. That is why the R&amp;D ecosystem is responding in a spirit of partnership. Pharmaceutical companies, biotech firms, academic researchers, public health institutes, NGOs and others, are showing their commitment by sharing data, knowhow and ideas.” (Moll, 2020)</i>

### Appendix 10.3.3: Focus on Sustainability (Table 15)

Focus on Sustainability	
Participant	Quote
Johnny Sørensen	<i>“There is a limit to a certain point at which mother earth will say ‘that is it’. And that is what she is doing now. You can actually see it right now on the pollution levels of the Shanghai air.”</i>
Steve van Houten	<i>“I think we [will] live greener.”</i>
Anonymous 14	<i>“That was a pretty important topic before the crisis. It's certainly taking a bit of a back seat now. Many people also say that if we had been a bit more sustainable overall, then maybe we wouldn't have been affected to this extent. [...] Otherwise, if we continue, we should simply not neglect the issue, because the scale of the disaster is far greater than what we have now. However, this is not happening in fast motion but in slow motion, so we do not take it as such a threat. [...] Nevertheless, I believe that the concerns and needs of companies will now focus on something else for the time being. So, I suspect that the sustainability issue will get a dent, but I hope that it will rise again. For now, as a dampening factor, but I think in the medium term the topic will be at the top again. Maybe even intensified.”</i>
Anonymous 16	<i>“I am really very worried that now, after Corona, whenever that will be, [...] the topic of climate protection will be completely ignored. I have the feeling that many people have not yet realized that climate protection is an issue, that if we mess up, we cannot reverse it. This means that climate protection must be the number one priority and measures must be taken around it. And it's not about first stimulating the economy and then looking at climate protection. I think that is completely wrong prioritization.”</i>
Anonymous 17	<i>“Climate protection and so on, will pick up speed again.”</i>
External Data	<i>“The coronavirus crisis has unleashed headwinds that threaten to limit the corporate response to the sustainability imperative. Many companies now find themselves in a difficult cash position, deeming anything not critical for survival as unnecessary. As companies struggle with decisions affecting their day-to-day existence, ESG matters may seem like slow-burning issues they can deal with tomorrow. [...] Companies that commit to sustainability during the crisis will come out stronger, with more solid customer and supplier relationships, enhanced corporate reputations, and improved employee loyalty and productivity. Those that do not will face serious reputational ramifications that could—even more than the virus itself—threaten their survival.” (Davis-Peccoud &amp; van der Branden, 2020)</i>  <i>“The COVID-19 crisis is likely to have a profound and negative effect on sustainable development efforts. A prolonged global economic slowdown will adversely impact the implementation of the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change. [...] It is vital that in the response to the crisis, countries keep the sustainable development goals and climate commitments in focus to hold on to past gains, and in the recovery, to make investments that propel us toward a more inclusive, sustainable and resilient future.” (UN, 2020a)</i>

### Appendix 10.3.4: Horizontal Diversification (Table 16)

Horizontal Diversification	
Participant	Quote
Niels Heyer	<i>“You have to diversify. And that's one thing we can't forget. That you don't just concentrate on one or the other, but really try to find a portfolio.”</i>
Anonymous 8	<i>“And I also claim that there will be a very big consolidation of companies. Because many simply cannot survive by themselves.”</i>
Anonymous 9	<i>“We have 3 different sales channels. Of course, this is quite good for us in the current situation, because if you were only in the stationary trade and the shops were closed, you wouldn't make any sales and still have costs. We have the same problem, but only in one of our business areas.”</i>
Anonymous 11	<i>“And my guess is that the institutional investors have their expectation that there won't be a growth of M&amp;A transactions. That would be growth among competitors who are merging. It would be a wave of mergers where they say that they are both too weak. And if you look from the perspective of a classical investor, he will see that the business model is currently unsustainable. And if they merge now, they won't have savings that they didn't have before. So, I can't imagine that this is now a market for larger M&amp;A transactions.”</i>
Anonymous 20	<i>“What also becomes an advantage for us now is that we are active in different regions, so that we can take the ups and downs of the different regions with us, in the negative as well as in the positive. In Asia, for example, you can now see in South Korea, where we have a plant, and in China, which is slowly being ramped up again there, and that is a region that is now giving us more pleasure again. The Americans are now a bit further down in comparison and we in Europe are experiencing a bit of relaxation again, so that this decentralization is quite reasonable in terms of our business.”</i>

Anonymous 22	<i>"I think that [the number of M&amp;A's conducted] will rise again. I think first of all there is uncertainty in the current situation, that's why many companies that are not sure how their business will develop are not going to make big deals. But as soon as this has settled down a bit, I think there will be those who emerge from the crisis strongly and are therefore very interested in buying up companies again. There will also be many companies that have a great interest in being bought up because they are worse off. [...] As far as the number of transactions is concerned, I can imagine that there will be more, but as far as volumes are concerned, I am not sure. I don't think that the really big takeovers will happen."</i>
External Data	<p><i>"Although it is too soon to fully assess the long-term consequences of COVID-19 on M&amp;A, deal-making activity in the near term has naturally been affected by the deterioration of capital markets and the real economy. M&amp;A activity has declined, with a greater emphasis on acquisitions of distressed businesses by those companies strong enough to weather the economic storm. Indeed, downturns often present opportunities to create value through M&amp;A."</i> (Keienburg et al., 2020)</p> <p><i>"What makes Ping An's ecosystem particularly powerful is the 'full stack' of interdependent businesses that run autonomously in sectors adjacent to Ping An's core financial offerings. These businesses represent a wide variety of revenue streams and business models, and they fulfill a number of customer needs, with opportunities to cross sell and attract new clients from one business to another. [...] Hedging your bets was always important in an emerging market where opportunities and threats come and go. Organizing a business as an ecosystem enables companies to hedge and thrive. This is now also true for companies all around the world and especially true during the coronavirus crisis, in order to compete in the turbulent time."</i> (Greeven &amp; Yu, 2020)</p> <p><i>"Relatively cash-safe apparel, fashion and luxury players and PE or other private investors may look to combine multiple brands in a portfolio and give them creative autonomy, while realizing cost benefits from jointly negotiated rents, wholesaler terms, and back-office cost synergies."</i> (Atmar et al., 2020)</p>

### Appendix 10.3.5: Rethinking Just-In-Time Production (Table 17)

Rethinking Just-In-Time Production	
Participant	Quote
Alexander Drees	<i>"We only made it through it so well because we had a high stock. If we hadn't had that and if we were dependent on imports, it would have gone different for us. But it is also part of our risk plan that we always work with high stock levels in order to always be able to deliver."</i>
Anonymous 5	<i>"We are also concerned that at some point the parts will no longer be available. That is why we have developed a strategy of simply procuring the critical spare parts and keeping them in stock."</i>
Anonymous 9	<i>"This just-in-time approach, many have not even seen the risks yet, because the competition wanted to be more and more cost efficient, faster and so on. I think that the risk that such a crisis could override such a situation was often underestimated."</i>
Anonymous 16	<i>"Over the years, a lot of things have been rationalized away simply to save costs. In the past it was so that one had rather large stocks, in order to be able to react at short notice also to such events. In addition, I think there used to be an alternative supplier for each part. But this was rationalized away by increasing specialization. Of course, the bigger the safety net is the higher the price. And at some point, it was decided that such safety was no longer worth it. And now Corona shows how vulnerable international supply chains really are. It takes so long until the supplier can deliver again, or an alternative supplier can be found, which can take weeks or even months. I think this might lead to a rethinking of suppliers and manufacturing companies."</i>
Anonymous 20	<i>"Perhaps we will also reconsider to what extent we want to uphold this just-in-time delivery principle, or whether it is not better to have one or the other spare part here as well. So that in such a situation we are not dependent on third parties."</i>
External Data	<p><i>"Once the pandemic passes and the global economy begins to function normally, many senior executives might assume they should manage their global supply networks as in the past, with the lowest-cost supply and minimal inventory levels. While that approach worked in a stable global economy, it now brings increased risk. The assumptions about supply chain management have shifted."</i> (Schatteman, Woodhouse &amp; Terino, 2020)</p> <p><i>"COVID-19 disruptions are also testing the viability of just-in-time inventory and complementary supply chains designed to minimize working capital tied up in assets in warehouses. The impact elevates the need for companies to ensure their supply chain is diversified with options for secondary sources, incorporates innovation, includes a backup plan to address workforce disruption, and targets logistical bottlenecks."</i> (Zanni, 2020)</p> <p><i>"The Covid-19 outbreak has exposed the thin margins on which much of global business runs. Highly indebted companies, working from lean inventory, supported by just-in-time supply chains and staffed by short-term contractors, have borne the brunt of the sudden blow. They will now suffer the rolling, longer-term impact of its unpredictable consequences. Too late, many executives and owners have realised that by pursuing the holy grail of ever greater efficiency, they sacrificed robustness, resilience and effectiveness. In many cases, they will turn out to have sacrificed the business itself."</i> (Financial Times, 2020)</p> <p><i>"Weaknesses in supply chains were unforgivingly exposed during the COVID-19 pandemic. 30% of companies admit experiencing major problems with their supply chain. In response to the disrupted added value streams, those surveyed are striving to build up inventories (36%) and achieve greater vertical integration (26%) in addition to searching for other suppliers and improving the management of their supply chain."</i> (Staufen, 2020)</p>

### Appendix 10.3.6: Risk Premia for Global Supply Chains (Table 18)

Risk Premia for Global Supply Chains	
Participant	Quote
Dr. Clemens Schwerdtfeger	<i>"We are so close and highly connected; everybody says we should not buy that much in China anymore. In the end, I think it is a price question."</i>
Dr. Wilfried Kienzle	<i>"In this respect, there are no signs as yet that the global flow of goods or the flow of goods from China, at least to Europe, will be severely affected by this. At least not with the products we are testing."</i>
Johnny Sørensen	<i>"I would re-consider, if I was sitting with a company, the whole supply chain. One reason why we have this situation now is because we have been hunting the last dime. [...] I think when we go out now the whole purchase thinking</i>

	<i>will disappear. Because right now in purchasing management, they are measured by the fact on how much discount can they get. And I think that has to disappear."</i>
Anonymous 8	<i>"I do believe that in the future, people will think about proactively securing these global effects in advance. For example: Why do I massively source certain products from overseas or China, where I then say that I perhaps have to build something up there that I then make myself in Germany or in Europe."</i>
Anonymous 9	<i>"This just-in-time approach, many have not even seen the risks yet, because the competition wanted to be more and more cost efficient, faster and so on. I think that the risk that such a crisis could override such a situation was often underestimated."</i>
Anonymous 16	<i>"Over the years, a lot of things have been rationalized away simply to save costs. In the past it was so that one had rather large stocks, in order to be able to react at short notice also to such events. In addition, I think there used to be an alternative supplier for each part. But this was rationalized away by increasing specialization. Of course, the bigger the safety net is the higher the price. And at some point, it was decided that such safety was no longer worth it. And now Corona shows how vulnerable international supply chains really are. It takes so long until the supplier can deliver again, or an alternative supplier can be found, which can take weeks or even months. I think this might lead to a rethinking of suppliers and manufacturing companies."</i>
Anonymous 19	<i>"At BMW, this is always a discussion, but at BMW, vehicle project awards and supplier awards are primarily made on the basis of the cost principle. As long as all the specific requirements for a particular supplier are met, the cheapest supplier gets it. Accordingly, I do not think that localization will take place."</i>
Anonymous 20	<i>"The question is how much this risk is ultimately worth to us. These are things that have not yet been clarified, and we will have to decide again with a reasonable risk devaluation."</i>
External Data	<p><i>"Managing supply chain disruption is a challenge for both global and local enterprises and requires a risk-versus-economic efficiency calculation on the part of every company." (WTO, 2020)</i></p> <p><i>"Once the pandemic passes and the global economy begins to function normally, many senior executives might assume they should manage their global supply networks as in the past, with the lowest-cost supply and minimal inventory levels. While that approach worked in a stable global economy, it now brings increased risk. The assumptions about supply chain management have shifted." (Schatteman, Woodhouse &amp; Terino, 2020)</i></p> <p><i>"COVID-19 may accelerate companies' search for ways to reduce supply chain risk and the likelihood of future disruption." (Zanni, 2020)</i></p> <p><i>"Many companies and leaders talk about the need to do supply network mapping as a risk-mitigation strategy, but they have not done so because of the perceived large amount of labor and time required. [...] People from procurement, logistics, and supply-chain financing need to come together to talk about what key gaps (tools, information, people, processes, etc.) need to be fixed to protect the company from disruptive events in the future and how to align the goals of procurement with the overall business objectives." (Choi, Rogers &amp; Vakil, 2020)</i></p> <p><i>"After COVID-19 recedes, additional and possibly different kinds of supply chain risk factors may emerge." (KMPG, 2020b)</i></p>

