The Adoption and Use of Digital Communication Technologies in the Strategic Management Process

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THE ADOPTION AND USE OF DIGITAL COMMUNICATION TECHNOLOGIES IN THE STRATEGIC MANAGEMENT PROCESS

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Abstract

The strategic management literature is currently falling behind other areas in business management when it comes to providing meaningful data and theoretical explanations about the adoption and use of digital communication technologies. Many important issues, such as details of which kind of technologies are used for the different parts of strategic management remain largely unexplored. Drawing on media synchronicity and media interactivity theory, this thesis provides a meaningful classification of digital communication technologies with which scholars can explore how different affordances (degree of control and synchronicity) help to explain the varying impact digital communication and social technology use can have on a business process. Further, I detail a novel theory which explains how specific types of this classification are better suited for some activities associated with the strategic management process than others and lead to a higher business performance. I also provide a theoretical framework that identifies several factors in the firm's organizational and environmental context that are significantly associated with the adoption of digital communication technology in the strategic management process. By using a quantitative survey methodology I researched the phenomena of digital communication technology adoption and use for the strategic management process in 239 British and German firms.

I systematically explored the strategic management literature and discovered that the lack of progress could, amongst other reasons, be attributed to an insufficient theoretical explanation of how digital communication technology use affects the strategic management process. Based on open strategy and digital strategizing theory, I provide such a theoretical explanation and empirical support for the fact that using specific types of the digital communication technologies for certain activities in the SMP, e.g. mission statement formulation, can enhance the effectiveness of this stage. I make a novel contribution to the

open strategy literature by developing and testing new theory that can help us understand how opening up certain activities of the strategic management process through digital communication technologies can help to make that process more efficient. By identifying the specific type of digital communication technology that support each of the activities best, I contribute to the digital strategizing literature by highlighting the importance of the affordances each technology has in its adequacy to meaningfully enhance the efficiency for the various activities.

Furthermore, I uncovered the anteceding factors that can be associated with an adoption of digital communication technologies in the SMP (process compatibility, participation intention, and network effects). I focused on two theoretical angles for this: diffusion of innovation and adaptive structuration theory as these allow me to explain potential associations between strategic management-specific factors and technology adoption in the strategic management process. Resultantly, I discovered the central role top management plays in supporting such an adoption by acting as a mediator in the technology adoption process. With this I contribute to the diffusion of innovation theory by providing empirical evidence for the role of "champions" in the adoption process. Furthermore, I add to our understanding of adaptive structuration theory, as I identify the importance of compatibility of the strategic management process with the technology that is adopted.

My theoretical explanations provide useful insights for strategic management as my data supports the claim that shared-control digital communication technologies such as wikis, forums, and collaboration platforms can enhance the effectiveness of the strategic management process. Moreover, my theoretical model for describing the adoption of digital communication technologies in the strategic management process highlights the important role organizational and environmental factors play in technology adoption while the technological factors, such as technology readiness and integration do not.

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Glossary

AST	Adaptive structuration theory
AVE	Average variance extracted
CEO	Chief executive officers
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CFO	Chief financial officers
CMB	Common-method bias
CMV	Common-method variance
CSO	Chief strategy officers
DOI	Diffusion of innovations
FAME	Financial Information Made Easy
FDI	Foreign direct investment
GDPR	General Data Protection Regulation
IB	International business
ICT	Information communication technology
IT	Information Technology
KPI	Key performance indicator
OLS	Ordinary least squares
RBV	Resource-based view
RMSEA	Root mean square error of approximation
ROA	Return on assets
SEM	Structural equation model
SIC	Standard Industrial Classification
SMP	Strategic management process
SRMR	Standardized root mean residual
TAM	Technology acceptance model
TCA	Transaction cost analysis
TLI	Tucker–Lewis index
TMT	Top management team
TOE	Technological, organizational and environmental

TSLS	Two stage least square
UK	United Kingdom
UTAUT	Unified theory of acceptance and use of technology
VIF	Variance inflation factor

Chapter 1 — Introduction

1.1. The Digital Business in the 21st Century

In the modern business of today, non-digitalized approaches are increasingly less relevant and constitute the minority of actions and processes. The recent accelerated development of new digital technologies has given many companies the opportunity, even those with limited resources, to develop and establish a global presence. On the other hand, some long-established businesses have struggled to maintain and even lost their place on the global stage as they failed to remain current and abreast of digitalization (Tekic and Koroteev, 2019).

To ensure future success and longevity, businesses need to embed these digital technologies into their business processes and operations where there is potential to increase performance and efficiency. This constitutes a significant exercise that requires fundamental organizational change: a truly digital transformation. Beginning in the 1960s and accelerated in its development from 2010 onwards, the digital era leads businesses into a position where innovations are much faster-paced and more interconnected (Tekic and Koroteev, 2019). Some scholars and commentators regard this new era and growing emergence of digital technologies as the “new industrial revolution” (Hervé et al., 2020; Schwab, 2016). The increasing adoption and use of digital technologies by individuals and businesses have prompted a radical transfiguration of how organizations and institutions are functioning and structured (Hervé et al., 2020). This adoption alters how businesses are internationalizing, operating globally and competing with one another. With the growing development of digital tools influencing how businesses operate, manage, train their employees, direct their organizational culture, generate revenue, and handles customer relationships (Hervé et al., 2020), there is a greater demand for scholars and management practitioners to understand the impact of the use of digital technologies in the different spheres of business management.

The term "digital technologies" encompasses a wide variety of different information technology (IT), computer processing and information communication technology (ICT) (Horváth and Szerb, 2018). As such I follow the definition of Yoo et al. (2010) that digital technologies — different from analog technology — are reprogrammable and homogenous. In that regard I exclude physical hardware from the definition, such as computers, circuits, wiring or recording devices. While the functioning of digital technologies depends on hardware; hardware on its own does not provide the input, output, memory, and flexible processing capabilities (Britannica, 2020). Therefore digital technologies are distinct from the actual devices that run the software and are thus reprogrammable (Yoo et al., 2010). Moreover, the focus on digital technologies are the additional functionalities accommodated by the Internet and inter-connectivity. The homogenous nature of digital technology refers to the fact that data shared among digital technologies can be accessed, generated, disseminated and displayed all with the same hardware such as mobile phones, tablets or desktop computers as they are connected with each other via the Internet (Yoo et al., 2010). While the available digital technology has surely changed since 2010 when Yoo et al. described the differences, the unique features of reprogrammability and homogeneity remain relevant and set out digital technologies as a distinctive category. As such, the focus of my study is solely on digital technologies and the processes they facilitate such as the sharing of knowledge and information throughout their organization (Majchrzak et al., 2013). This represents the key drivers of the digital transfiguration.

Among the broad category of digital technology there are several subcategories. One of these is *social* technologies. One of the earliest mentions of the term social technologies can be found in Alan Fox's (1974) book *Man Mismanagement* where he describes social technologies as all forms of technology that "seek to order the behaviour and relationships of these people in systematic purposive ways through an elaborate structure of coordination, control, motivation, and reward systems." While this definition was written without knowledge of the digital technologies that businesses have available today, the principle function and purpose of social technologies, in particular the ordering of relationships and structures between individuals, can be found in some digital technologies such as social networks. As this purpose of social technologies still prevails, albeit taking place now in a digital environment, one can speak of these as *digital social* technologies.

With digital social technologies being a broad and inclusive term, various formats can be described with this. For instance, social media, which represent a combination of online communication, social settings and group software (Baptista et al., 2017). The term also includes communication technologies such as email, instant messaging etc. which have been noted for their egalitarian nature (Tyran et al., 1992). A more recent reconceptualization of digital technologies is "social software". The concept of social software emerged when scholars started to develop an interest in how these are used in the strategic management process (SMP) of businesses (Haefliger et al., 2011). Combining the earlier conceptualizations and taking into consideration the terminology in more recent studies on digitalization, I use the term *digital communication and social technologies* to capture the various affordances offered by those technologies, namely, to facilitate and transmit human interaction.

The number of digital tools and platforms promising and offering solutions to businesses to increase their efficiency and profitability is apparently without limit. The developments in digital communication and social technologies in the past 20 years have brought profound changes to both the individual working within a company and the professional environment of firms more generally (Kaplan and Haenlein, 2019). Using these more recent Internet-based digital communication and social technologies appears to give businesses many advantages such as cost reductions and improved flows of communication (Bughin et al., 2017). While the opportunities seem endless, often overlooked are some of the disadvantages of the growing digitalization and implementation of numerous digital communication and social technology tools, such as the risk of micro-management or tying the company into costly contractual agreements (Nell et al., 2020).