### Appendix 10.3.7: Sponsoring and Support for Sports and Culture (Table 19)

Sponsoring and Support for Sports and Culture	
Participant	Quote
Steve van Houten	<i>"My wife and I have subscriptions to two different theater companies. There are no shows on. And our son [...] is an actor. He signed a contract to be in a theater company this summer. Highly questionable whether this is going to be possible. He was going to be in a movie right now. That is postponed; maybe it is cancelled."</i>
Anonymous 1	<i>"The cultural branch [...] will be impacted [...] and I also think the professional sports will be hit. Why should we pay so much money for some of the Ronaldo's of this world? Maybe a company in the future will get a high reputation if the invest in health initiatives. Sponsoring hospitals instead of football."</i>
Anonymous 12	<i>"The long-term consequences [for motorsport] are quite clear. There will be fewer teams. [...] You have sponsoring contracts which say 'advertising on the car' and the sponsor will certainly keep his feet still for a while, but at some point he will also say as a company 'you don't deliver your contractual performance so I can't make the final payment'. And so, the basis of every racing team is gone because nobody pays. I think some of them will definitely not survive. [...] I think at first everything will be smaller. I still think firms will use [motorsport] as a marketing tool. Definitely. So, there will still be motorsport, but with smaller starting fields."</i>
Anonymous 21	<i>"And the cultural industry is to a certain extent an affected industry, the whole ticketing business and everything that goes with it, they have a particularly difficult time. [...] I see it as a problem from a social point of view, especially when cultural institutions in small cities simply no longer exist. Why? Not even perhaps due to Corona itself, but because the debts of the communities, the states and the federal government are increasing enormously and at some point, even a district administrator can actually decide to close the theatre in a city. And when culture falls victim to this, it has many, many other social implications that you can't really grasp."</i>
External Data	<p><i>"The current crisis is particularly critical for cultural and creative sectors due to the sudden and massive loss of revenue opportunities, especially for the more fragile players. Some actors benefit from public support (e.g., public museums, libraries, theatres) but may experience significant budget shortfalls. The sector includes major multinational companies with sustainable revenues (e.g., Netflix), but many small companies and freelance professionals essential for the sector could face bankruptcy. This crisis creates a structural threat to the survival of many firms and workers in cultural and creative production." (OECD, 2020c)</i></p> <p><i>In the face of COVID-19, many millions of jobs are therefore at risk globally, not only for sports professionals but also for those in related retail and sporting services industries connected with leagues and events, which include travel, tourism, infrastructure, transportation, catering and media broadcasting, among others. Professional athletes are also under pressure to reschedule their training, while trying to stay fit at home, and they risk losing professional sponsors who may not support them as initially agreed. In addition to economic repercussions, the cancellation of games also impacts many social benefits of global and regional sport events, which can cement social cohesion, contribute to the social and emotional excitement of fans, as well as their identification with athletes</i></p>

	leading to greater physical activity of individuals. Sport has long been considered a valuable tool for fostering communication and building bridges between communities and generations.” (UN, 2020b)
--	--

### Appendix 10.3.8: Supply Chain Dependencies (Table 20)

Supply Chain Dependencies	
Participant	Quote
Alexander Drees	“I think it's become apparent how dependent we are in many parts of industry on other countries, even in critical or essential areas, medical technology, or simple things like when respirators have to be produced. And the German government will look again and say what are critical industries for us and where do we actually have to secure our industrial base or create incentives to ensure that such things continue to be produced in Germany or at least in Europe.”
Karen Frisch	“Globalization will go backwards mainly for big countries like Brazil. For instance, they will look back what industries they have outsourced and bring it back because in cases like this you need to have those industries back in Brazil.”
Niels Heyer	“I think that customers will also change and maybe choose us or others who are closer to them, because the trade barriers and all the problems are much bigger and cannot be estimated. And I think that will create opportunities for us. But maybe also obstacles, if we talk about Japan or China as customers now. I think regionalization will be a bigger issue after the crisis.”
Orlando Santos	“If they say something against China, they will not receive it. This is what we are seeing today. Let's say from a perspective of the world trade and the organization of the world economy, this should, I do not know if it will, but it should at least ring the alarm bells that something is very wrong in the way the world is structured. And you see for instance Japan. Japan is moving production from China to mainland Japan.”
Steve van Houten	“Impacts on the supply chain. Huge. And that is very vivid [...]. But it makes you realize that supply chains are more important than you we probably knew. Maybe they have to be more complex than you realize, and you do not want to be so reliant on outside sources. Even if you think the outside source is a friendly one, because they might now be when the time comes. And you do not want to be too reliant on one outside source. You got to have several.”
Anonymous 3	“I do not believe that globalization will be restricted by this pandemic in the long run. There may be additional hurdles to overcome in this business [...].”
Anonymous 5	“For example, Mr. Altmaier [German politician] says that more will be produced and stockpiled in Germany again, and I believe that will happen. But that is what I call activism, which will disappear from people's mind in 5 or 7 years and then will not happen again.”
Anonymous 7	“The government will certainly have to think about [...] securing supply chains. We are so dependent on countries like China, which produce things that we simply cannot get in Germany.”
Anonymous 8	“I do believe that in the future, people will think about proactively securing these global effects in advance. For example: Why do I massively source certain products from overseas or China, where I then say that I perhaps have to build something up there that I then make myself in Germany or in Europe.”
Anonymous 17	“The companies are now learning how strongly they are dependent on local politics. These are no longer just trade agreements, whether we can trade freely or not, but what is also possible locally. The bottom line is that in most industries global and international thinking will be necessary to survive. And that is why it is being done again. It is inherent in the system that we need this. In other words, it is inherent to the market economy. You can't tell a medium-sized company that has made 50% of its turnover in China and Asia, 'because of the crisis, why don't you do the turnover somewhere else'. In Germany he can't double that. That means we will have globalized markets again, certainly changed and certainly changed power relations, but globalization as a whole, perhaps under different premises, also climate protection and so on, will pick up speed again.”
Anonymous 22	“But apart from that, there is the issue of production sites. For example, do we have to produce our core products in Germany? To what extent must we as a country be able to supply ourselves independently at all times? And to what extent is that possible or are we dependent on other countries such as China?”
External Data	<p>“The pandemic has prompted a new wave of globalization obituaries, but the latest data and forecasts imply that leaders should plan for - and shape - a world where both globalization and anti-globalization pressures remain enduring features of the business environment. [...] Current forecasts call for international flows to start growing again as the pandemic comes under control. Thus, 2020 is likely to be a low point for many globalization metrics. But how deep will the plunge really be? How fast can we expect global flows to rebound? And how might future flow patterns look different from the past? None of these questions can be answered definitively yet.” (Altman, 2020)</p> <p>“Economic nationalism [...] has gathered momentum during the past few years, and surfaced strongly again as nation-states respond unilaterally to COVID-19 developments. From an operations strategy perspective, economic nationalism is best characterized as a make-where-you-sell-and-buy-where-you make approach.” (KPMG, 2020b)</p> <p>“Tax considerations will play an increasingly important role in the design of supply chains of the future. Economic nationalism puts pressure on open markets and global free-trade. In its wake, we'll find greater barriers to cross-border trade—increased tariffs, export controls, and trade sanctions.” (KPMG, 2020b)</p>

### Appendix 10.3.9: Vertical Integration (Table 21)

Vertical Integration	
Participant	Quote
Niels Heyer	“Companies, I know within the industry, slaughterhouses, that is to say bulk slaughterhouses, they practically only do the slaughtering and freeze and export that. Or they just put it into this gastro track. Of course, they then have a problem because business is not going well. And the other thing we have done well is vertical integration, which means that we can now plan the animals, plan the feed, plan the live animals, plan the chicks.”
Stuart Hardy	“The first thing to go is external luxuries and external consultants fall into that category.”
Wilfried von Rath	“We've stopped external obligations, i.e., consultants, to almost 100%.”
Anonymous 1	“[Many of our customers] are not allowed to hire any consultant at the moment. And then they realize it will work without consultants. [...] the expenditure for external services such as consulting will not be on the same level as the years before. I expect for this year maybe a 75% dropdown and maybe for the next year a 50% plunge.”

Anonymous 8	<i>"I can share that, the external strategy consultancies in the [company name censored] have all been thrown out – immediately."</i>
External Data	<p><i>"Given the uncertainty over exactly how this crisis is going to play out, medium-term actions will need to be taken to secure [...] company's ability to operate. Measures like adjusting the company's degree of vertical integration and the global footprint or actions such as insourcing central function could make sense, but they require a well-founded analysis of the strategic implications." (Haghani, 2020)</i></p> <p><i>"The COVID-19 epidemic, coming on the heels of the bird flu and African swine fever outbreaks, will further accelerate the transformation of China's food supply chain, especially animal products. [...] Larger players will also further vertically integrate throughout the value chain to give them more control over raw material prices, quality and supplies. These factors will put smaller players with weak cash positions out of business." (Luedi &amp; Liu, 2020)</i></p> <p><i>"Weaknesses in supply chains were unforgivingly exposed during the COVID-19 pandemic. 30% of companies admit experiencing major problems with their supply chain. In response to the disrupted added value streams, those surveyed are striving to build up inventories (36%) and achieve greater vertical integration (26%) in addition to searching for other suppliers and improving the management of their supply chain." (Staufen, 2020)</i></p>

## Appendix 10.4: Uncertainty Dimensions Related to Strategic Agility

### Appendix 10.4.1: Cost Cutting (Table 22)

Cost Cutting	
Participant	Quote
Katrine Brusgaard	<i>"We are looking at cost reductions. [...] We are looking into a 10% cost reduction in general not on headcount but on all the flexible costs. A third thing is about the salary regulations this year. [...] What we potentially are looking at is a zero-rise regulation. People will definitely feel some monetary and financial impacts. [...] We already discussed issues on how we can restructure our company or how can we make things more efficient and is there any whipped cream that we can remove. That has been accelerated now due to the circumstances."</i>
Wilfried von Rath	<i>"Well, first of all we have of course lost considerable liquid funds. Because we did not produce and did not sell anything, but of course we were stuck on a considerable part of the costs. We felt the same way as other companies, where the liquid assets are melting down, so to speak. It is the case that we must now pay very close attention to saving for the immediate future, that we avoid unnecessary expenditure. [...] Well, we have started programs, and measures are underway worldwide that have the exact goal of securing liquidity. That means that we are actually looking into every area."</i>
Anonymous 1	<i>"We try to cut our costs down. [...] Many of our customers have a cost freeze. If the business improves then cost-cutting will be maybe released in the third or fourth quarter of the year."</i>
Anonymous 7	<i>"We need fewer staff and fewer accountants. So, this will be reflected throughout the entire organization. Losses in sales can have consequences for the whole personnel situation. It is not only the colleague who is connected with the catering business who can be unsure, but unfortunately it is a problem that runs through the whole organization."</i>
Anonymous 8	<i>"It is now really about cutting costs."</i>
Anonymous 14	<i>"Cost reduction will certainly be an issue in the coming months."</i>
Anonymous 19	<i>"You can see now that savings are generally taking place. So, there is a hiring freeze, for example. I would also say that investment in innovation is being cut back. So, it's mainly at the departmental level. In any case, you can see that there is a significant cost-cutting program to get through the crisis."</i>
Anonymous 21	<i>"As far as efficiency measures are concerned and in general, as far as business world topics are concerned, there is an increasing prioritization, mainly because the resources are currently very limited."</i>
External Data	<p><i>"Waiting for recovery is not an option. The uncertainties of the current moment make cost optimization an urgent priority for nearly every company" (Gupta et al., 2020)</i></p> <p><i>"As the full economic impact of the crisis hits, pressure will continue to build to cut costs." (Fitzpatrick et al., 2020)</i></p> <p><i>"As a recent PwC survey of Fortune 1000 CFOs suggests, cost containment is the top financial action companies are considering now. And it should be. Experience from prior Black Swans and market crashes shows that hardly anyone regrets acting decisively on costs. BUT as research also shows, across-the-board cost cutting does not help companies emerge stronger after a crisis. In fact, it may even make it harder to recover at all. No company cut its way to greatness." (Mani, 2020)</i></p> <p><i>"To overcome the recent COVID-19 crisis quickly and respond to the 'new normal' of lower revenues in the mid-term, most firms will need to deploy structural performance improvement programs. For these programs, leaders will first have to develop a clear target picture for the firm in three to five years. This should include the future core business model and operating model, but also define profitability targets and profit and loss goals." (Kelp &amp; Becker, 2020)</i></p> <p><i>"The CIO needs to reduce costs quickly and thoughtfully, while also positioning the organization to drive new growth and innovation for the next normal. He or she is the person who will have to balance the pain of cost-reduction measures with the potential value to the business of reinvested savings. In navigating these twin pressures well, the CIO can not only ensure business survival but also position the business to succeed in the next normal." (Blumberg et al., 2020)</i></p>