In a survey of 165 managers in Austria, Ireland and Denmark, the vast majority of participants indicated agreement with the idea that digitalization of their firm would provide them with a greater amount of data that could help them to make more informed and timely decisions. Additionally, the managers seemed to expect that the information and knowledge they accumulated through digitalization would enable them to make more accurate predictions about the possible outcomes of their decisions (Nell et al., 2020). The same survey also found that the managers thought that digital tools would allow them to consolidate more power at the central office (76% agreed), taking some of the autonomy away from their respective businesses' sub-offices (Nell et al., 2020).

Given the results of Nell et al.'s (2020) survey demonstrating the strength of managers' beliefs in the benefits of using digital technologies in their businesses, it would appear as if managers were key players in *the adoption* of digital communication and social technologies by firms. However, a survey conducted by MIT & Deloitte (Kane et al., 2015) found that the degree of digitalization of firms, and thus the use of digital technologies, also to some extent depends on the formulation of a digital strategy, which thus represents some form of a self-sustaining cycle. The survey was conducted across 129 different countries and

27 different industries, comprising a sample that included firms of different sizes. Kane et al. (2015) assessed the “digital business maturity” by measuring the amount or lack of strategic priorities in regard to digitalization and whether the business had developed the necessary technological and managerial skills. The survey’s findings indicate that it is indeed a business’s digital strategy that drives its digital maturity. The conclusion drawn from this study highlights the importance of a firm having a digital strategy, as the degree of digital maturity of a business depends on the provisions made in the digital strategy which details the scope and objectives in regard to the use and implementation of digital tools throughout the business (Kane et al., 2015).

While there are surveys about the extent of digital technology use by businesses, there are fewer studies that empirically investigate the use of digital communication and social technologies in a specific business function or for a certain managerial task. Research in several fields, such as marketing (Kannan and Li, 2017; Quinton et al., 2018), business operations (Botthof and Hartmann, 2015; Gölzer and Fritzsche, 2017) and supply chain management (Asare et al., 2016; Scuotto et al., 2017), has focused on digital communication and social technology use in those parts of the wider business management discipline. Strategic management research, however, is falling behind and there is a dearth of knowledge about whether, how, and why digital communication and social technologies are used in the SMP of businesses (Hazlehurst and Brouthers, 2018). The aim of this thesis is to contribute to filling this gap by addressing the questions of whether those involved in the SMP use digital communication technologies and, if so, whether their use has an impact on business performance (empirical study I); and why or why not strategy makers adopt them in the SMP (empirical study II).

1.2. *Business Strategy as a Digitalized Process*

The idea of strategic management in business denotes the concept of a firm undertaking a series of tasks with the purpose of identifying potential affecting factors in its current internal and external environments, and setting out an appropriate course of action to exploit or mitigate such factors. This course of action consists typically of a set of planned objectives and actions that the firm is going to undertake in the future. These can be directed toward the achievement of various purposes — for example, to react to an exogenous shock or to extend the firm's market share. This seemingly process-like and structural approach to strategy is described as the "strategy architecture" (Vuorinen et al., 2018). The term "architecture" indicates that a firm's strategy is influenced by exogenous and endogenous factors and that the more tangible output of a strategy is set out in the form of objectives and targets for a set period (Vuorinen et al., 2018; Kaplan and Norton, 2008a). Regardless of the exact choice of terminology to describe the form or shape of the strategy process, the main aim of any strategy-related processes and efforts within an organization is to ensure its longevity and to drive the performance of the organization as a whole or of specific individuals within it to fulfill a set of objectives (Whittington, 2006; Vuorinen et al., 2018).

I take on the understanding that companies are operating in a competitive environment and, to ensure their longevity, they need to establish some sort of competitive advantage by differentiating themselves and providing a distinct set of values which sets them apart from their competitors (Porter, 1996). To achieve this, companies undergo a "more or less formalized, periodic process that provides a structured approach to strategy formulation, implementation, and control" (Wolf and Floyd, 2017). In this regard, the strategy is a plan of action providing a company with purpose, future direction and a set of objectives on how to achieve this aimed future state (Chandler, 1962 (1975 printing)). The process, from the initial setting out to the final achievement of this future state, can vary in shape, ranging from a set number of formal stages (Evered, 1983) to a more informal stream of decisions (Mintzberg, 1977). While the concept of strategic management along with several widely used tools and models were developed by academic research, they were subsequently adopted and used by businesses (Bracker, 1980). When describing and explaining the phenomena of adoption and use of digital communication and social technologies in the SMP, I refer to this process as *digitalization of the SMP*. “Digitalization” generally denotes how processes of day-to-day life or business operations are reconceptualized through digital communication technologies (Bloomberg, 2018).

With scholars and businesses starting to engage more and more with business strategy from the 20th century onwards, it is particularly the period after the Second World War that marked an increase of this engagement with strategy, when firms started more to consider developing a strategy on their own due to two main factors. First, the market had sped up in terms of the frequency and magnitude of change which firms needed to undergo to remain competitive. Second, the growing extent to which scientific and technological matters were becoming more involved in the process, so demanding an increased level of agility and flexibility in firms to constantly detect those advances and implement them where relevant (Bracker, 1980). Hence Bracker (1980) argues there is a need for firms to have some form of process in place which enables them to address the growing demands of the environment on them.

Since the peak of strategic planning in the 1970s, which was caused by the increasing diversification of companies (Grant, 2003), some scholars have argued that from the 1990s onwards there has been a change in the manner in which firms conduct strategic planning. While the practice of strategic management has not declined in its application (Grant, 2003), the interest that strategic management has received from scholars has declined, with the numbers of publications falling from the early 1990s onwards (Wolf and Floyd, 2017). Nevertheless, as a key tool in modern business, strategic planning continues to rank high (Rigby and Bilodeau, 2015). Considering all the various contingencies and factors that firms face in both their external and internal environments, strategic planning continues to offer a system and approach with which firms are able to address, leverage and handle any eventualities that transpire (Luthans and Stewart, 1977).

With the aim of this thesis being to explore the adoption and use of digital communication and social technologies in the SMP, I take on the understanding that there are a certain number of stages, phases or activities associated with the development and implementation of a business strategy within a company. Firstly, there needs to be some form of identifying or establishing the problem or issue which the company is facing and is required to address, by setting out goals in regard to the future state of the company (Pettigrew, 1977; Tyran et al., 1992); secondly, some form of analysis and scanning of the firm's external and internal environment to detect changes, technological innovations, changing trends, or internal problems (Tyran et al., 1992; Pettigrew, 1977); thirdly, specifying and formulating the actual strategy that constitutes the plan of action to achieve the envisioned future state or to combat the identified problem, given the contingencies identified during stage two (Pettigrew, 1977; Tyran et al., 1992). Then, fourthly, the various potential options and alternatives are evaluated and one is selected (Pettigrew, 1977; Tyran et al., 1992). Fifthly, measures to implement the chosen strategy are taken and the strategy is executed (Pettigrew, 1977; Tyran et al., 1992). Finally, control measures are established to assess and measure the level of implementation of the strategy (Pettigrew, 1977; Tyran et al., 1992).

While the above approach to strategic management might imply some form of linearity of process, these stages denoted in the literature can also be seen as activities that could place concurrently (Shendel and Hofer, 1979). Given the developments in and emergence of technology in other parts of businesses, my leading research question for this thesis is: is the SMP itself also undergoing digitalization? In particular, I want to focus not just on the outputs of strategy, such as a digital strategy, but on the strategy process itself (Adobor, 2019). There have already been some initial observations, remarks and developments in this direction that highlight that this is becoming a research question valuable for exploration and thus enable me to make a meaningful contribution to the academic literature (cf. Hautz et al., 2017; Plotnikova et al., 2020).

Digital communication and social technologies hence hold the potential to instigate fundamental changes to the manner in which firms are conducting their business strategy. For instance, recent technologies, such as IBM’s jamming technology, are creating ways in which participation and inclusion in the SMP can be facilitated (Whittington, 2014). Another key benefit, especially of the more recently emerged technologies, is the greater degree of interactivity they allow. This, in turn, allows a higher speed of transmission and inclusion of a wider geographic scope of communication within businesses (Markus, 1987). Additionally, there is the potential that these tools can also enable businesses to drive their performance (Bughin et al., 2019). In a McKinsey survey of 2016, 85% of all respondents stated that they were currently using social technologies in their business. This percentage had increased from 69% in 2014 (Bughin et al., 2017). Even though there may have been an adoption by businesses holistically, these survey findings do not indicate if and how businesses are using these digital communication and social technologies in the SMP. One point to note from the McKinsey survey is that the executives who were using these technologies viewed them as supplemental rather than exclusive (Bughin et al., 2017). Of the executives consulted, 75% said they relied on “older” technologies which included email and classic telephony (Bughin et al., 2017). This might provide some indication for the conclusion that, despite the advantages and novelty of taking a more digitalized approach to the SMP, the adoption of these digital communication tools appears to fall below expectations. Chen et al. (2015, p.5) observed a similar phenomenon in the adoption of big data by firms, which seemed to lag behind the general perception of industry experts and business managers. Thus, availability and growth in availability alone may not be a reliable indicator of the use of technology in certain business processes. Therefore I am seeking to address this gap by collecting empirical data on the use of digital communication and social technology specifically in regard to strategy-related processes and activities.