### Appendix 10.4.2: Innovation Efforts (Table 23)

Innovation Efforts	
Participant	Quote
Wilfried von Rath	<i>"We have stopped IT projects or cut back very heavily. [...] This means that we are using financial resources that were actually [planned for innovative efforts] to manage urgent liquidity issues. Of course, we are trying to avoid endangering our future fields as much as possible. This naturally includes electric driving, autonomous driving, vehicle projects in this whole context. As far as possible, we succeed in ensuring that these are not endangered. But everything that is unnecessary we try to leave out now. And that will keep us busy for a long time to come."</i>

Anonymous 8	<i>"There are of course - and we experience this again and again - clients who are investing in innovative topics right now in this situation."</i>
Anonymous 12	<i>"What I find outstanding [...] is creativity. It is incredible what happens out of this need."</i>
Anonymous 14	<i>"Certainly, also in the field of artificial intelligence, stories like the automation of processes will receive an increased demand. So, I believe that as long as there is a reasonable budget available, there will be more emphasis on it, so that companies will change over faster."</i>
Anonymous 19	<i>"I would say that investment in general could be an issue. So now not only at BMW, but also especially in the automotive industry at supplier level. That there is no longer the liquidity to make really large investments. And that could possibly weaken us compared to the Chinese market. Since many German companies are generally rather cautious about investments and if the capital is no longer available, this could be a point in any case. So, I could imagine that the speed of innovation will be reduced."</i>
Anonymous 21	<i>"Issues that were previously rather, let me say colloquially, hobby issues fall away, because they can't be done. On the other hand, we then really looked at what are now topics that we need in order to be strategically positioned. Then there are things like autonomous driving in the car area. I'm not speaking now for trucks, that's something different, but it will probably take a while before we can really drive around autonomously in private vehicles. That will be reduced rather, but the transformation of the engines will be tackled all the more strongly."</i>
External Data	<p><i>"The journey out of the current crisis may be long and unclear, but disruptive and innovative companies such as Zoom and Teladoc are the market's flags of hope. [...] Indeed, growth techs offer lessons for companies of all sizes. [...] strategies during crises past and present suggests that CEOs should develop and deploy a strategy simultaneously guided by three broad imperatives: survive, thrive, and inspire." (Taneja et al., 2020)</i></p> <p><i>"In the midst of the global pandemic, digital technologies have captured our imagination for their potential to support us in the fight against COVID-19. Before the current COVID- health, education, social and economic crisis, the most visible uses of emerging technologies, such as Artificial Intelligence, have been their applications in entertainment, in increasing productivity and convenience. Now, however, the potential of digital technologies to go beyond that have been revealed to the larger public. Emerging technologies such as Artificial Intelligence (AI) help to expedite the development of a vaccine; predict which public health measures would be most effective; and to keep the public updated with scientific information. They have also allowed us to move much of our lives online, maintaining economic and education systems when most people are staying home and helping us to remain connected to one another." (UNESCO, 2020)</i></p> <p><i>"In this process, firms have an opportunity to reassess their options. They can invest in new as well as shelved technologies and product designs that are particularly effective in mitigating risk and improving safety—even when they are initially inferior in terms of costs, user-friendliness, or other quality dimensions. [...]key question many managers face now is how much and in what form to invest in risk-mitigating technologies and corresponding changes in products and services. This, to a great extent, depends on how long the crisis will last and what form the risk (and the fear) of contagion will persist once the peak is behind us." (Luo &amp; Galasso, 2020)</i></p>

#### Appendix 10.4.3: Shift in Consumer Behavior (Table 24)

Shift in Consumer Behavior	
Participant	Quote
Alexander Drees	<i>"The main consumption [of grocery products has increased, and we have higher sales. People also attach importance to healthy food, which means that more people are turning to organic."</i>
Dr. Clemens Schwerdtfeger	<i>"Of course, people will reduce spending on cars and other things. This is a short- and a long-term effect."</i>
Niels Heyer	<i>"I talked to a supplier today, I asked him how the business was going. And he said that the business is going great. He makes pet food. So, people probably love their dogs and cats more in a crisis. It's booming."</i>
Steve van Houten	<i>"I think we [will] live smaller."</i>
Anonymous 1	<i>"I think the consumer behavior for luxury goods will change."</i>
Anonymous 2	<i>"I often think about what things we consume on a daily basis and how important they actually are."</i>
Anonymous 6	<i>"I think retail markets are a huge issue, because all the spending has gone down really well. I think there are only a few categories where it has gone up somehow. I think in general there was a spending shift."</i>
Anonymous 7	<i>"Well, personally, even if the shutdown were to be completely resolved tomorrow, I would still have some discomfort in entering a larger group of people. I suppose that this year will be a theme that is outside, maybe in autumn but not like the Oktoberfest or something like that – there won't be 500 or 1000 people going into a small hall. I don't think there will be any events of that size this year."</i>
Anonymous 15	<i>"People have less confidence and consume less and take out less credit and pay you back faster. You might think that now a crisis is coming, and people would collect all the money they can get, but the opposite is the case. They look to pay back the loans as soon as possible. [...] People are very cautious [...] and you can see that in the consumer behavior. [...] Online payments have increased slightly, not as much as you would think, at least for our clients."</i>
Anonymous 16	<i>"If you look at all the barometers of consumer sentiment, I think that the propensity to consume will drop a little bit over the next few months, if not years on the consumer side. This will have a direct influence on many factors."</i>
Anonymous 17	<i>"So, this economic slump, combined with changes in consumption, [...] means that we have to adapt our business much more quickly and flexibly to get through this period, which will last much longer."</i>
Anonymous 19	<i>"It was said at the beginning that the demand is just shifting to the back of the year. That means, if you wanted to buy a car in 2020, you just do it 3 months later. I think that since BMW is a premium manufacturer and often many of its clients are companies, and now many small companies are experiencing liquidity problems, demand will not simply shift 1 to 1 to the next quarter, but there will definitely be a decline in sales."</i>
External Data	<i>"And we can already see significant shock-driven shifts in purchasing patterns in our analysis of credit card activity for hundreds of thousands of consumers. Groceries and pharmacy products have increased by more than 50% compared to pre-crisis levels, and online shopping on Amazon has also increased. On the other hand, travel spending has declined by 56%, and live entertainment and apparel purchases have declined by more than 30%. We should not expect that all of these shifts will stick, however. [...] Undoubtedly, we will see some consumption patterns reverting to long-term trend lines, albeit at different speeds." (Reeves et al., 2020)</i>

	<p><i>“The longer the crisis lasts, the greater the likelihood that online and omnichannel purchasing will become the next normal. While this shift is pronounced in grocery and other essential categories, the channel shift within apparel, fashion, and luxury (AF&amp;L) brands and retailers has not come close to making up for the lost brick-and-mortar sales [...].” (Atmar et al., 2020)</i></p> <p><i>The crisis has rapidly changed consumer behavior. [...] In times of crisis, a critical look at the product portfolio and the ability to quickly adapt and introduce new products is a clear competitive advantage.” (Porsche Consulting, 2020)</i></p> <p><i>“Consumers increasingly expect a lengthy impact to their routines and finances, and most report a reduction in income over the past two weeks. Overall spending intent is down across two-thirds of countries surveyed, but more categories are showing positive trends. While spending on staples and stay-at-home entertainment has always been elevated, spending on other categories such as food takeout and delivery, snacks, personal care, skin care, non-food baby products, fitness and wellness, and gasoline is slowly picking up in regions that are emerging from the crisis.” (Bhargava et al., 2020)</i></p>
--	---

#### Appendix 10.4.4: Strategic Adaptability (Table 25)

Strategic Adaptability	
Participant	Quote
Katrine Brusgaard	<p><i>“I think a lot of people have shown that the change resistance is less. So, people are more change minded. [...] There is more uncertainty, but the bigger picture is maybe more changeable.”</i></p> <p><i>“In the long-term we are looking into many ships many ships will probably not change the engines but instead we will have to repair more. So, in the future we may have to make more money on the repairment, but we will not sell as many engines.”</i></p>
Wilfried von Rath	<i>“What I personally learned is how flexible and fast people can adapt to such situations.”</i>
Anonymous 9	<p><i>“The biggest strategic change was of course in logistics, because supplying an online customer is of course completely different from supplying a store. This happens partly from different warehouses and this is of course a huge change that has to be pushed forward, because flexibility must not be lost. This means that if the stationary trade would increase again extremely quickly, the changes can be changed back again. [...] That's why it was a good time that something like this happened. That we take such flexibility into account in our future orientations.”</i></p> <p><i>“Although this flexibility is virtually taken away from you now, it will continue to be important in the future to be able to change the space you have quickly and respond quickly to crises. And that nothing is so rigid that small changes require huge re-planning.”</i></p>
Anonymous 13	<i>“We have rebuilt a lot of our existing products, so for example we have a product that you can use what you can use to inspect with a camera like the products in manufacturing [...]. And of course you can also use that to watch, if people in a factory have enough distance from each other or if people are wearing the right thing or if they have their face protection on properly, you can use that for security issues within the production. That means we have simply rebuilt many existing products. [...] That means that we are trying to set ourselves up commercially as well, so that we just give something like mini loans to customers, so that they still use our service.”</i>
Anonymous 16	<i>“There have also been initiatives on adapting delivery methods for some suppliers. We thought about what alternatives are there that the supplier does not have to take up our stock. In a way that we don't store the products from the supplier ourselves, but that we can use our logistics to supply our customers directly from our suppliers' warehouses, for example.”</i>
Anonymous 17	<i>“This economic slump, combined with changes in consumption, combined with supply chain problems, means that we have to adapt our business much more quickly and flexibly to get through this period, which will last much longer.”</i>
Anonymous 19	<i>“Attempts are also being made to control production in such a way that at the moment priority is given to those sales markets where demand is starting to pick up again. Asia in particular, especially China, has more or less overcome the crisis and accordingly, vehicles are now being produced for this market in particular.”</i>
Anonymous 21	<p><i>“Most of the manufacturers are focusing on battery electric vehicles, but if there is a breakthrough in fuel cell technology, and so on. This has already led to the fact that a lot of work has been done in strategy in recent years with scenarios and scenario planning. I would say that this instrument has now been given a further real push at the methodological level.”</i></p> <p><i>“Corona has shown us that any event can happen without you foreseeing it and so fast that you don't have the time to prepare for it. And that's why I think that scenario planning, even if it was already there, will play a much stronger role. I think it's almost a psychological issue, if I take the topic of strategic planning now, that you have always gone into every last detail. The management has always asked me on what assumptions is that based, what is the exact number that comes out of the 10-year planning for sales, for example. And it has always been clear that a forecast is supposed to give a certain strategic direction, but of course it never comes true in the same way. So, it's not worth asking for every last detail. It would be much more exciting to take a level of detail and take the time to look at different scenarios. This has become more and more common in the last few years and I think that a Black Swan event, as you called it, is likely to push the need for scenario planning even more.”</i></p>
External Data	<p><i>“COVID-19 is testing not only the systemic resilience but also the adaptability of businesses, institutions, governments, and entire societies.” (Candelon et al., 2020a)</i></p> <p><i>“No country, company, executive team, or individual leader will be immune from COVID-19's impact. No strategy will survive fully intact. Scenario-thinking and sensing capabilities can strengthen the courage and conviction of executives to lead through these unique times.” (Deloitte, 2020a)</i></p> <p><i>“Coronavirus has exposed the vulnerabilities of companies whose competitive advantage is based on the ownership of unique physical assets — such as airlines and cruise lines, but also manufacturing and traditional retail. While some manufacturers have been able to quickly shift to the production of medical supplies, such as surgical masks, hand sanitizer, and ventilators, these are (very) temporary advantages.” (Greeven &amp; Yu, 2020)</i></p>



	<i>"Crises like the one we are facing today force businesses and their leaders to change and adapt at extraordinary speed." (Strack et al., 2020)</i>
--	---

## Appendix 10.5: Uncertainty Dimensions Related to Dynamic Capabilities

### Appendix 10.5.1: Digital Leadership Skills (Table 26)

Digital Leadership Skills	
Participant	Quote
Anthony Dickinson	<i>"The ability to make a relationship with a completely stranger digitally is much harder. And we have certainly noticed that."</i>
Gregory Glanzmann	<i>"As a manager I have to think about it: How do I access my people now? To focus a bit more on employee involvement in the management task."</i>
Johnny Sørensen	<i>"But when I need to get to know the team fast, I always travel to the team and I am sitting with them, to learn them, to see them, how they react. When they say 'yes' do they really mean yes or do they mean 'yes, but' or do they mean 'no'. You have to learn people before you can do business. [...] So, I think this is one of the negative parts that we are going to be limited in travelling. And that we have to be aware of it. [...] What I have seen is that managers just take everything they have done yesterday, and copy paste that into virtual reality. And I think that is one of the things we have to reconsider when we will get a little bit further down the road."</i>
Karen Frisch	<i>"When you are talking about classes that is more than 20 people, like 50 people, the engagement of the students with the class, of course, you can have it, but it is completely different than having a professor face-to-face. [...] Because it is not just about the tools that your organization puts in place for the employees but also to understand that different people will adapt through different methods and different technologies."</i>
Katrine Brusgaard	<i>"It demands from the managers to do more emotional handling. I think that is the biggest thing where we are trying to prepare the managers for. For example, we are sending some information out today on what to talk about with your employees and how to make sure that everybody is coping with it fine. Make sure managers ask about their private situation and whether they feel lonely or flooded with people at home. For sure the emotional part of leadership is gaining importance now."</i>
Steve van Houten	<i>"I am not going to criticize [my client] over the internet. Because maybe there is a good reason. So, I am doing that one by one on Skype or on Zoom. And it is not really as good because I cannot see the factory or the office. I cannot see all the people together. I cannot see what is going on. I cannot see how they work or what they do. So, it makes my work less effective at least from my point of few."</i>
Anonymous 3	<i>"We discovered that if teams know each other it works well but if teams do not know each other it does not work so well. [The skillset for digital management] was already a discussion topic before but not so concrete and with the same intensity."</i>
Anonymous 5	<i>"It has become clear to me that people who make more home offices are also more difficult to control and manage."</i>
Anonymous 7	<i>"[It is critical to] bring structures into these video conferences, into this home office topic, train the managers in dealing with home office employees."</i>
Anonymous 8	<i>"And what I learned, you have to be extremely disciplined and you have to prepare yourself for the pitch. So, the preparation of this, if you start with a 3-man team, is much higher than if you can do it face to face on site. [...] And you can't even make small talk with 15 people on a [virtual] team. That's not possible, which you would normally do when you're invited to a client."</i>
Anonymous 10	<i>"The topic of leadership is being expanded to include the competence of having to lead a team from a distance. The topic of team cooperation now gets additional challenges because you don't sit opposite each other."</i>
External Data	<p><i>"Successful organizations will depend on leaders who are as empathetic as they are capable. Technological change makes our world a fast-paced one on any given day, and unexpected circumstances (like a pandemic) force companies and teams to adapt at lightning speed. While the crisis is frightening and tragic, it also offers valuable lessons. What we learn today about ways of working will be invaluable for years to come, so it is up to leaders to rise to the occasion. Whether they do is a deciding factor in which companies emerge from this crisis stronger than before. To hone their empathy and ability to adapt, leaders require three elements: The head, to envision the future and the priorities required to succeed. The heart, to inspire and empower employees. The hands, to ensure innovative and agile-execution capabilities." (Strack et al., 2020)</i></p> <p><i>"In the context of digital transformations, the main implication is that you cannot expect big changes or upgrades to your organization unless you start by selecting and developing your top leaders in that vein to begin with." (Frankiewicz &amp; Chamorro-Premuzic, 2020)</i></p> <p><i>"Managers need to understand factors that can make remote work especially demanding. Otherwise high-performing employees may experience declines in job performance and engagement when they begin working remotely, especially in the absence of preparation and training." (Larson et al., 2020)</i></p> <p><i>"Not being able to work together in the same room with colleagues may become a major challenge in the next few weeks. To make virtual meetings work, [leaders] might need to adjust how [their] team conducts them." (Frisch &amp; Greene, 2020)</i></p> <p><i>"Virtual leadership means that now the social influence of leadership is executed by means of digital communication technologies. In order to lead effectively via virtual leadership, a strong digital fluency, deep knowledge and a positive attitude towards digital technologies – a digital mindset – are indispensable." (Fastenroth &amp; Jochmann, 2020)</i></p> <p><i>"Digital work requires more than mere structural and technical know-how. Shared leadership offers an ideal approach to remote leadership. Building trust and visibility despite of spatial distance as well as enabling employees proved as best practices." (Fastenroth &amp; Jochmann, 2020)</i></p>

### Appendix 10.5.2: Digital Literacy (Table 27)

Digital Literacy	
Participant	Quote

Gregory Glanzmann	<i>"Even if you're technology-savvy, for example, you haven't necessarily figured out that you can create live pools directly integrated into Skype or that there are whiteboards in there. That is just a bit hidden. If you are suddenly faced with the challenge of making collaboration interactive online, especially in a corporate environment, what tools do I have that I can use?"</i>
Karen Frisch	<i>"On one day to the other we were said 'the school is closed you need to teach online. [...] I do not think that is working so well. But it does not mean that it will not work well in a couple of months.'"</i>
Stuart Hardy	<i>"A great example is just the simple virtual communication that is taking place within businesses nowadays. If you look at the medical profession and you look at tech in the UK with virtual consultations with doctors. The technology has been around to do that for many, many years. But as being reluctant, the medical profession has been in denial for the use of virtual communication with the patients. But within a matter of months it has become the norm. Prior to COVID-19 in the UK I think there was something like 0.5% of consultations were done virtually. And now it is about 90%."</i>
Anonymous 2	<i>"Some of our clients who are more familiar with virtual communication technologies feel more confident for the future and are more able to keep on working right now. As for our clients which are not digital natives there, we can see that many of their operations are not continuing right now, because they are not able to establish a virtual work environment."</i>
Anonymous 3	<i>"Guidelines and best practices are currently being developed that will make it easier to exchange information virtually."</i>
Anonymous 5	<i>"After the Corona crisis is over, there will be a different way of working. [...] We also have the possibility to use different media to simply go through drawings that we have made for process engineering."</i>
Anonymous 6	<i>"Right now, we are working with an insurance customer, and there was a lot of paper-based work up to now. It is really crazy how many faxes are still being sent back and forth with the doctors' offices. It's really horrendous. I think that will really have to be changed now."</i>
Anonymous 7	<i>"We communicate daily via Skype and Microsoft video conferences. We have learned a lot through this, and it will have an effect beyond this corona topic."</i>
Anonymous 10	<i>"A giant leap in digital literacy, forced by necessity. We've always had the excuse 'digital collaboration tool can be used but not necessarily has to be. There is no pressure'. Now, however, and digital literacy will be a big part of it'. [...] Then there is also individual digital competence, for example in task structuring, where Trello is an instrument and organizational aid. Then, of course, there will also be a huge boost for digital forms of learning. So, the topic Learning 4.0 will also get a boost from this crisis."</i>
Anonymous 12	<i>"Basically, I think it should be noted that I see the advantage of this pandemic in the fact that we have moved very quickly from the Stone Age to the Middle Ages of digitalization."</i>
Anonymous 17	<i>"That will have an impact, because now everyone will gain experience with it, which was previously perhaps also recommended theoretically or by consultants or even carried around the world as a fashionable topic. [...] They are much more experienced to say what is actually feasible to do virtually in workshops, in conferences, in training, in routine meetings etc."</i>
Anonymous 20	<i>"What we are doing now shows us that conference calls also have many possibilities. This is an aspect we are learning now, where we will also try to optimize things in the future."</i>
External Data	<p><i>"Given the importance of talent in accelerating progress, it's critical to adopt a through-cycle mindset on people—not just in keeping the right talent but also in building the skills of the people you already have. [...] Training itself is likely to see profound change. Before COVID-19 hit, most companies struggled to get online learning to work. The new world of remote working, however, is acclimatizing people to the tools and processes that are core to distance education. This represents an opportunity for training to scale the programs built for how people actually learn best: shorter, 'bite size' learning modules tailored to the individual and delivered when they're needed as part of a thoughtful learning journey." (Fitzpatrick et al., 2020)</i></p> <p><i>"Virtualized workplaces are certain to extend beyond the COVID-19 crisis and become a permanent fixture of the corporate landscape. Being successful will require innovation to construct them with virtualization as a strength, for employees and companies both, and not a weakness." (Ghose, 2020)</i></p> <p><i>"Contrary to popular belief, digital transformation is less about technology and more about people. You can pretty much buy any technology, but your ability to adapt to an even more digital future depends on developing the next generation of skills, closing the gap between talent supply and demand, and future-proofing your own and others' potential. [...] The main implication is that when leaders think about investing in technology, they should first think about investing in the people who can make that technology useful." (Frankiewicz &amp; Chamorro-Premuzic, 2020)</i></p>

### Appendix 10.5.3: Measures for Resilience Building (Table 28)

Measures for Resilience Building	
Participant	Quote
Anthony Dickinson	<i>"And perhaps the need to create more resilience in my own systems. Resilience is really the key term. I often look at my U.S. colleagues and I noticed something after getting to know quite a few of the throughout the years. Most of them do not just have a job and a salary. Most of them invest their money somewhere, they have a little bit of a side hassle, they have multiple things to make sure that almost to a certain extent their very much striving to be independently. Ultimately, to build resilience into their income stream."</i>
Johnny Sørensen	<i>"I see a tendency that companies go from completely panic and then after a few weeks suddenly it becomes a norm."</i>
Steve van Houten	<i>"I think we are also finding that people are very resilient or adaptable. I mean yes, it is tough, but we can handle a lot."</i>
Anonymous 12	<i>"The human component is very large, and the uncertainty is very great, and it is my job to intercept that a little bit, whereby I personally have the same uncertainties and had no answers at all too many things. Therefore, I could only try to calm down and to show what possible courses of action are."</i>
External Data	<i>"People, organizations and communities need fit-for-purpose plans today that can evolve as the global health and economic environment changes. Businesses, governments, citizens, and non-profits all play critical roles in establishing a human-centered, systems-minded approach that promotes shared workforce resilience." (Accenture, 2020)</i>

	<p><i>“Resilient leaders shift organizational mindsets, navigate uncertainties, and invest in building trust in order to develop a recovery playbook that serves as a solid foundation for the post-COVID future. [...] Resilience is not a destination; it is a way of being. A “resilient organization” is not one that is simply able to return to where it left off before the crisis. Rather, the truly resilient organization is one that has transformed, having built the attitudes, beliefs, agility, and structures into its DNA that enable it to not just recover to where it was, but catapult forward—quickly.” (Renjen, 2020)</i></p> <p><i>“The emphasis on efficiency in the operation, management and outcomes of various economic and social systems was not a conscious collective choice, but rather the response of the whole system to the incentives that individual components face. This has brought much of the world to rely upon complex, nested, and interconnected systems to deliver goods and services around the globe. While this approach has many benefits, the Covid-19 crisis shows how it has also reduced the resilience of key systems to shocks and allowed failures to cascade from one system to others. A systems approach based on resilience is proposed to prepare socioeconomic systems for future shocks.” (OECD, 2020d)</i></p>
--	---