Furthermore, in this study I am not only aiming to explore the current degree of social and digital communication technology use in the SMP but also to develop an understanding of the underlying dynamics behind this use and to determine what factors can predict the adoption of such technologies.

To understand the multifarious ways in which digital communication and social technologies can be used during or for any efforts relating to the SMP, I have chosen a broad definition of the former so as to include a wide variety of platforms and software. However, to reduce the level of specificity required during the data collection, I develop a classification of those technologies based on their affordances. While reviewing the academic literature on this subject, I noticed some studies have focused their research effort on one specific technology. The inherent danger of any writing on technology is of course that the technology can and will eventually become obsolete and, therefore, the insights gained by those studies have already become archaic and possess only limited relevance for current research. Hence

I follow Treem and Leonardi's (2013) approach in not singling out one particular technology, and instead concentrate on the “communicative practices that various features afford”. Previous work in the nascent literature explored, for instance, features of social media (Mayfield, 2008) or the degree of social presence transmitted through the medium (Standaert et al., 2016; Dennis et al., 2008). However, due to the lack or inappropriateness of some pre-existing classifications of digital communication and social technologies (Kaplan and Haenlein, 2010), I develop a classification myself based on media synchronicity (Dennis et al., 2008) and media interactivity theories (Jensen, 1998; Kiousis, 2002).

There are several potential mechanisms through which these new digital communication technologies can transform the manner in which businesses currently strategize, whether through new ways to use Web 2.0 technology to conduct the business’s environmental analysis (Cooke and Buckley, 2008) or to increase the flow of communication in the SMP by using more synchronous platforms (Tyran et al., 1992).

Although there are no generalizable and larger sets of data available that could provide an indication of the current adoption and use of digital communication and social technologies, there are case study explorations of certain digital strategizing practices that take place in the field. For instance, Adobor (2019) refers to the German car manufacturer BMW as a company that uses some form of social technology as part of its strategy process. Kaplan and Haenlein (2010) used the now defunct mobile phone manufacturer Nokia as an example of a company utilizing a wiki-based platform to keep its employees updated about product developments. Software company Red Hat managed to obtain more strategic advantages through the opening up of its SMP (Gast and Zanini, 2012). Equally, Indian tech company HCL obtained great economic returns from making its strategy process more open to input from its rank and file employees by including a form of peer review system for evaluating different strategic options (Adobor, 2019). Siemen's "References@BT" is an example of a so-called internal social network that allows employees located in different departmental, geographic and hierarchical spheres to communicate with each other and exchange ideas (Müller and Stocker, 2011). The Siemens platform demonstrates the highly egalitarian nature of digital communication and social technologies as the case study describes the exchange of information and ideas across hierarchical boundaries (Müller and Stocker, 2011). While these case studies provide some useful insights into the use of digital communication and social technologies, one inherent shortcoming of their research design is that it does not provide generalizable results with a larger sample size. The provision of such results is another valuable contribution I intend to make with this thesis.

1.3. Adoption and Use of Digital Communication and Social Technologies in the Strategic Management Process of Firms: Importance of Research

With this study, I am responding to several calls for further research in regard to the use of digital communication and social technologies in the SMP. For instance, Baptista et al. (2017) called for more research into how employees might use social media to take part in the SMP for purposes ranging from enhancing transparency to taking responsibility for strategic decisions (Baptista et al., 2017). I respond to this call by including a variable measuring inclusivity and top managers' willingness to involve other stakeholders in the SMP. Additionally, both researchers and managers are still in the process of determining how digital communication and social technologies should be interpreted, especially in regard to strategic management. There are also unanswered questions about the effectiveness of using digital communication and social technologies for internal communications (Haefliger et al., 2011). I address this call by demonstrating whether the use of specific types of technologies has a positive impact on firm performance. Moreover, there are questions around the use of social software in certain organizational contexts, such as strategic management (Haefliger et al., 2011). In addition to that, Krogh (2012) points both to the various forms of digital communication and social technologies and the need for a theory that can explain the different impacts of implementing these. I respond to this call by focusing on one type of digital communication and social technologies, collaborating technologies, to explain the antecedent factors that can predict the adoption of these by firms. Additionally, by providing a typology of digital communication and social technologies I enable future research to explore these types of technologies in different settings and contexts.

Apart from the calls for further research, scholars have also repeatedly pointed out that the use of tools and technology in strategy exhibits a dearth of knowledge, especially when it comes to determining the impact of these on, for instance, business performance (Jarzabkowski and Kaplan, 2015). Another aspect that has been highlighted is that strategy research lacks appropriate theories to understand the strategic planning and business performance relationship (Wooldridge et al., 2008). This lack of any theoretical basis often extends beyond that of a model of the actual SMP itself (Cohen and Cyert, 1973). Recently, the focus of interest has moved to the extent to which new technologies can contribute to the strategy-as-practice phenomena of open strategy (Hautz et al., 2017). Through a survey of strategy practitioners, Chaudhuri et al. (2021) also pointed out that there is a growing demand to understand the relevance and implication of increased data access and the impact of digitalization of the strategy process. There are also calls for a deepening of our understanding of the variety and degree of openness in strategy and what means can be used to either increase or decrease it (Dobusch et al., 2017). While the vast majority of calls for further research have the common theme of setting the unit of empirical investigation to the firm level, Venkatesh (2006) in his call for further research focuses more on an individual level in regard to the use of technology in decision making.

Reviewing these calls for research, it becomes apparent that there is a growing interest in the use of digital communication and social technologies and how their use relates to the practice of other streams of research such as open strategy. At the same time, there are also several calls for more theoretical grounding in understanding the various types of digital communication and social technologies and the underlying dynamics that explain the strategic planning–performance relationship. Additionally, recent global events, in particular, the unfolding of the COVID-19 pandemic, have forced businesses worldwide to adopt remote-working tools and technology. This further highlights the value of the research I have undertaken for this thesis in helping businesses better understand the contribution certain digital communication technologies can make compared to others when used in the SMP.

1.4. Aim and Objectives of PhD Thesis

Considering the lack of knowledge in the field, with this thesis I intend to make an original contribution to expand the current understanding of the emerging phenomenon of the adoption and use of digital communication and social technologies in the SMP.

While market research data points to an ever-increasing adoption of said technologies (Bughin et al., 2019), there appears to be a dearth of knowledge about their actual use and the factors leading to their adoption in the SMP (Haefliger et al., 2011). Additionally, there is a lack of any large-sample empirical data on how precisely businesses are using these technologies in that process. Combined with the calls for more theoretical grounding in understanding the impact of the various forms of digital communication and social technologies which are currently available (Krogh, 2012), these gaps in understanding lead to the formulation of the following research questions that I intend to address through this thesis:

1. What is our current understanding and knowledge regarding the use of digital communication and social technologies by businesses for the SMP?
2. How can we categorize the various formats of these technologies to understand or differentiate the impact that they have on business processes or individuals?
3. How do strategy makers in businesses use digital communication and social technologies in the SMP? Does it vary with the cultural context?
4. What is the impact of using digital communication and social technologies in the SMP on firm performance?
5. Why do managers either use or not use these technologies in the SMP? What are the factors that can help us understand the adoption of those technologies on the firm level?

The purpose of this thesis is to address these four questions by means of an empirical and original piece of work for the completion and achievement of the academic degree of PhD.

As digital communication and social technologies can potentially support or enhance specific processes and tasks associated with strategy formulation or even firm performance, their resultant adoption by businesses has generally increased (Bughin et al., 2017; Bughin et al., 2019). The current academic understanding of which factors are associated with the use of these technologies does not reflect this increase. Extant scholarly work already hints at the powerful dynamics that underlie the use of, for instance, communication tools (Eisenhardt, 1989b). Moreover, existing research highlights the use of digital communication and social technologies for activities that are typically associated with the SMP such as the scanning of the external firm environment or the generation of new ideas (Cooke and Buckley, 2008; Adobor, 2019). The adoption and use of these technologies in the vital business process of strategic management drives the value that businesses can derive from these technologies (Brown et al., 2010). To contribute to remedying this gap and to address the research questions above, the subsequent aim of this empirical thesis is:

> *To uncover the current use of digital communication and social technologies in the SMP of businesses and to develop a theoretical framework of the antecedent factors in firms' adoption of those technologies.*

Setting the direction of this study, this is achieved through the following research objectives:

- To systematically search the current literature on the use of social and digital communication technologies for strategic management;
- To identify current streams and clusters of research that have been conducted in this field;
- To develop and test a theoretical framework to classify the various forms of digital communication and social technologies;
- To obtain an in-depth understanding of how digital communication and social technologies are used in the SMP;
- To identify variables as part of a theoretical framework that explains the direct and indirect effect of the use of digital communication and social technologies in strategic management on firm performance;
- To delineate the antecedent factors that determine the adoption of digital communication and social technologies for the SMP at the firm level;

- To ascertain, through the analysis of empirical data, the impact of national differences in the use and adoption of social technologies.

The population from which the relevant sample for this empirical study has been drawn comprises medium to large-sized businesses in the United Kingdom of Great Britain and Northern Ireland (UK) and the Federal Republic of Germany. The population is set to exclude small businesses or entrepreneurial start-ups, as the SMP in these firms tends to be more informal (Verreynne, 2006). To achieve some form of comparability between the UK and continental European business culture, Germany has been selected as an additional geographic entity. There are several reasons for this selection: (i) Germany continues to be one of the highest exporting countries in the world and, therefore, a large number of businesses in the country operate on an international scale (Jones, 2018); (ii) from a scholarly perspective, Germany has received a considerable amount of attention as it is perceived to set the direction for many aspects of business operations, subsequently followed by other countries (Palazzo, 2002); (iii) in addition to being a leading and long-standing member of both the European Union and the Eurozone, Germany's different regulatory and institutional environment provides a fruitful context in which to test how structural and institutional factors can predict the use of digital communication and social technologies in the SMP (Berg et al., 2018); (iv) there is an observable institutional difference between the UK and Germany as both represent specimens of a liberal market economy and a coordinated market economy respectively, which, among many things, describes how firms interact and compete with another (Hall and Soskice, 2001); (v) several of the case studies conducted to investigate the use of technology in strategic management or nascent processes were carried out in German companies such as Siemens, Daimler or Premium Cola, highlighting Germany's advanced level of integrating technology into business processes (Swabey, 2017).

Digital communication and social technologies allow businesses more easily to adopt participative modes of strategy making. In line with the intention of this research to determine any national differences, Germany is a relevant national entity as it is a more collectivist country than the UK (Hofstede et al., 2010). Consequently, this cultural difference could also manifest itself in the use of digital communication and social technologies in the SMP. Additionally, the regulatory environment in Germany has distinctive features such as the *Betriebsverfassungsgesetz* [Company Constitution Act] that regulates the participation of employees in corporate governance issues and other important decisions. This Act further allows the establishment of workers' councils in companies. This provides a unique environment in which strategic decisions are made within companies (Aguilera and Jackson, 2003). The existing company-specific regulation in Germany also highlights the value of researching in this area, as it could help to develop our understanding of how the use of social technologies in the strategy process can accommodate greater participation.

1.5. Toward a Framework for Understanding the Adoption and Use of Digital Communication and Social Technologies

1.5.1. Types of Digital Communication and Social Technologies

Among the core issues that need to be discussed is the question as to why firms should consider using these new technologies in their SMP. Despite the promising outlook, there are equally concerns of ever-increasing control and monitoring from centrally coordinated head offices or the risk of data security breaches and misuse of these technologies. Moreover, implementing these technologies might also be associated with a certain financial cost. However, one of the key propositions I am putting forward in this thesis is that the use of these technologies can potentially enhance a firm's performance relative to its competitors. I test this hypothesis by computing a statistical model that allows me to determine whether the use of digital communication technologies is statistically associated with higher relative business performance. In order to understand if certain types of digital communication and social technologies contribute more to an increase in firm performance than others, I develop a two-by-two classification with which I am able to meaningfully categorize the various formats of digital communication and social technologies that are currently available: corresponding, broadcasting, aggregating and collaborating technologies.

Corresponding technologies are those technologies that are low in interactivity and synchronicity. As such, corresponding technologies allow for a high affordance in editability (Treem and Leonardi, 2013) which manifests itself in one individual being able to edit the content, format or shape of a piece of information before they distribute it to its intended recipients. Corresponding technologies are also mostly controlled by one person or at least one person at a time. One example of such technologies is email where each communication can be edited, altered and formatted without other individuals perceiving those changes being made in real time. It is possible to ensure that only the final intended form sent to a recipient is seen by another individual. Equally, once an email has been sent to a recipient, the recipient cannot alter the content format or shape of the original message. Hence the control of the communication lies with one individual at a time, namely the sender.

Broadcasting technologies are also controlled by one individual who can generate or edit the content, format or shape of a piece of data or information, as such broadcasting technologies are still low in interactivity. But, unlike corresponding technologies, broadcasting technologies are characterized by being high in synchronicity. This means that the content, while it is being generated, is also disseminated, or “broadcast”, at the same time to a potentially indefinite number of recipients. Hence, this type of digital communication and social technology does not exhibit the same amount of editability as corresponding technologies. This means that while the content is generated it is almost immediately perceivable by the intended recipients. The recipients, due to the low interactivity, are unable to make changes to the content being generated, and are more in the position of a passive viewer. Examples of these technologies include webinars in which one person (or agent) controls the content being generated. Equally, live streams would fall into this category as they are one-way communication channels that happen in real time.

Aggregating technologies are low in synchronicity and high in interactivity, meaning they are controlled by more than one individual. However, the low synchronicity affordance signals that this control cannot be shared simultaneously but takes a "one after the other" approach. This means that the content, while being generated, edited or changed, is not perceived by other individuals until that editing individual realizes, uploads or synchronizes the changes they have made. Depending on the platform this can happen almost instantly, while others may exhibit more of a time lag. An example would be internal or online wikis, such as Wikipedia. Wikis are a collection of web pages on several topics, information or projects that can be edited by multiple individuals (Arazy and Gellatly, 2012). One key feature of wikis is that the editing takes place according to a "one person at a time" approach. This means that while one person is editing a certain section of a page, the changes being made to the format, shape or content of that section are not immediately perceivable to others. Although in many cases organizations that host aggregating technologies put restrictions in place as to who can edit or access certain parts, the shared-control affordance remains a differentiating feature of this type of technology. Thus, aggregating technologies possess a high editability affordance as an individual is able to review or edit their changes before these changes become perceivable by others. However, individual control is not given and other individuals are typically able to change the same section, including any amendments made by a previous person. With aggregating technologies, there is the danger of a conflict between two different variations of a changed data file being synchronized at the same time. Different platforms have varying mechanics to respond to the occurrence of such a conflict. Other examples of aggregating technologies include online communities, which allow multiple people to change formats or web pages; and team management platforms on which individuals indicate their progress with a certain task they have been assigned, for instance.

Collaborating technologies are technologies that are both high in interactivity, i.e. they can be controlled by multiple individuals, and high in synchronicity, i.e. the changes made to shape, format or content are immediately perceivable by other individuals. This means that collaborating technologies exhibit a lesser degree of editability since other individuals are able to perceive the content while it is being generated. Examples of this technology include multi-user file editing platforms such as Microsoft Office365 or Google Documents. Those platforms can accommodate text, spreadsheet or presentation slide processing software through which multiple individuals are able to work on a file at the same time. The consequence of this is that the changes made to content, shape or format are also immediately perceivable by other individuals without any significant delay. Video conferencing is another technology that would fall into this category, as the medium that is being generated, i.e. sound, images, and the conveyance and convergence of a matter, can be changed in format, shape or content by multiple individuals with those changes being immediately perceivable by others.

1.5.2. Impact of Digital Communication and Social Technology Use in Strategic Management

Even though strategic planning remains a mechanism vital to ensuring a company's longevity, academic scholars' interest in this subject has seemingly declined, given the decreasing number of publications from the early 1990s onwards (Wolf and Floyd, 2017). While the 1970s were a period of growing interest in strategic management with several studies published on this subject at the time, the stagnant period of the 1990s that followed was mainly caused by the lack of a solid theoretical grounding, and inadequate methodological approaches in those studies. Therefore, the impact these 1970s' studies had on managerial practice in strategic management was limited. The first meta-analysis combining the empirical results of several studies was published in 1994 (Powell, 1992; Miller and Cardinal, 1994). The main premise of strategic management research was that those firms that engage in strategic planning should outperform those that do not (Wolf and Floyd, 2017; Boyd, 1991; Kudla, 1980; Thune and House, 1970). Until the 1980s, empirical research only produced inconclusive or mixed results (Kudla, 1980). Miller and Cardinal (1994), through their meta-analysis found support for the notion that strategic planning has a positive influence on business performance (Wolf and Floyd, 2017). A more recent study by Menz and Barnbeck (2017) that investigated the link between strategic planning and improved business performance found only limited evidence for this relationship. Thirteen years previously, Andersen (2004) brought in the idea of wider participation of company employees in the SMP; however, he found that more participatory decision making in strategy making cannot be consistently linked to superior business performance.