## Appendix 10.6: Uncertainty Dimensions Related to Collaboration and Information Styles

### Appendix 10.6.1: Appreciation and Reflection on the Meaning of Life (Table 29)

Appreciation and Reflection on the Meaning of Life	
Participant	Quote
Alexander Drees	<i>“What has been good for me is the deceleration. To have more free time, to be more with the family, also to be more creative in what you have to do, in your own four walls. I have done more cycling tours in the last 6 weeks than in the last 10 years. These little things, otherwise, you just visited friends in Düsseldorf or Munich, and now you do something like that. They were very small, but very beautiful things. I really liked it, it slowed me down and made me feel even more down to earth. This one of me flying to New York, which I used to do, has of course taken on a different meaning. You just see how special it is that you can do that. But that there are also many simpler things that are also a lot of fun and beautiful.”</i>
Dr. Clemens Schwerdtfeger	<i>“[I learned] that slowing down does something good to you, [...] that it is also quite nice at home and that you do not always have to travel around the world.”</i>
Gregory Glanzmann	<i>“You can change your life model without having to change everything in your life. I still have the same job. I still live in the same place, but I can still live a life that has much more time for a family. [...] And so, I have a completely different insight into her everyday life. Of course, this is not 100% the model for the future, but I think it is possible in some part. So, to look at the work-life balance a little bit differently for the future, I think that can have a lasting effect on me. I used to do home office every other week or once in a while, but I could imagine that in the future it will be more like two days a week. [...] I do believe that it will have a lasting effect.”</i>
Johnny Sørensen	<i>“Maybe we were just running in the hamster wheel because we were in the hamster wheel. But if we step 2 minutes out of the hamster wheel, we say ‘it is nice to be here’.”</i>
Katrine Brusgaard	<i>“I think my biggest positive finding has been that my team is fabulous. I am so proud of my team in HR. The feeling I sometimes get that if we have a problem, I have to solve it, and people are stepping up and taking responsibility just getting things done with a good spirit and a good mood all over. Just so constructive and that makes me really, really happy. So, I feel that from an HR perspective, we are totally delivering and that is such a proud feeling and that is cool. [...] So, that is really nice and also a little bit scary, because the thought of being back to work 5 days a week in the hamster wheel makes you think a little bit. I sleep a little bit longer in the morning. I do not have to shower, dress nicely and put on a lot of make-up. I just can sit here in my hoody and just do all my things from here.”</i>
Steve van Houten	<i>“I think there has been a lot more appreciation of people. Like the cashier at the grocery store. Thank you. There are grocery store workers who have died from this thing. Some poor person making minimum wage is risking his or her life so I can have food on the table. Wow!”</i>
Stuart Hardy	<i>“I think everybody, and I would put myself into that category as well, welcomes the opportunity to reconnect and to sort of take a time out from the normal way of working. I am quite enjoying spending a lot of time at home and getting fitter and eating well, sleeping well all those kinds of things. Taking a time-out of all those normal things on the rollercoaster of business. So, that is a chance of reconnecting with the environment and yourself.”</i>
Torsten Schneider	<i>“It simply offers a chance to get away from the normal hamster wheel, which I never felt negative about, and to get out of it and maybe find new values and perspectives. Just that you are primarily at home or in your personal environment all day on the weekend and everything is much slower and feels good.”</i>
Anonymous 1	<i>“People will really re-think on what is essential in life. Is this level of luxury really important? [...] or relax and accept to be happy with a lower wealth status but with less stress and more enjoyment of life.”</i>
Anonymous 2	<i>“Going out of the crisis, I think I will definitely keep some of the habits that have evolved now during the pandemic times such as reflecting more intensely in my daily structures.”</i>
Anonymous 6	<i>“I think a little priority shift. In the sense that you just notice for yourself what's really important, also in dealing with other people. That health should have a higher priority than the bank account or a trip or something like that. You have time to think, read books or develop new habits.”</i>
Anonymous 7	<i>“Maybe in the next few years I'll be questioning holidays in certain countries that were still around. Like the backpacking trip through South Vietnam with these markets, I might give up on that.”</i>
Anonymous 9	<i>“Well, of course now it's being said everywhere that people value life more again. But that's also true. Personally, I think home office is great. I can do everything in my home office and get my full salary, but still you reflect on what you value and what you had before Corona. Even now I am still totally happy, but before that you could just walk around freely and do what you wanted. I think I appreciate that now much more than before. I simply didn't have the awareness of this in my daily life.”</i>
Anonymous 12	<i>“I think that the being together is a little more human, with a little more understanding of each other. It's no longer this 'I, I, I' or elbow mentality. I think you pay more attention to your environment and you are more sensitive to it. But I am also curious if this will continue when things are going normally again. [...] And we also learn a lot about ourselves.”</i>
Anonymous 13	<i>“You learn to understand that people not only work, but also have a private life. I think everybody feels that way a little bit. I also learned a lot about how [company name censored] works and how my team works. And also, how to prioritize a lot more.”</i>

Anonymous 14	<i>"I got the confirmation that I have married the greatest woman in the world. That helps a lot in isolation now."</i>
Anonymous 16	<i>"And the lesson I have learned is that many things that are taken for granted are very fragile."</i>
Anonymous 17	<i>"I think that the word consciousness, awareness, has received another reinforcement. I think I have always been a conscious and reflective thinking person and acting, but this awareness that life is uncertain, the awareness that there is an unbelievable complexity in which we don't make life and the decisions so easy. That means I have an awareness of this uncertainty, which I personally can take quite well. That is life. An awareness also for this complexity and therefore certainly also an awareness for what is important to me personally now and what is less important to me. I believe I am not alone in this. There are many who are now readjusting this. [...] Or even if you say such an awareness of this uncertainty, then it has the effect that I appreciate what I have. And maybe see the full glass more than the half-empty glass. And I have also resolved to take pleasure every day in things that are good and to accept the uncertainty."</i>
Anonymous 18	<i>"I learned that I was some time of my life on not so important things. I realize that although I am a guy who tries to live the life as I should. But there are things that I cannot neglect mainly with friends and family."</i>
Anonymous 19	<i>"You simply can't do so much anymore, which is perhaps not so bad and somehow leads to increased productivity."</i>
Anonymous 20	<i>"First of all, I'm glad that we don't live in a 60 square meter apartment. So that you still have a free space with garden etc. The other thing is that you notice that things are a bit quieter now, whether it's traffic or something else. And the fact that you don't necessarily pursue this consumerism idea any further, whether it's ordering goods on the Internet, is something I don't really feel like doing at the moment. What you are missing are of course meetings with friends, a dinner outside, holidays, these are all things that come up now but are only possible to a limited extent. In the last consequence so a little bit pause, rest, also see that also unnecessary vacation trips are not necessarily, the measure of the things now as well as environmental influences etc."</i>
Anonymous 21	<i>"[It] is almost a bit philosophical, but the question 'what is really important in life? You have a lot of time to think about that when you're on short-time work. And yet I still remain someone who says: 'The job is something very important for me'. Work is very important to me. And yet I have also noticed that it's not so bad if you don't work for a long time. [...] You start to think about prioritizing things in your actual everyday life. So 'what value does work have for me?' And I have already thought about that, that work is very important for me and I am glad when the Corona crisis is over, and I can work again. But it doesn't have to be X hours every day and you rarely see your family and partner. That is always the question. One already thinks about it. But it can also be that you fall back into old patterns afterwards. Everything is possible."</i>
Anonymous 22	<i>"What I perceive is the discussion about the perception of doctors and nurses. Keyword appreciation towards them."</i>  <i>"I have certainly also noticed that it is good to slow down. So especially for me, because I was always on the road a lot. And now I was forced to be in one place and realized that this can be good for me. [...] I think you now really appreciate a garden or open space; it is crazy how much value they simply provide to you in such a situation."</i>
External Data	<i>"Major disruptions can cause fundamental shifts in social attitudes and beliefs, which pave the way for new policies, ways of working, and consumer needs and behaviors, some of which persist in the long run."</i> (Reves et al., 2020)  <i>"Coronavirus may make us reconsider how many journeys — holidays, work trips, conferences — are actually essential. [...] At some point, the habits of a lifetime will change. At some point, a nudge will be required. If the shock of coronavirus disruption isn't enough for us to recalibrate, what will be?"</i> (Mance, 2020)  <i>"Our lives have been forever changed by the coronavirus pandemic. Hundreds of thousands of people around the world have died. Millions in the United States alone have lost their jobs. Though the coronavirus outbreak was declared a pandemic just over a month ago, many of us are already feeling nostalgic for our lives before the virus went global. We asked [our readers] to send us photos and videos that captured those moments of normalcy. We received nearly 700 submissions from all over the world — from Wuhan, China, to Paris, Milan to Mumbai, and across the United States. Nearly every submission expressed a sense of gratitude and appreciation for the time before the pandemic."</i> (The New York Times, 2020)

#### Appendix 10.6.2: Cultural Changes (Table 30)

Cultural Changes	
Participant	Quote
Gregory Glanzmann	<i>"From a cultural point of view, the personal approach and team spirit has gained another importance. Looking at other formats or introducing dailies, things like that. These are things for the team that could have taken forever to develop and are now being tried out of necessity."</i>
Johnny Sørensen	<i>"I think the word 'fairness' will gain importance."</i>
Katrine Brusgaard	<i>"I really think this has been the biggest cultural change and it was done by a stupid virus."</i> <i>"I think the home office thing, which is a bit of a curious thing, a cultural thing, I mean these are completely new ways of working."</i>
Torsten Schneider	<i>"And yet things are happening culturally in the company, which are positive and negative in terms of digitalization, flexibilization, work from the home office, new work cultures, where experiences are being made. This will change something culturally massively."</i>
Wilfried von Rath	<i>"I believe that the way we work together will change permanently."</i>
Anonymous 14	<i>"There will be a different corporate culture, a different management culture and we are already learning a little bit about that."</i>
External Data	<i>"Company culture, leadership, employee experience and the whole digital workplace experience are now being put to the test. The way many companies work will change overnight and there will be no return to normal. The cultural and economic organization of work will feel different. The problem is that we don't yet know what that difference will be."</i> (Roland Berger, 2020b)  <i>"An organization's culture is its behaviors at scale—basically, what it says and does. Culture is guided by purpose and values. And it will be put to the test by crisis, as is happening right now with Covid-19. Our research tells us that</i>

	<p>among the values exhibited by strong cultures are collaboration, agility, integrity, people-centricity, innovation, accountability and ambition. Companies that exhibit a winning culture, that have a strong internal compass and inspire their employees, are, we have found, 3.7 times more likely to be business performance leaders. [...] Reconnecting with your purpose and values will make it possible, when this crisis has passed, to look back with pride at how your company responded. Culture always matters, but it matters now more than ever.” (Berman &amp; Thurkow, 2020)</p> <p>“COVID-19 isolation measures have abruptly changed ways of working. The rapid shift to remote working is cause for significant anxiety among the workforce. It is going to put many company cultures to the test. The right culture—a culture that embraces change, recognizes the new challenges facing employees and encourages them to take the initiative, do things differently and more effectively—can support this shift, easing the transition and driving productivity.” (Díaz Gutiérrez, 2020)</p> <p>“Every day we are seeing and experiencing the human impacts of COVID-19 on individuals, teams and organisations. The list is long: disruption, change, fear, anxiety for self and family, isolation, lack of certainty and clarity, and frustration. Our global research shows that culture is even more important to organizational performance and success than strategy or operating model. Protecting and nurturing your culture should be part of your crisis management approach.” (PWC, 2020a)</p>
--	--

### Appendix 10.6.3: Crisis Management (Table 31)

Crisis Management	
Participant	Quote
Anthony Dickinson	“We live in a complex interdependent world with very many moving parts. The management techniques [developed for the industrial revolution] do not necessarily work in that world anymore.”
Dr. Clemens Schwerdtfeger	“Developing a crisis scenario, [...] these considerations did not exist before. [And this is currently developed] not only for the current situation, but also for future crises.”
Wilfried von Rath	“We also have a crisis management team, which we have now set up, as I believe every company does. It meets every day. We coordinate all measures there, across all divisions. This is a very intensive form of cooperation. Very concentrated, very consensus-based, as I have rarely experienced. [...] Well, I have just set up a project group to look at what we want to learn from the crisis and what we want to keep.”
Anonymous 10	“Our pandemic plan will certainly be adapted from the experience gained.”
Anonymous 16	“Perhaps we must first say that all decisions relevant to Corona are made at the very top of our list. That is really very top-down. The top level really means the level Germany boss and sometimes even higher. And they make global decisions on how to deal with the corona virus.”
Anonymous 19	I also think that the topic of crisis management in general is getting a higher profile because you really see how vulnerable global supply chains actually are to disasters. And it is precisely in the case of such disasters that it is particularly difficult to set up efficient risk management and to prevent them in a measured way is relatively difficult. But I believe that crisis management, that is, the reactive component, is getting a bit more attention. [...] I think that for crisis management this awareness is definitely not there. In principle, you can't prepare for a crisis like that anyway. Now Corona happened and now you have to see how you deal with it. Now that the ball has already started rolling, I think we are discussing how we can better prepare for similar scenarios in the future. And now lessons learned makes out of what has happened and how to deal with it in future crises. The whole crisis management was now also a process that developed slowly. In the beginning, you set up a task force at the company level and broke it down into departments, but the way you really approached it was a bit of a try-out approach. I believe that you are already trying to establish it now and use it for future crises.”
Anonymous 21	“I can't describe it for other companies but speaking from the [company name censored] perspective, I really have to praise this company at this point, because there is a very transparent central crisis information channel. There are regular videos or personal messages. I think that is important to counteract this and to have a clear information policy that prevents rumors from arising. [...] I would even almost basically transfer that and say transparent communication doesn't hurt even in good times.”
External Data	<p>“For leaders, the challenge of guiding people through uncertainty and into the new reality brings timeless needs into sharper focus. Empathy and flexibility are important leadership qualities at any time. When employees experience sudden and radical change—such as the need to work remotely or in highly restricted workspaces for an extended period—these qualities are even more essential in order to keep teams cohesive, engaged, and motivate.” (Strack et al., 2020)</p> <p>Effective leaders take a two-pronged approach, both acknowledging the stress and anxiety that employees may be feeling in difficult circumstances, but also providing affirmation of their confidence in their teams, using phrases such as “we've got this,” or “this is tough, but I know we can handle it,” or “let's look for ways to use our strengths during this time.” With this support, employees are more likely to take up the challenge with a sense of purpose and focus. (Larson et al., 2020)</p> <p>“79% of board members, according to the EY Global Risk Survey 2020, state that their organizations are not very well-prepared to deal with a crisis event. [...] What is of the highest priority for businesses and governments during a crisis is the well-being of people – the individuals. Businesses can contribute and complement these efforts by having a professional crisis management plan. A strong crisis management plan can also help businesses ensure the well-being of their people, keep their resources protected and strengthen their ability to perform optimally when the odds are stacked against them.” (Weidemeyer, 2020)</p> <p>“For many leading companies, the next urgent priority was setting up a fully dedicated Covid-19 war-room team, consisting of senior leaders from disciplines ranging from sales and operations to HR and finance. The team's mission is to deliver critical business action plans with clearly defined work streams, including initiative owners and designated sub teams of experts. The team is action-oriented and Agile, operating in sprints with daily virtual huddles and using a real-time digital platform to track the status of different initiatives. Its members break all normal reporting cycles to overcommunicate consistently and transparently with all key stakeholders across the organization.” (Saenz &amp; O'Keeffe, 2020)</p>