There are numerous criticisms of the studies attempting to establish a link between strategic planning and business performance as researchers were never fully able to explain why this strategic planning performance causal relationship should or does exist. The critics often cite the lack of an appropriate theory to fully explain and capture this phenomenon (Grant, 2003), or the absence of control of other extraneous variables that may impact a firm's performance (Kudla, 1980). There are also several limitations to the established models that were used. For instance, it is difficult to argue from the resource-based view, as strategic planning cannot be considered a rare resource since the knowledge of it has become freely and increasingly available (Whittington et al., 2011) While it is beyond the scope of this study to address all of these criticisms, I propose to contribute to this debate by providing evidence as to whether the use of digital communication and social technologies has an impact on the planning–performance relationship.

1.5.3. Factors Explaining Firms' Adoption of Digital Communication and Social Technologies

In my second empirical study, I intend to identify certain firm-related factors which can help us to predict whether a firm would adopt digital communication and social technologies in the SMP. Several of these antecedent factors stem from established technology adoption models, such as the technology acceptance model (TAM) (Davis, 1989), or the unified theory of technology acceptance and use (Venkatesh et al., 2003). Despite widespread use of these two models, they only describe technology adoption by an individual and not at the firm level. Since the SMP typically involves more than one individual I have chosen a theory which can describe and explain technology adoption at the firm level: the technology–organization–environment model (TOE) (Tornatzky and Fleischer, 1990), which takes account of the context in which a firm operates.

The *technological context* of firm technology adoption describes the interior and exterior technological innovations which are of relevance to the firm. Therefore the term not only encompasses the technologies that the firm already has available internally, but also those technologies which the firm could acquire on the market (Zhu et al., 2003). Consequently, the technological context includes factors such as the technological readiness of the firm (Yang et al., 2015), the compatibility and thus integration of existing technologies with the new technology (Low et al., 2011), and the perceived benefits of that technology (Chen et al., 2015; Gangwar et al., 2015; Iacovou et al., 1995; Oliveira and Martins, 2010). Through a consideration of some previously identified and relevant factors in the technological context, I am able to predict the extent to which these factors can predict the use of digital communication and social technologies, specifically for the SMP.

The *organizational context* includes some more firm-specific characteristics such as the size of the firm, the extent of centralization, the organizational structure and the slack resources available (Soares-Aguiar and Palma-dos-Reis, 2008). Furthermore, the organizational context also includes factors such as the support available for a specific technology (Kim et al., 2018). The direction of causality for some of these factors is subject to debate, for instance, in the case of firm size. I therefore hope to make a vital contribution to this existing discussion by establishing the direction of some of these factors. Through the identification of factors in this context, I hope to determine those that have a significant relationship to technology adoption in the SMP. Since a business strategy can have a strong impact on a firm's organizational context once it is implemented, this context may be part of a dialectical relationship with a business's performance. Nevertheless, in this study, I want to focus exclusively on how the existing organizational contexts in firms predict their use of digital communication and social technologies, rather than drawing out what the impact of business performance on the organizational context can be.

The *environmental context* denotes the "realm" in which the firm runs its business. Hence this context includes factors that relate to the external environment in which the firm operates. This includes the firm's industry, direct competition, governmental relations and resource access (Soares-Aguiar and Palma-dos-Reis, 2008). The environmental context can also include a change dynamic such as a physical or social change which lies outside the direct control of the firm (Furneaux and Wade, 2011). Various potential factors in this context of the TOE framework have been found to be statistically significantly associated, and also among the strongest predictors of technology adoption, particularly in more recent studies (Kim et al., 2018; Gutierrez et al., 2015). Since a business strategy is by its nature outward-looking, I expect that these factors within the environmental context also play a vital role in explaining the adoption of digital communication and social technologies in the SMP of the firm. Through the identification of previously uncovered factors in the literature, I aim to establish the strength of these factors in my model.

1.6. Theoretical Contributions

The established academic fields of strategic management and international business (IB) currently do not answer important questions regarding the adoption and use of digital communication and social technologies. Consequently, the literature does not elucidate which factors can lead to the technologies' adoption in the SMP. This is despite the fact that they are increasingly adopted by businesses.

1.6.1. Systematic Literature Review

Apart from the growing interest businesses have in these technologies, another core reason that highlights the relevance of this PhD research is the fact that, despite the advanced age of some of these technologies, scholarly activity in the strategic management field has failed to produce any meaningful and comprehensive work on this subject. As a corresponding technology, email has been available since the 1970s (Crocker, 2012). Using his then innovative live-broadcasting TV technology, Scottish engineer John Logie Baird was able to have his image broadcast from London to Glasgow in May 1927. Supplemented by conventional phone lines to transmit sound, this was thus the world's first video call. The first video call between two companies was in the 1930s in the US (Borth, 2011). While it was not until the late 1990s, through the widespread availability of ISDN lines, that video conferencing started to become a daily activity in businesses, this technology has also now been in use for almost 30 years (Borth, 2011). Another digital communication and social technology that has been in use for some time is cloud technology, an example of an aggregating technology. In principle, cloud computing has been around since the 1960s and 70s, however, our more contemporary understanding of it emerged in the late 2000s (Carr, 2009). Closely linked with the emergence of cloud computing is that of collaborating technologies. These, too, have been in use since the 1970s (Brown et al., 2010). With the emergence of Web 2.0 technologies, social media emerged not only as a platform for individuals to engage and communicate with each other but also as a way for companies to develop their platforms or to engage in B2B and B2C communications (Flew, 2017).

While some studies picked up on some aspect of digital communication and social technologies and the impact on strategy (c.f. Croteau and Bergeron, 2001; Akter et al., 2016; Adesi et al., 2018; Gassemi, 2019; Leonardi and Vaast, 2017), to this date and the knowledge of the author, there has not been a study that systematically explores the use, impact and factors in adoption of different types of digital communication and social technologies. As a result, there is a gap in the literature in strategic management. Extant work already recognizes this gap regarding technology use. Brouthers et al. (2016), for instance, note that there has been very little progress in developing our understanding of how Internet-based businesses internationalize and strengthen their position in the market, which are both core strategic processes. This gap further manifests itself when the factors that lead to technology adoption in the SMP are not even clear. Brown et al. (2010) call for more research into the use of collaborative technologies by businesses. Furthermore, when it comes to the use of internal social media networks by companies, there is yet to be a formal review undertaken of how precisely such use relates to certain tasks and processes that are performed in the organization (Leonardi and Vaast, 2017).

Through a systematic literature review, I am able to draw out the boundaries of this gap in the current literature. Other aspects that highlight the value of the systematic literature review are: (i) the increasing use of digital business communication and social technologies by businesses (Bughin et al., 2019); (ii) the advanced lifecycle of many social technologies; and (iii) the absence of relevant research. Therefore the contribution of this first study is to provide a comprehensive and synthesized overview of all relevant studies which have investigated the use of digital communication and social technologies by businesses. In particular, the focus of this systematic review is the work published in strategy and IB journals. As a consequence, the review addresses the need to have a consolidated overview of the strategy and IB literature and the directions it provides as to how these technologies are used in the strategic management field.

1.6.2. First Empirical Study — The Use of Digital Communication and Social Technologies in the Strategic Management Process

With my findings, I intend to provide the scientific and empirical evidence to capture this seemingly growing trend of the use of digital communication and social technologies by businesses from a strategic management perspective. In particular, I focus on the current use of the four types of digital communication and social technologies that I identify (Chapter 3). Since the 1990s, scholars have identified a growing need to accelerate the formulation and implementation process, due to the changing nature and volatility of the external environment in which firms operate (Hart and Banbury, 1994; Meyer, 2009). Another trend observed in the literature is that organizations require their members to display a greater willingness to share knowledge and to cooperate in the strategy formulation process

(Hutzschenreuter and Kleindienst, 2006). Indeed, scholars have noted that there is growing interest by companies to open up their strategic management process and involve more stakeholders (Pittz and Adler, 2016; Dobusch et al., 2017; Hautz et al., 2017). Subsequently, a growing body of literature has concerned itself with identifying various practices that could be associated with a more open and less traditional way of strategic planning (Whittington et al., 2011; Doeleman et al., 2021). Scholars previously identified several potential advantages of open strategizing such as increasing the amount of input from stakeholders to inform decision-making (Morton et al., 2020) or boosting commitment to the strategy to enhance the success of implementation (Hautz et al., 2019).

In this regard, I contribute to the open strategy literature by determining the firm performance impact of on-going open strategy practices within companies (Adobor, 2020). By developing new theory to explain how different types of digital communication and social technology can facilitate greater involvement of different stakeholders in the SMP (Heracleous et al., 2018), I make a novel contribution by investigating this issue more wide-scale with a larger sample size, providing some more generalizable data on the matter (Morton et al., 2020). Initial explorations I undertook as part of this research into this topic indicate that, to some extent, digital communication and social technologies find little to no use in the SMP, in particular the shared-control technology types such as aggregating and collaborating technologies. This implies that, despite increasing automatization and greater availability of relevant data, the SMP remains an intuitive process undertaken by the upper managerial levels in businesses, which represents the more traditional upper-echelon approach to the SMP (Pittz and Adler, 2016; Adobor, 2020). In that respect, open strategy represents the antithesis (Whittington et al., 2011), particular when it comes to the ease with which specific types of digital communication and social technologies can open the SMP

(Morton et al., 2020). However, there is also consensus in the literature that a too radical opening of the SMP can also have negative consequences, such as, increasing complexity, exclusion of middle management, and a decrease of flexibility (Splitter et al., 2021; Adobor, 2020; Heracleous et al., 2018; Dobusch et al., 2017; Hautz et al., 2017; Hautz, 2017). To allow businesses to capture the best of both traditional and open strategy-making, some authors have come forth and advocate a blended approach with certain phases or stages of the SMP being more opened up and others being closed (Adobor, 2019; Hautz et al., 2017; Morton et al., 2020). I contribute to this debate in the literature by theorizing that a purposive use of specific types of digital communication and social technologies for distinct stages or activities of the SMP can positively enhance the effectiveness of that stage. Different types of technology that can either accommodate greater participation of stakeholders or restrict access and transmission of content can be used to open or close specific activities of the SMP.

As several factors in the use of digital communication and social technologies during the SMP are unknown, such as what the relationship is between technology use and the impact on business performance (Hutzschenreuter and Kleindienst, 2006), I intend to contribute to filling this apparent gap through the first empirical study by (i) scoping the extent of current digital communication and social technology use in the SMP; (ii) determining differences between countries to identify any legislative, cultural or geopolitical differences; and (iii) identifying a significant association: whether the use of digital communication and social technologies is associated with superior business performance. By addressing these three aspects, this study makes a meaningful contribution to knowledge by providing some empirical evidence of technology use in the SMP.

1.6.3. Second Empirical Study — The Factors Determining Firms' Adoption of Digital Communication and Social Technologies in the Strategic Management Process

The first empirical study contributes to our current knowledge through the collection, analysis and presentation of empirical data that provide a snapshot of the use of digital communication and social technologies in the SMP. Complementary to that, the second empirical study addresses the absence of knowledge regarding our understanding of why managers and strategy makers may or may not use digital communication and social technologies in the SMP. There is an extensive stream of research relating to the factors predicting technology adoption by firms (Zhu et al., 2003). However, this area of research currently does not investigate the use of these technologies in the context of the SMP. Nascent fields, such as marketing, have already investigated several aspects of technology adoption, although from an individual and consumer perspective (Pinho and Soares, 2011).

When it comes to investigating the adoption of a specific technology or innovation by a firm, one frequently applied model is the TOE framework (Tornatzky and Fleischer, 1990). Despite its frequent application in the literature, the TOE has not yet been used in strategic management research. As a result, the main contribution of the second empirical study is the application of this model in the context of the SMP by determining and adapting significant factors in the model so that they can explain the adoption of digital communication and social technologies in the SMP.

1.6.4. Overall Contribution of PhD Thesis

The contributions that I intend to make with this PhD thesis are relevant to different fields in the literature. The systematic literature review (Hazlehurst and Brouthers, 2018) highlights the current gaps in the literature about the use of digital communication, social and other types of technology in the SMP. The first empirical study is an attempt to fill one gap identified by the systematic literature review by outlining how and when businesses are using specific types of digital communication and social technologies in the SMP. Additionally, I am able to draw out a link between the use of certain digital communication technologies and improved relative business performance. The second empirical study takes the results from the first one further and investigates them in regard to factors explaining why firms adopt or do not adopt digital communication and social technologies for use in the SMP.

As a complete monograph PhD thesis, this research makes a multi-field contribution. First, this thesis contributes to our understanding of technology use in strategic management by scoping and synthesizing current research on this topic. Second, it contributes to the SMP and the strategy-as-practice literature by outlining how social technologies are used. Third, it takes the results of the systematic literature review and the first empirical study to investigate the factors leading to the adoption of these technologies. By utilizing a larger-sized dataset consisting of quantitative data, this study is able to draw out more generalizable results. Additional contributions made by this study are also relevant to the strategic planning performance literature and open strategy research.

1.7. Findings, Managerial and Policy Implications

The findings of this thesis show that using specific types of digital communication technologies at specific stages — for example, aggregating technologies for mission statement formulation — can have a positive impact on business performance. We can, therefore, draw implications from this research for current managerial practice that opening up specific, but not the entire, stages or activities of the SMP using shared-control digital communication technologies such as aggregating or collaborating technologies can enhance business performance. Using widely dispersed but closed technologies, such as corresponding technologies, did not indicate any business performance enhancing effect.

Moreover, the findings indicate that top management support — specifically, mediating the relationship between network effects, participation intention and process compatibility, and the adoption of collaborating technologies — is statistically significant in the adoption of collaborating technologies for use in the SMP. These results help to explain that the decision to adopt collaborating technologies in the SMP and thus to subsequently engage in digital strategizing depends to some extent on how compatible the firm's existing SMP is with the use of such technologies, whether the firm would like to involve more individuals in the SMP and how important the associated network effects are in the firm's wider value system. Additionally, from a policy perspective, the findings of this research imply that a greater contribution from and involvement of more individuals in the SMP could be promoted and maybe even made a legal requirement. Although, if every business were to do it this might, to some extent, then limit the impact on performance, it could nonetheless provide employees with a greater sense of belonging and commitment, and also give them more autonomy and ways in which to hold the actions and decisions of top management accountable (Hutter et al., 2017).

1.8. Outline of the Thesis

The remainder of this PhD thesis is structured as follows. Chapter 2 contains a systematic literature review of studies investigating various aspects of digital communication and social technology use in strategic management and IB. I also draw out themes of topics and present the research that was undertaken. To conclude, I present three reasons why there may be a lack of research in the field. Chapter 3 details the methodological approach for the subsequent two empirical studies. Chapter 4 starts with a review of the relevant literature and then presents the analysis and discussion of the empirical results for the first study. Chapter 5 contains a literature review and data analysis and discussion for the second empirical study.

In Chapter 6 I then discuss the overall results of the empirical data in light of the current literature. I conclude the thesis by pointing out future directions of research for this topic.

Chapter 2 – Systematic Literature Review of Technology Use in Strategic Management

2.1. Introduction

The purpose of this chapter is to review what research has been undertaken and to identify areas for future scholarly work that can contribute to our understanding of the use of social technologies in the IB and strategic management (strategy) process. Even though the main focus of this thesis is on the strategy literature, the search was deliberately expanded to include the nascent IB literature in order to identify any studies that may also contain relevant results for the strategic management process (SMP). More specifically, the focus is on research that investigates the *use* of digital communication and social technology in strategic management or IB-related contexts. Through a systematic review of the literature, I identify the research published to date, and demonstrate how the IB and strategy literature is falling behind other areas such as marketing and information systems. I also present reasons why this lack of research in IB and strategy might exist. Further, there is excellent potential for research to be undertaken that contributes to our understanding of the benefits and drawbacks of using digital communication and social technologies in these areas.

Despite the apparently pervasive use of social technologies in the business world, the academic literature in IB and strategy has provided few insights about its use. While researchers in information systems and marketing have increasingly explored the use of social technologies in their areas, IB and strategy scholars have only begun to explore its impact (see for example the 2016 special issue of *Journal of International Business Studies*). Other scholars have also identified this lack of research. Brown et al. (2010) note that there is little research on the use of the unified theory of acceptance and use of technology in regard to social technologies in businesses. Leonardi and Vaast (2017) maintain that few scholars have explored the use of social media for collaborations in business, while Brouthers et al.

(2016) suggest we know little about how Internet technology-based businesses such as i-businesses internationalize.

Although empirical research can be a time-consuming endeavor and cannot realistically produce results as fast as markets change (Buckley, 2002), an important question needs to be asked: why have "new" digital communication and social technologies not received more research in the areas of IB and strategy? In this chapter, I systematically scan the existing literature in order to consolidate and synthesize existing work in the field. First, I detail the methodology of the search; second, I present the overall results by theme; third, I highlight the results specifically from the strategy and IB literature; and finally I discuss the results and answer the above question.