#### Appendix 10.6.4: Digitizing Internal Processes (Table 32)

Digitizing Internal Processes	
Participant	Quote
Alexander Drees	"The trend is that people can exchange information via video conferencing in both private and business situations, and that they don't need personal contact for every meeting."
Dr. Clemens Schwerdtfeger	"We work a little bit more with virtual communication like videoconferencing and more telephone contacts than personal contacts and interviewing candidates via Skype, WhatsApp or Facetime."
Johnny Sørensen	"No more global travelling to see each other or share information. You can do that through conference calls."
Niels Heyer	"All the meetings will have to be held online. And we have now had some discussions with European customers, also via telephone conferences."
Steve van Houten	"My Ukraine project got moved from in person to virtual. What I am doing now is having done this workshop that I was supposed to do over there; I did it virtually."
Stuart Hardy	"A great example is just the simple virtual communication that is taking place within businesses nowadays. If you look at the medical profession and you look at tech in the UK with virtual consultations with doctors. The technology has been around to do that for many, many years. But as being reluctant, the medical profession has been in denial for the use of virtual communication with the patients. But within a matter of months it has become the norm. Prior to COVID-19 in the UK I think there was something like 0.5% of consultations were done virtually. And now it is about 90%."
Torsten Schneider	"Let me give you an example. We used to have 400 WebEx accounts and there were perhaps 50 WebEx sessions throughout the year. Now there are more like 50 per hour and not over a year."
Wilfried von Rath	"We have set up the technical infrastructure for this in a very short time. So, you have to imagine for Wolfsburg alone, these are gigantic capacities that are needed to send 30,000 or rather 40,000 employees to the mobile office concentrated in one location. And then of course worldwide in a group with over 600,000 employees."
Anonymous 1	"Many meetings will be online, but also many meetings will be made physically. There will be a great mixture."
Anonymous 3	"We try to continue our program online via video conferencing. In addition, guidelines and best practices are currently being developed that will make it easier to exchange information virtually."
Anonymous 5	"We have also always done telephone and video conferences. This is simply taking place more intensively now and will be a focus in the future as well, which will become even more widespread in the way we work together."
Anonymous 6	"Right now, we are working with an insurance customer, and there was a lot of paper-based work up to now. It is really crazy how many faxes are still being sent back and forth with the doctors' offices. It's really horrendous. I think that will really have to be changed now."
Anonymous 7	"We communicate daily via Skype and Microsoft video conferences. We have learned a lot through this, and it will have an effect beyond this corona topic."
Anonymous 8	"There were already tools, such as Microsoft teams or virtual conferences, to work with virtual desktops. But the abrupt application of this, that was not planned."
Anonymous 11	"I think there will also be a boost in the justice system. Up to now, the rules of procedure do not provide for video transmission, but I think that will happen now. This is the momentum that is needed, so to speak. This is certainly not possible for all proceedings, but certainly for many"
Anonymous 12	"So of course, we have now tried very hard to boost our online presence. So, we tried to make our online presence as secure as possible and that was very noticeable. When I now let this happen, we even sold cars online, both new and used. More than I could have even dreamed of."
Anonymous 14	"They will experience acceleration. I believe that many companies are realizing that a stable and reliable digital infrastructure helps in such phases, that it also makes you a little bit more independent."
Anonymous 18	"We have to get used to these protections and how to make meetings without the presence of the people but by Skype or how to get people working from home and not working here in the office."
Anonymous 20	"What we are doing now shows us that conference calls also have many possibilities. This is an aspect we are learning now, where we will also try to optimize things in the future."
External Data	<p>"Digital natives may have an initial edge. Other companies will have to act quickly to acquire the skills, capabilities, and ways of working needed to begin the AI journey. But regardless of their starting point, companies must look beyond the COVID-19 crisis and begin focusing on transformations that put AI at their core." (Candelon et al., 2020b)</p> <p>"Amid the humanitarian crisis that has upended lives and cast a veil of uncertainty over the future, one thing is clear: we are living in a much more digital world. As governments around the world institute nationwide lockdowns, the demand for digital services and products, from both customers and employees stuck at home, has hit record levels. [...] This new digital reality presents a unique challenge for chief digital officers." (Alatovic et al., 2020)</p> <p>"Beyond the immediate fallout of the crisis, it has become clear that some of these shifts are here to stay: Covid-19 is radically accelerating the digital future." (Caimi, Anderson &amp; Hoppe, 2020)</p> <p>"Rather than occurring as a normal evolution over a multi-year span, COVID-19 has pushed the virtualization of business upon us with immediate effect. And crucially, not only are business models now being disrupted, business processes are too. [...] The changes in business practice being wrought by social-distancing will be profound and permanent: we're already living in The Day After. From now on we will all have to define, learn, and practice a new paradigm of social presence and engagement. [...] Virtualized workplaces are certain to extend beyond the COVID-19 crisis and become a permanent fixture of the corporate landscape. Being successful will require innovation to construct them with virtualization as a strength, for employees and companies both, and not a weakness." (Ghose, 2020)</p>

#### Appendix 10.6.5: Employee Safety Measures (Table 33)

Employee Safety Measures	
Participant	Quote
Torsten Schneider	"The pandemic plans were more like precautionary measures that we took. And here, too, the cooperation with our service providers on occupational safety and health has intensified considerably and a different awareness of these

	<i>services has developed in various offices. They were often questioned beforehand according to the motto 'who needs such crap anyway'. Nobody wanted to understand the meaning. Now you don't have to explain it anymore."</i>
Anonymous 3	<i>"[...] security measures are being put in place for pathogens, physical security is becoming a greater dimension."</i>
Anonymous 5	<i>"We are buying more soap dispensers and disinfectants."</i>
Anonymous 7	<i>"This topic of hygiene and safety will be a topic for me that I will also be dealing with in the coming months."</i>
Anonymous 10	<i>"The topic of support in self-care, or even care of the employer for health, especially mental health, will increase in enormous importance."</i>
Anonymous 16	<i>"So of course, we have also implemented security measures in the individual warehouses. We have to keep more distance, not everyone can come to work at the same time and so on. On the one hand we are limited in our own ability to deliver and on the other hand there is an increased demand."</i>
Anonymous 18	<i>"From the point of people protection this will have long-term consequence."</i>
External Data	<p><i>"Trust is essential for businesses to regain capacity to operate (supply). Employees need to go back to work, but they may not immediately trust the safety of their business environment. Measures such as temperature checks and social distancing in workplaces can help." (Candelon et al., 2020)</i></p> <p><i>"As businesses prepare to reopen, setting up a plan-ahead team to guide and accelerate decision making may be appropriate. The team's responsibilities will include critically evaluating all return-to-work policies and protocols, stress-testing workforce safety interventions, and reviewing and refining processes after implementation. Because every day brings new developments in the fight against COVID-19, a plan-ahead team can help a company adapt and react quickly—and, ultimately, be better positioned to protect the health and safety of employees and customers alike." (Rivera et al., 2020)</i></p> <p><i>"Many companies have already adopted the safety measures they view as most important, including personal protective equipment, physical distancing and disinfectant sprays and wipes. Short of widespread testing or an effective vaccine, US workers rate effective safety measures higher than various government actions in terms of making them comfortable at work. Our survey results also suggest that companies have substantial room to alleviate worker stress through a number of simple additional actions." (Saenz et al., 2020)</i></p>

#### Appendix 10.6.6: Home Office (Table 34)

Home Office	
Participant	Quote
Alexander Drees	<i>"The home office will gain new clout, and companies will learn from it."</i>
Dr. Clemens Schwerdtfeger	<i>"Home office might now be more a point to discuss than before."</i>
Dr. Wilfried Kienzle	<i>"This will certainly have positive effects on home office. Personally, I have never used a home office before, for a variety of reasons [...]. In this context, I would still prefer office work, but I have to say that for some employees it makes no difference whether they are in their home office or here in the office."</i>
Johnny Sørensen	<i>"I met a few companies how said: 'I do not believe that my people can work from home'. And now you will see people coming back and saying: 'Well it worked pretty well at home'. I hope that the managers and companies will say: 'Yes that makes sense'."</i>
Karen Frisch	<i>"Home office, doing a couple of things through digital this will be a big change in the future. Because everybody has already been gone through it. The confidence about working from home changed completely."</i>
Katrine Brusgaard	<i>"Actually, since that day, I guess it was the 13th of March, our company has more or less worked from home with 1,500 people. So, it has been quite an interesting change because it is an old-fashioned company, not very modern. A bit traditional on the perspective of for example working from home or being flexible and all these kinds of things. We are not really that modern. Now the perspective of working like this via Microsoft Teams, making team work virtually and all of this, is just working super fine. [...] Really interesting to see that beforehand the managers had this impression that if people work from home they were not working. I have been in some companies before where working from home was quite usual. And there everybody was not looking at when you are working and how long you are working. They are essentially looking at the output. We had a guideline for working from home which was pre-discussed just before Christmas and it was really, really short. I think it was 7 pages in Germany and we shortened it to 1.5 pages for Denmark. And now in the latest discussions last week in the work council we discussed: 'Do we even need a guideline?', because I mean it is a manager thing. Just let the manager decide what can fit in their team and how they arrange everyone around it."</i>
Niels Heyer	<i>"I could never have imagined 8 weeks ago that we would be doing home office. And the IT department was always against it. We were always such a dinosaur. And now, I think it could be something for the future, that we do more home office."</i>
Stuart Hardy	<i>"All the impacts on home working and so on will go up massively. Already companies I am talking to, many of them are considering actually keeping a large portion of the home working once the lockdown is relaxed because they seem to be saving costs and working as effectively as they were before if not better."</i>
Torsten Schneider	<i>"And yet things are happening culturally in the company, which are positive and negative in terms of digitalization, flexibilization, work from the home office, new work cultures, where experiences are being made."</i>
Wilfried von Rath	<i>"I think the positive effects are that we have massively gone into mobile working, especially in the indirect functions [...]. It has changed overnight from 3% to 97% and a lot of that will remain even after the crisis is over."</i>
Anonymous 1	<i>"Now people are used to it and may even enjoy staying at home. [...] In the future, there will be both. Maybe in the future they will only work for 2-3 days in the office."</i>
Anonymous 2	<i>"There were discussions about [...] the new way of working. The focus is [now] more on extending offsite times. But I think it will be accelerated much more through COVID-19."</i>
Anonymous 3	<i>"Through the expansion of the [internal] infrastructure, a lot has been invested in the last month, so that everything is possible and that all employees can work remotely from home."</i>
Anonymous 4	<i>"A lot of people previously just did not think it could actually work. For instance, working from home in such massive scales. At the moment, we did not have any other option than to do it. And we have just done it. Everything is not the same, but it is working." s</i>