2.2. Methodology

To achieve the objectives of this study (as set out in Chapter 1) and to provide insights into current knowledge in the field, I undertook a systematic review. While it is more common to conduct narrative reviews in management, it is argued that a systematic review is a more effective way to understand what research exists in the area (Tranfield et al., 2003). A systematic review differs from a narrative review in that the former takes a systematic approach to review literature in an attempt to reduce or eliminate reviewer bias while the latter approach relies on the reviewer's knowledge, insights, and choice of literature. In this systematic review I followed an adapted three-stage approach as outlined by Tranfield et al. (2003). The first stage involved the plan, such as setting the search terms and scope; second, the literature search was executed and the results that were obtained for each search string were systematically recorded; third, the results were systematically analyzed, assessed for relevance, and documented (Tranfield et al., 2003). The three-stage process enabled this study to conduct a thorough investigation of previous studies and synthesize the advances made in the field, so helping to identify the gaps in the literature that future empirical research can fill (Webster and Watson, 2002).

Due to the heterogeneous nature of the strategic management and IB fields, the literature search was as broad as possible. In this first study, an inclusive definition of both IB and strategy and its associated processes was used (David, 2011; Hill and Hult, 2017). As I intended to find out if there were any studies on how, for instance, social technologies are used in the scanning and interpretation of the internal and external environment, or assessing internal competencies (Nag et al., 2007), the search was not limited to any specific theoretical understanding (Furrer, 2011), dimension (Aaker and McLoughlin, 2010) or stage (Johanson and Vahlne, 1990) of the strategy or IB process.

2.2.1. Search Protocol and Plan

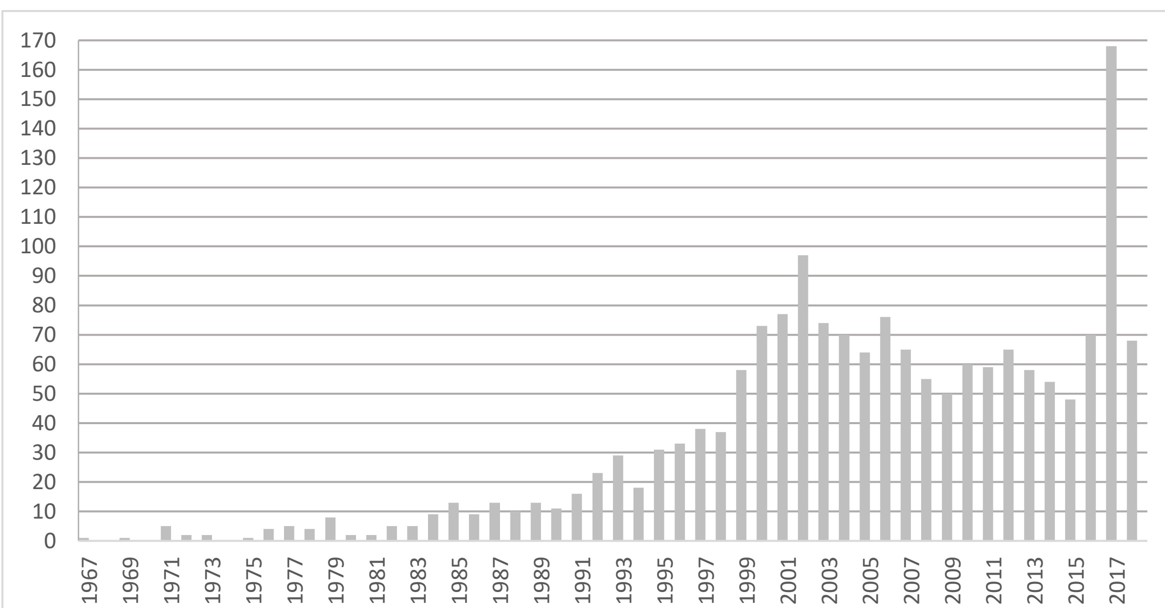
The research protocol contained the search terms and scope of the search. The search terms used centered around six constructs that are outlined in the Appendix (1). I used various combinations of the search terms but at least one term that related to strategy or IB was included, to keep the results relevant. To avoid subjectivity, at this stage the terms were discussed with and reviewed by the main PhD supervisor. The literature search was not limited to specific journals or publication types but focused predominantly on journal articles and conference proceedings, for the purpose of keeping the results manageable. The search was limited to English language documents, published between January 1970 and February 2018, in line with the emergence of the commercial use of digital communication and social technologies such as email. Because strategy and IB often overlap with other areas including sociology, finance or economics, the search was not limited to a specific subject area (Nag et al., 2007). To minimize potential biases and to produce a pool of critical contributions in the field, two scholarly databases were used: Google Scholar and EBSCO Business Source

Complete (Pinho and Mendes, 2017; Zott et al., 2011). The search for the terms was applied to the title, keywords, abstract and the main body of the article.

2.3. Headline Results of the Literature

The search was carried out between February and April 2018, through which 1,759 different publications were identified. These mostly included academic journal articles (90%), but also captured conference papers (4%), textbooks (4%), book chapters (1%) and Internet documents (0.34%). A review of the publication dates revealed that the majority of papers (77%) were written after 2000 (Figure 2-1). This reflects the time in which social technology started to be used more widely by businesses (Zhu et al., 2003). After a peak in 2002, the number of publications decreased, possibly reflecting the dot-com bubble-burst in the early 2000s. However, more recent years (2016 and 2017) have seen a substantial increase in publications. This trend is likely to continue as the number of 2018 publications is already at a similar level to the total for 2016.

Figure 2-1 Count of Publications Obtained by Year



2.3.1. Classification of Results

Once the search was complete, each abstract was read and subsequently all the articles were classified into broad themes (Neuendorf, 2010), regardless of their relevance to the IB and strategy field. I identified 15 themes and classified the research accordingly (Table 2-1). The choice of themes did not follow any pre-set scale and the themes were inductively set after an initial review of the first 250 articles (Drisko and Maschi, 2016). Each theme was set as a heading under which existing research was gathered to obtain an overview of the general subject areas. Studies were assigned to a theme even if there was no clear indication that the use of social technologies was the key focus of the research. The following section contains a brief description of each theme and summarizes the direction of the research within each theme.

Table 2-1 Number of Articles Found Per Theme

Items per theme	**Total**
Marketing Strategy and Communications	177
Education and Research	62
Medicine, Healthcare and Natural Science Specific Use	80
Individual User Behavior	139
Adoption of (Social) Technology	57
Organizational Structure and Behavior	154
Macro and Market Focus	98
Tourism and Leisure Specific Use	12
Business, Management, Strategy and Internationalization	311
Entrepreneurial Management and Behavior	27
Supply Chain, Manufacturing and Logistics	66
(Social) Technology Company Perspective	58
E-commerce and Online Trading	55
Technology and Computer Science	129
Unrelated Content	334
TOTAL	**1,759**

Marketing Strategy and Communications: This theme includes all marketing-related publications, predominately from the corresponding literature. The size of this category demonstrates the level of interest in the subject of digital communication social technology in the area, with 10% of all identified publications being classified under this theme. The most common subjects are research on social media use for consumer-level marketing purposes (e.g. Wood and Burkhalter, 2014), in business-to-business Internet marketing (e.g.

Eid et al., 2006), and how marketing-related research can be undertaken using social technology (e.g. Bakopoulos et al., 2017). Generally, the marketing literature focuses on the use of digital communication and social technologies, in particular, social media use by companies. The main use of these technologies is for the creation and capturing of value from customers.

Education and Research: With a percentage share of 3.5%, this is one of the smaller themes. It includes publications that address the use of technology at any level of education, academic or university-based research, and the pedagogic use of digital communication and social technologies. Common themes in this area range from using digital communication and social technologies for scientific research (Robinson, 2000) to how universities need to use digital communication and social technologies either as part of the curriculum (McCorkle and Payan, 2017) or in teaching (Barn, 2016).

Medicine, Healthcare and Natural Sciences Specific Use: digital communication and social technologies are not only of interest in the social sciences but also in the field of natural science as the number of publications in this theme (4.5% share) reveals. These papers are concerned with the potential use of social technology to provide remote patient treatment (Bates et al., 2001) as well as with the risks and ethical considerations of increasing interconnectivity in healthcare (Greengard, 2017).