Anonymous 5	<i>"We will reduce our home office work again even in the Corona crisis. [...] We actually have a home office rule here too. [...] The rule actually means that if you want to do it, then tell me why, there has to be a reason, a task, and it has to be approved and then checked if the work has been done. It must be verifiable. It is, after all, a total effort that you make."</i>
Anonymous 6	<i>"I don't think home office was ever a priority. Of course, I can imagine that people have always thought about how to improve the work situation. But it was never a strategic priority. It may have been an initiative at one time, but now it has really become a priority."</i>
Anonymous 7	<i>"Funnily enough, two weeks before the Corona issue, I negotiated a works agreement with the works councils, which is signed by the management. That's when we thought about it and talked about the possibility of only one day in the home office. Now we have been in the home office for quite a while. That's why the corona virus has played a positive role in our cards. The topic will now find much more acceptance in the company, especially among managers, and will also be much easier to implement because IT has provided everything in many projects so that all our office staff can work completely from home."</i>
Anonymous 9	<i>"We have a possibility to work from home, but very few people do that, and it wasn't really very popular. And now that everyone is in the home office many people realize how well it works."</i>
Anonymous 10	<i>"For example, mobile working, I don't believe that time will be turned back to the way it was before the pandemic. So, we will certainly let people back into the building, but I believe that the willingness of the departments to let people work remotely from their home office has increased considerably."</i>
Anonymous 12	<i>"Car sales and home office - that doesn't really work. It's comparable with pilots, who can't do a home office either. There are just professions where you have to be on site. I think in car sales home office does not work."</i>
Anonymous 14	<i>"Yes, [the willingness of customers to work together digitally] is much stronger. So now they have to. And most customers have managed to do that very quickly. And I think that there is a learning effect now, which has implications for the phase after the crisis."</i>
Anonymous 15	<i>"In banks [remote working] was almost impossible before. You even had to ask the supervisory authorities and so on. And now it all happens without permission. It happens very quickly. Before it was not the case at all. I don't know if I like it that much when people are away for weeks. Sometimes one day a week in the home office is obviously good for thinking about a topic in peace and not having people coming into the office all the time. But before we had it super, super little. That will change. I do believe that home office will be staged more. Staying at home one day a week. That has multiple advantages. People no longer have to travel to work, they save time, have a higher standard of living, and you spend less time in the car."</i>
Anonymous 18	<i>"I think [home office] is a possible [long-term] approach. And the [employees] will like to do it."</i>
Anonymous 20	<i>"We have concluded a general agreement on [remote working] in 2018. To put it politely, various superiors expressed distanced opinions. Do we then have any impact on what the employees will do at home? Will they just sit around and take parcels from Amazon instead of working? So, this fear is completely gone now. We see that employees are very concentrated in the home office. Even we here in the HR department, who need direct contact with employees, works councils or superiors, even that is possible here in these times."</i>
External Data	<p><i>"New research suggests that companies that let their workers decide where and when to do their jobs – whether in another city or in the middle of the night – see increased employee productivity, reduced turnover and lower organizational costs. Prithwiraj Choudhury, an associate professor at Harvard Business School, and his fellow researchers compared the outcomes of flexible work arrangements. The team found that employees with liberal work-from-anywhere arrangements were 4.4 percent more productive than those following a more traditional work-from-home policy that gives schedule flexibility but requires workers to live near the office. Choudhury's findings can help firms understand the effects of various flex-work options and support certain types of employees as they negotiate with employers. (Roland Berger, 2020b)</i></p> <p><i>"The new work environment is home and online. Interaction is via collaboration tools." (Díaz Gutiérrez, 2020)</i></p> <p><i>"When implementing remote working, business leaders must first define a goal. COVID-19 is no goal in itself. Company leaders need to ask why they want to implement remote working beyond the demands of the current crisis. [...] Remote working is here to stay and will more than ever become an integral part of the way we work. Now is the time for companies to prepare for this 'back to the new normal'." (Verbeemen, &amp; D'Amico, 2020)</i></p> <p><i>"While no one knows how long the COVID-19 crisis will last, it seems inevitable that many of us will be working remotely for at least weeks if not several months. Productivity may take a hit, but it doesn't have to hurt. An agile approach can keep remote teams functioning effectively and make them more resilient for the future." (Rehberg et al., 2020)</i></p>

#### Appendix 10.6.7: Mental Health Effects of Digital Working (Table 35)

Mental Health Effects of Digital Working	
Participant	Quote
Katrine Brusgaard	<i>"When you are at the office you walk a little bit around and you talk to colleagues and here you are a little bit isolated. We also start to see that people start to get a little bit tired and start to see the downside [of remote working] and so on."</i>
Anonymous 10	<p><i>"Well, from my perspective, the topic of mental stress is the largest group of illnesses with the greatest increase, which also leads to many absences with long-term illnesses. The whole issue of mental stress, sleeping disorders, is of course enormously fueled by this situation of the new, the unknown, the insecure."</i></p> <p><i>"The topic of support in self-care, or even care of the employer for health, especially mental health, will increase in enormous importance."</i></p>
Anonymous 11	<i>"You can ask yourself whether it's really good if there is no longer a clear distinction between office and private life. That's fine with me, I enjoy it at home, but there are also people, and you have to accept that, who say that they need a clear distinction. But as I see it, that no longer fits into this world. Of course, this also leads to the psychological strain becoming ever greater. If you talk to other professions, people tend to be more stressed out, more annoyed, burnout, you didn't have anything like that before."</i>
External Data	<i>"The negative effects of this "always-on" lifestyle were becoming apparent even before the pandemic, with research demonstrating that spousal resentment and work-family conflict increased the more often employees checked smart</i>



	<p>devices during family time. Now that constant connectivity is our new normal, it is even more important that we learn to set clear boundaries for ourselves, in order to sustain our productivity and our families' well-being." (McAllister et al., 2020)</p> <p>"Those who work from home or remotely from elsewhere inevitably accept that the clear boundaries between their professional and private lives will blur. And while teleworking can provide more freedom and flexibility, it is also associated with the need for greater personal responsibility. Managers and affected employees must therefore jointly examine how the balance between private and professional needs can be maintained – not least from the point of view of protecting health." (Roland Berger, 2020b)</p>
--	---

#### Appendix 10.6.8: Reduced Professional Travel (Table 36)

Reduced Professional Travel	
Participant	Quote
Alexander Drees	"I just think that people realize that the new media can be used in a meaningful way after all. They say that you don't have to fly to Munich for every meeting. The trend is that people can exchange information via video conferencing in both private and business situations, and that they don't need personal contact for every meeting."
Gregory Glanzmann	"From the point of view of travel cost arguments, you have always suggested that maybe you don't travel, but make a telephone conference. But I would say that without Corona you wouldn't have reached this depth. Now let's take a look at what the possibilities actually are. Now we do it as well as possible so that it is perceived as a real alternative and not as a second choice."
Johnny Sørensen	"A lot of companies will realize 'do I actually need to travel to Singapore every second week? Or should I just do it once a month?'. Because if people realize they can do it 3 months without doing it, it will change the way of work."
Karen Frisch	"There will not be as many travels. I think it will continue to have travels, but not as many as before. I think people will start to understand that globally working from home is not as bad for the company."
Niels Heyer	"I think that we will completely restrict our travel activities until the end of the year. I don't think you will travel so much in the future, you will think three times if a meeting is really necessary, if you go to the customer."
Wilfried von Rath	"And of course, also effects on travelling. There are different things we don't really understand yet. But that will come, because the travel restrictions will remain. We have an internal works shuttle. That means we have urban traffic running between, say, Ingolstadt and Wolfsburg, or to Poland and Russia at different intervals. We've now stopped all that. [...] This also leads to the question whether everyone really has to travel with the background of the work task and the results he wants to achieve. Is that really so necessary?"
Anonymous 2	"[The management board of PwC] is already speaking about deviated working behaviors such as not staying at the client side for 4-5 days but rather 2 days with all client meetings compressed in these 2 days and trying to manage the other issues from the PwC office. This is something which will definitely change. [...] In particular, in administrative and management jobs I think there will be reduced travelling times."
Anonymous 3	"With regard to travel costs, one must also consider that the company is currently saving a lot of money."
Anonymous 5	"[Reduced business travel] has actually already happened, that was simply the perspective of having to travel long distances to customers. If you look at a flight chart for the year, you realize that even though we had the same turnover in Australia and England, people flew to England much more often than to Australia. Because they simply saved themselves the work and tried to arrange many things over the internet and where the distance was not so great, then they did it personally. And I think this second part, the flights to England, is getting less, because now you get used to it. They say, 'ok, it works now, we can continue like this'."
Anonymous 6	"Our job is normally designed to be with the customer 4 days a week. Not anymore. I think the biggest long-term change for us is that we no longer do the dull 4 days a week, but on average over the year perhaps around 3 days."
Anonymous 7	"We have to travel much less on business and visit locations much less."
Anonymous 14	"I believe that in the future, business trips will decrease, and here, too, people will think about whether it is absolutely necessary to fly across the continent to meet or whether a good part of it can be done virtually."
Anonymous 20	"We will certainly learn from this that not all the business trips that we have undertaken in the past will necessarily take place in the future."
External Data	<p>"Most obviously, virtualized business processes are cash-efficient. Business travel reduces to a minimum, and hot-desking happens at your kitchen table. [...] Virtualized workplaces are certain to extend beyond the COVID-19 crisis and become a permanent fixture of the corporate landscape." (Ghose, 2020)</p> <p>"Business Travel Has Stopped. No One Knows When It Will Come Back. But one thing is certain: It will be changed." (Levere, 2020)</p> <p>"Business travel worldwide has basically come to a standstill in the coronavirus pandemic. When it will come back, and in what form, is anybody's guess. [...] A poll this month of 106 corporate travel managers who work for BCD clients found similar pessimism about any quick return, with a little over 40 percent saying they expected business travel to return to former levels this year. Another 10 percent predicted that it would not fully return until at least 2022, while 3 percent said it would never return." (Levere, 2020)</p>

#### Appendix 10.6.9: Social Distancing (Table 37)

Social Distancing	
Participant	Quote
Dr. Wilfried Kienzle	"The hygiene awareness of employees has certainly also increased 100%."
Anonymous 3	"Physical security is becoming a greater dimension."
Anonymous 5	"We have now assessed the office space and found that we are generously equipped, and we will manage to give at least 2/3 of our colleagues an individual office. And this will guarantee safety distances and other things."
Anonymous 7	"Well, personally, even if the shutdown were to be completely resolved tomorrow, I would still have some discomfort in entering a larger group of people. I suppose that this year will be a theme that is outside, maybe in autumn but not like the Oktoberfest or something like that – there won't be 500 or 1000 people going into a small hall. I don't think there will be any events of that size this year."

	<i>"This discomfort in crowds. Our circle of friends, the neighborhood and our parents, we stick strictly to the guidelines, avoid large gatherings, keep our distance, and beyond Corona, we cover up this issue of maintaining hygiene standards. Like frequent disinfection, look where are people who cough. [...] I like the distance rule. This is not a Corona topic for me now, because I think after Covid-19 comes the next topic. If you think about how the topic of multi-resistant germs has developed over the last few years."</i>
Anonymous 16	<i>"So of course, we have also implemented security measures in the individual warehouses. We have to keep more distance, not everyone can come to work at the same time and so on. On the one hand we are limited in our own ability to deliver and on the other hand there is an increased demand."</i>
Anonymous 18	<i>"From the point of people protection this will have long-term consequence."</i>
External Data	<i>"This shift to the ("socially-distanced") virtualization of all business models was already fated to happen one day. Rather than occurring as a normal evolution over a multi-year span, COVID-19 has pushed the virtualization of business upon us with immediate effect" (Ghose, 2020)</i>  <i>"Consumers remain hesitant to return to some of the in-person activities that were part of their daily lives before the start of the pandemic. Across countries, net intent to visit the mall is negative, and only in Germany and Japan do more consumers expect to increase in-store shopping compared to before the pandemic. Consumers in the US, Germany, Spain, Italy, and Japan intend to do more grocery shopping in person, while those in France, the UK, and India intend to do less." (Bhargava et al., 2020)</i>

## Appendix 10.7: Uncertainty Dimensions Related to Decision-Making Styles

### Appendix 10.7.1: Decision-Making Procedures and Speed (Table 38)

Decision-Making Procedures and Speed	
Participant	Quote
Johnny Sørensen	<i>"Basically, what happened now is that somebody forced you to change. Then after a few weeks you realize that this works really well. And I see that at a lot of clients."</i>
Katrine Brusgaard	<i>"You never know what will happen so you just off to sort of go with it. I think a lot of people have shown that the change resistance is less. So, people are more change minded."</i>
Wilfried von Rath	<i>"I believe that this will speed us up enormously. We would have discussed this [internal digitalization effort] over the next 10 years, sent it through the committees and now it just happened. And I think that will stay."</i>  <i>"We also have a crisis management team, which we have now set up, as I believe every company does. It meets every day. We coordinate all measures there, across all divisions. This is a very intensive form of cooperation. Very concentrated, very consensus-based, as I have rarely experienced. [...] Well, I have just set up a project group to look at what we want to learn from the crisis and what we want to keep."</i>
Anonymous 17	<i>"And I notice that this is a quick course, which is no longer dominated by articles and books and evangelists [...]. But that everything is now being tried out in a differentiated way and that you have a much better basis for decision-making."</i>
External Data	<i>"Lifting non-critical administrative barriers can help expedite the delivery of critical products. "Emergency" regulations can be adopted through "fast-track" procedures. This does not mean, however, an absence of scrutiny, and can be combined with careful review after implementation and, potentially, sunset clauses." (OECD, 2020f)</i>  <i>"Leaders with the right temperament and character are necessary during times of uncertainty. They stay curious and flexible but can still make the tough calls, even if that makes them unpopular. They gather differing perspectives and then make the decisions, with the best interests of the organization (not their careers) in mind, without needing a full consensus. For decisions within their delegated authority, they escalate only the trickiest problems for input or approval. In wartime, you want a Winston Churchill, not a Neville Chamberlain." (Alexander et al., 2020)</i>  <i>"The speed with which the Covid-19 crisis is unfolding is putting the world's leaders mercilessly to the test. They — and indeed all of us — have to make decisions fast, under great uncertainty, and with great stakes hanging on the outcome." (Sandbu, 2020)</i>  <i>"All of which is to say that in times of (relatively) slow-developing existential crises like a pandemic, it is best to take your time when making decisions rather than acting on gut feelings. Those quick actions may reduce some of your anxiety in the short-run, but they are likely to create more problems than they solve." (Markman, 2020)</i>

### Appendix 10.7.2: Forecasting and Prediction Efforts (Table 39)

Forecasting and Prediction Efforts	
Participant	Quote
Anthony Dickinson	<i>"We are using management techniques that are based on the first and the second industrial evolution. Adam Taylor or Taylorism is still very much at the core of scientific management. It is still at the core of the way we run our businesses. We are breaking them down into functions and think that if we can manage the parts effectively you get what you are expecting when you integrate those back to the whole. I think that something that COVID shows that actually that is not the world we live in. We live in a complex interdependent world with very many moving parts. The management techniques do not necessarily work in that world anymore."</i>
Katrine Brusgaard	<i>"Now the picture is much more uncertain. We cannot do a financial forecast in the same way we could just 2 months ago. It is not like it did not exist, but it exists now with more power and with a different aspect because of the uncertainty. I guess the uncertainty is the really difficult part here."</i>
Anonymous 12	<i>"Well, first of all you can say quite clearly that we were used to planning in medium-term to longer-term cycles. I think this is the first time we realized that we can only plan from one day to the next. That we also tend to react rather than act in this crisis."</i>
Anonymous 14	<i>"What applies in principle is that it is difficult to make forecasts, and especially today."</i>
Anonymous 19	<i>"In principle, you can't prepare for a crisis like that anyway. Now Corona happened and now you have to see how you deal with it."</i>
Anonymous 21	<i>"Corona has shown us that any event can happen without you foreseeing it and so fast that you don't have the time to prepare for it. And that's why I think that scenario planning, even if it was already there, will play a much stronger role. I think it's almost a psychological issue, if I take the topic of strategic planning now, that you have</i>

	<i>always gone into every last detail. The management has always asked me on what assumptions is that based, what is the exact number that comes out of the 10-year planning for sales, for example. And it has always been clear that a forecast is supposed to give a certain strategic direction, but of course it never comes true in the same way. So, it's not worth asking for every last detail. It would be much more exciting to take a level of detail and take the time to look at different scenarios. This has become more and more common in the last few years and I think that a Black Swan event, as you called it, is likely to push the need for scenario planning even more."</i>
External Data	<p><i>"The biggest enemies of good decision-making in times of crisis are neither uncertainty nor ambiguity; they are, rather, over-confidence, procrastination, and incomplete or biased data. Intelligent scenario-thinking, when executed well, can mitigate the risk of falling into the trap of over-confidence when anticipating future possibilities. It can reduce or remove hesitation altogether by providing a logical structure to challenge and validate underlying assumptions. And it can mitigate the risk of incomplete and biased data by combining intuition with objectively measured qualitative data." (Deloitte, 2020a)</i></p> <p><i>"Perhaps the only certainty is that any attempt at a definitive forecast will fail. However, we think examining various scenarios still adds value in this environment of limited visibility." (Carlsson-Szlezak, 2020)</i></p> <p><i>"Since the COVID-19 outbreak in Wuhan City in December of 2019, numerous model predictions on the COVID-19 epidemics in Wuhan and other parts of China have been reported. These model predictions have shown a wide range of variations. In our study, we demonstrate that nonidentifiability in model calibrations using the confirmed-case data is the main reason for such wide variations." (Ronda et al., 2020)</i></p>

## Appendix 10.8: Uncertainty Dimensions Related to Performance Outcomes

### Appendix 10.8.1: Development of Prices (Table 40)

Development of Prices	
Participant	Quote
Anonymous 1	<i>"Whenever there is a crisis, there is a price surge. Many consulting companies now offer a Corona discount of up to 50% [...] to still make some money."</i>
Anonymous 15	<i>"The prices of non-performing loan portfolios have collapsed a bit."</i>
Anonymous 16	<i>"I think that the propensity to consume will drop a little bit over the next few months, if not years on the consumer side. That alone will have a direct influence on many factors, for example on the price level. Many also suspect a price war in the retail sector as soon as the shops open again. Simply because many are sitting on large stocks that they have to get rid of."</i>
External Data	<p><i>"The collapse in the price of crude oil is putting immediate and severe financial pressure on producers that are heavily dependent on revenues from exports. None of the OPEC states balanced their budgets at below \$50/barrel in 2019, with a number requiring more than twice that amount. The price decline is also putting pressure on the balance of payments of many nations, especially those that were already running significant current-account deficits at \$64/barrel." (Alkadiri et al., 2020a)</i></p> <p><i>"OEMs need to take immediate steps to look after their employees, manage their manufacturing, and stabilize their supply chains. And they face critical marketing decisions as well. But the overarching challenge for automotive OEMs is to control their discounts and avoid price wars. Overcoming those challenges will allow them to safeguard their margins, weather the crisis, and prepare for the industry's recovery." (Tordjman et al., 2020)</i></p>

### Appendix 10.8.2: Liquidity Management (Table 41)

Liquidity Management	
Participant	Quote
Katrine Brusgaard	<i>"Now the picture is much more uncertain. We cannot do a financial forecast in the same way we could just 2 months ago. It is not like it did not exist, but it exists now with more power and with a different aspect because of the uncertainty. I guess the uncertainty is the really difficult part here."</i>
Wilfried von Rath	<i>"Well, first of all we have of course lost considerable liquid funds. Because we did not produce and did not sell anything, but of course we were stuck on a considerable part of the costs. We felt the same way as other companies, where the liquid assets are melting down, so to speak. It is the case that we must now pay very close attention to saving for the immediate future, that we avoid unnecessary expenditure. [...] Well, we have started programs, and measures are underway worldwide that have the exact goal of securing liquidity. That means that we are actually looking into every area."</i>
Anonymous 8	<i>"[The EBIT] result has worsened from 3.9 billion last year to 900 million for only 3 months. And that's the point now: How long can companies keep up with this?"</i>
Anonymous 11	<i>"There will be a wave of insolvency."</i>
Anonymous 19	<i>"I would say that investment in general could be an issue. So now not only at BMW, but also especially in the automotive industry at supplier level. That there is no longer the liquidity to make really large investments."</i>
Anonymous 22	<i>"The restructuring business, i.e., the requests for advice adapted to the situation, has naturally increased. How can I quickly regain liquidity? How should I deal with the current situation?"</i>
External Data	<p><i>"US economic activity is slowing as millions practice social distancing to stem the spread of COVID-19 (coronavirus). As a result, companies are either currently experiencing or anticipating significant constraints on cash and working capital, including potential liquidity challenges." (PWC, 2020b)</i></p> <p><i>"These days a number of companies face weeks, if not months, of exceptionally poor trading conditions. For many, the revenue lost in this period represents a permanent loss rather than a timing difference and is putting sudden, unanticipated pressure on working capital lines and liquidity." (Deloitte, 2020b)</i></p> <p><i>"While banks have significantly improved their liquidity positions with the implementation of post-financial crisis regulation, treasurers need to reassess their risks and prepare for a large range of potential outcomes. Typical liquidity stress testing scenario development and liquidity risk driver identification and calibration would not have considered conditions that may develop under this COVID-19 scenario." (Sooklal et al., 2020)</i></p>

### Appendix 10.8.3: Short-Term Economic Impact (Table 42)

Short-Term Economic Impact	
Participant	Quote
Alexander Drees	<i>"So right now, it looks like we've had increased sales in March and April, that's because consumers are more at home, baking and cooking there, and just having more breakfast."</i>
Anthony Dickinson	<i>"For our existing projects, I am sure it is a simple thing. We are still able to work with [our clients]."</i>
Dr. Wilfried Kienzle	<i>"The strongest impact has been on our Academy and Life Care division. This is an academy business. We offer seminars there. [...] And this business of free enterprise and agency seminars is 100% affected by the lockdown at the moment. So, there's a 100% loss."</i>
Dr. Clemens Schwerdtfeger	<i>"We still have good projects, which we are working on."</i>
Katrine Brusgaard	<i>"What we have experienced is that the financial situation for the daily business is good. There are no changes. [...] Now the picture is much more uncertain. We cannot do a financial forecast in the same way we could just 2 months ago. It is not like it did not exist, but it exists now with more power and with a different aspect because of the uncertainty. I guess the uncertainty is the really difficult part here."</i>
Niels Heyer	<i>"The whole business closed down including our customers. KFC, Burger King, McDonald's, they had to closed down."</i>
Orlando Santos	<i>"I suspected that the Portuguese economy will have a negative impact in terms of GDP of minus 15%."</i>
Steve van Houten	<i>"Unemployment is amazing. In Alberta, where they are very reliant on oil. It used to be 100\$ dollars a barrel. Now it is 5\$. The unemployment rate is about 30%. And the industry which was at the core and it supports other industries and spin-offs, but that core industry, instead of being a 100\$ per barrel kind of industry, it is now 5\$ kind of industry. It is really tiny. What do you do with all those people?"</i>
Stuart Hardy	<i>"Most of my colleagues who are freelance consultants have lost nearly all their business."</i>
Torsten Schneider	<i>"On the one hand, many, many new topics arise, which are not new from the point of view of consulting, but which simply have the trigger COVID-19 and on the other hand other topic areas break away."</i>
Wilfried von Rath	<i>"That was a complete stop of our production. It still is. We are slowly starting again. We went into short-time work with almost 80,000 employees in Germany. [The near future development] depends on how the entire supply chain, i.e., from the supplier to the markets in which we produce, gets back on track."</i>
Anonymous 1	<i>"The impact is dramatically. About 80% to 90% of our business is cancelled at the moment."</i>
Anonymous 2	<i>"We can feel and definitely see less projects coming in. So, the project range is not anymore as broad as we used to."</i>
Anonymous 3	<i>"Everything that concerns international trade, whether it is air freight, ocean freight, supply chain or express, which is very company-dependent and more B2B, has suffered a major collapse."</i>
Anonymous 4	<i>"Our ride-sharing business has been decreased by 90%, whereas our food delivery business has actually increased."</i>
Anonymous 5	<i>"One branch [of our business], that is the scale of equipment, has almost fallen asleep. We have noticed that Central Europe has come to a complete standstill. Existing and started negotiations about projects are stopped or prolonged."</i>
Anonymous 7	<i>"The beverage pick-up markets in the in the supermarkets is going extremely well at the moment. There is a positive trend development, because people have to stay at home and consume at home. In contrast, the break-in in the catering sector is a catastrophe. We have around 50,000 gastronomy partners and of course we are now very badly affected by the plunge of the catering trade."</i>
Anonymous 8	<i>"Sales in this first quarter amounted to 55 billion euros and compared to last year they were 60 billion euros - a reduction of 5 billion. But the EBIT, the result has worsened from 3.9 billion last year to 900 million for only 3 months. And that's the point now: How long can companies keep up with this?"</i>
Anonymous 11	<i>"In my position I have remained completely unaffected by this Corona crisis so far. Nothing has changed so far. Nothing has failed here yet"</i> <i>"There will be a wave of insolvency."</i>
Anonymous 12	<i>"Well, first of all you can say quite clearly that we were used to planning in medium-term to longer-term cycles. I think this is the first time we realized that we can only plan from one day to the next. That we also tend to react rather than act in this crisis."</i>
Anonymous 13	<i>"I honestly believe that it will not influence us that much. I think it's going to affect us more positively, because for example our teams sell video conferencing and stuff like that. All this will be much more accepted now."</i>
Anonymous 15	<i>"As far as the business is concerned, there is of course great uncertainty. We have grown by 25% in the last few years, and we don't think that we will be able to maintain that this year or next year. There is no way we can do that."</i>
Anonymous 16	<i>"We are actually in a luxury position, if you like, because we can't quite meet the increased demand. That is of course because demand has increased, but also because we have a few restrictions on the logistics side."</i>
Anonymous 17	<i>"As far as the management function is concerned, orders were of course massively cancelled because we do face-to-face events. This means that the first phase was to accept cancellations, rescheduling and postponements."</i>
Anonymous 19	<i>"It was said at the beginning that the demand is just shifting to the back of the year. That means, if you wanted to buy a car in 2020, you just do it 3 months later. I think that since BMW is a premium manufacturer and often many of its clients are companies, and now many small companies are experiencing liquidity problems, demand will not simply shift 1 to 1 to the next quarter, but there will definitely be a decline in sales."</i>
External Data	<i>"WTO Director-General Roberto Azevêdo said [that] the unavoidable declines in trade and output will have painful consequences for households and businesses, on top of the human suffering caused by the disease itself."</i> (WTO, 2020)  <i>"Businesses struggling to pay their employees and cover operational costs wonder if they will have clients or customers when they reopen. Banks and investors realize that many companies, especially small and midsize ones, will default and are trying to protect both financial stability and public savings."</i> (Cadena & Ferrari-Haines, 2020)