Individual User Behavior: This theme encapsulates publications which focus more on the use of digital communication and social technology by individuals rather than how they are used in or by a firm. It also includes the use of digital communication and social technologies in a private or professional context (Xiang and Gretzel, 2010) and how individuals within an organization are using (Stronge et al., 2006) and interpreting digital communication and social technologies (Fulk and Connie Yuan, 2017). With an 8% share of identified research, this is one of the larger themes that emerged from my search results. Publications are based in a variety of sectors with most research being published in the primary information technology journals (*MIS Quarterly* and *Communications of the ACM*).

Adoption of social technologies: In a related theme, there appears to be a small but growing body of research (3.2% share) focusing on the adoption of digital communication and social technologies by either individuals or companies. Digital communication and social technologies have changed the way business is undertaken. Papers in this theme explore the adoption of technology within and outside the business itself. This research focuses on individuals in businesses or other organizations (Thong and Yap, 1995), technology adoption for the entire organization (Mergel, 2013), or adoption outside businesses, mostly by consumers (Venkatesh and Bala, 2012).

Organizational Structure and Behavior: With 8.7% of all the publications that were found through the search, this also is one of the larger themes. Publications in this area draw on the organizational behavior literature to describe the use of digital communication and social technologies by businesses. I distinguish the papers in this theme from that of *Adoption of Social Technology* by including only studies that describe things that are already in use and that focus on the actual usage and its associated impact, rather than on adoption and implementation. Dominant streams in the organizational structure and behavior theme include studies attempting to provide measures for the impact of social and information technology on organizational performance (Mukhopadhyay et al., 1995) or the role of technology as a mediator between different business processes within an organization (Zhuang, 1995). Another stream which emerged is concerned with the management of knowledge, innovation and resources through or with the aid of digital communication and social technologies (Hester, 2010).

Macro and Market Focus: Some studies examined the use of either social or information technology from a more macroeconomic or generic market angle. These studies represent about 5.5% of the articles identified. Studies classified into this theme mainly focus on either the use of information or social technology across a specific part of the economy (Eng and Unza, 2016) or in specific sectors within a country (Vajjhala and Thandekkattu, 2017). Some of this research also explores the markets of specific digital communication and social technologies such as cloud computing (Alsarhan et al., 2018) or how these technologies contribute to shrinking geographic and cultural distances (Fey et al., 2006).

Tourism and Leisure Specific Use: Despite representing only 0.7% of the articles identified, publications in this area have a distinct application of digital communication and social technologies to the tourism and hospitality industries. The content of these publications may overlap with other themes such as marketing (Standing and Vasudavan, 1999) or e-commerce, but these papers are published in tourism related journals.

Business, Management, Strategy and Internationalization: With a share of about 18% of identified publications, this is the most significant theme of studies that researched the use of digital communication and social technologies. This theme not only contains studies from the relevant literature (IB and strategy) but also studies from the information systems, IT, organizational behavior and marketing literature. I assigned publications to this category if there was a clear link to business strategy or the internationalization processes. This theme is explored in more depth in the following section.

Entrepreneurial Management and Behavior: Studies with an entrepreneurial focus represented 1.5% of the articles found. Here all publications that examined the use of digital communication and social technologies by entrepreneurs or their businesses were included. Additionally, studies on entrepreneurial education and development (McGowan et al., 2001) and those looking at how digital communication and social technologies are used for the formation of inter-business networks were also included (Vasilchenko and Morrish, 2011).

Supply Chain, Manufacturing and Logistics: Studies (3.7% of the total) examining the use of technology in supply chains, logistics, and manufacturing were included in this theme. Research in this area spans across various stages of the supply chain such as the use of digital communication and social technologies in manufacturing and supply chain management (Cagliano et al., 2003), the impact of e-business on manufacturing (Cagliano et al., 2005), and the use of technology in inter-supply chain communications (Prahinski and Benton, 2004).

(Social) Technology Company Perspective: Not all the publications identified focused on the use of social technology by third-party organizations or individuals. This category (3.3% of articles) contains those studies looking at social technology or information technology businesses. These studies explore diverse issues such as the future potential of advanced cloud computing (Goutas et al., 2015), the internationalization of high-tech companies (Jones, 1999), and the development of certain technology-based companies (Vise, 2007). This research is often undertaken using case study methodologies.

E-Commerce and Online Trading: The increase of private home Internet connections has supported the growth of e-commerce providers (Wang and Zhang, 2012). Publications allocated to this theme (3.3% share) investigate the use of digital communication and social technologies by businesses with an e-business or ibusiness model (Mahadevan, 2000). This includes online traders and providers of services via the Internet. To distinguish this theme from the one above, it included only those publications that look at consumer interactions with e-businesses, or transactions between two or more e-businesses. Specifically, these studies examine the use of digital communication and social technologies by e-businesses

(La Torre and Moxon, 2001) or explore the link between a specific social technology, social media for instance, and consumer behavior (Pilik et al., 2016).

Technology and Computer Science: With a 7.3% share of identified research, this theme comprises all publications that had more of a technological and computer scientific angle. Naturally, most of these publications stem from technology and information systems journals and related conferences. These publications are concerned with technology-related hardware (Raghunathan and Madey, 1999), aspects such as coding (Moore et al., 2003) or issues regarding cybersecurity (Samtani et al., 2017), or data mining (Kohavi, 2001).

Unrelated Content: By far the largest theme (19.2% share), this covers those studies that could not be easily classified into any of my other groups. This theme contains all articles which did not appear to research the use of social technology in businesses or were from unrelated or fragmented disciplines such as law or public policy. I also included here papers which had an outdated technological perspective (adoption of computers for example).

2.4. IB and Strategy Results

Once the initial search was over, the results were continually refined by identifying all the articles that were published in IB or strategy journals. This remaining sample consisted of 73 articles in 29 journals (see Table 2-2 for a list of the top journals, i.e. those that yielded the largest numbers of useful articles). Thus, it appears that IB and strategy research in the area lags behind other areas as it represents only a fraction of the total work undertaken so far. To learn more, the final list of relevant papers from the IB and strategy literature underwent a more detailed analysis to identify the areas of investigation and to highlight where there are gaps in the field.

Table 2-2 Top IB and Strategy Journals

	Journal Name	Number of Articles
1.	*Strategic Management Journal*	7
2.	*California Management Review*	6
3.	*Business Horizons*	5
	International Business Research	5
	Journal of International Business Studies	5
	Management Science	5
	Thunderbird International Business Review	5
4.	*International Business Review*	4
5.	*Journal of Knowledge Management*	3

2.4.1. Overview of IB and Strategy Research

While there is a relatively small number of studies in the IB and strategy area, there appears to be a diffusion of topics based on the aims and objectives of the authors. Many of the studies focus on delineating or defining the place of technology in a business model (12.3%) or on determining ways in which technology can be used to capture business value or manage customer and business relationships (12.3%). Others are concerned with the management of knowledge or other resource-based view conceptualizations of technology use (11%), identifying factors influencing technology acceptance (11%), strategy development (6.8%), or the facilitation of the internationalization process (9.6%).

About half of the studies in IB and strategy research (52.1%) did not mention or include a specific type of technology and how it was used within a business for strategy- or for IB-related processes. Of those that did discuss specific technologies, the largest group of papers explored social media (13.7%) followed by communication technology (12.3%). About 5.5% of the studies in the sample conceptualized technology more broadly as IT without referring to any specific features. Additionally, 4.1% of the extracted articles dealt with Web 2.0 or other Internet-based technology. Finally, almost 4.2% of the articles took a more general stance on technology and did not limit (or discuss) any specific format or included a variety of different manifestations of technology. Thus, the fact that just under half of the studies found, or just 2% of the total number of studies found in the review, focus on the use of specific technologies in the IB or strategy process, further demonstrates that there is currently a lack of research in the area.

Looking at the industries covered, the majority of IB and strategy studies did not link their sample or theoretical conceptualization to a specific business or industry sector (34.2%). The second largest group (23.3%) included multiple sectors, as numerous studies included businesses or organizations from a variety of industries and sectors in their empirical sample (e.g. Daniel et al., 2002; Gabrielsson and Gabrielsson, 2011).The largest group of studies focusing on only one sector was the retail and e-commerce sector with 9.6% of all papers in our list (Guzzo et al., 2014). Other specific industries on which studies concentrate include the Information Communication Technology (ICT) and IT industry itself (6.8%); healthcare; science and energy; and manufacturing (4.1% each); i-business; banking; logistics; and governmental offices (1.4% each).

Methodologically, about one-third of the IB and strategy studies (34.7%) were theoretical or conceptual (e.g. Berthon et al., 2012; Rowley, 2002). For the empirical papers, about one-third (33.3%) used quantitative methods which were predominantly surveys (e.g. Grover, 1993; Powell and Dent-Micallef, 1997) and had a mean sample size of about 218 individuals/firms. A further 19.4% used qualitative methods with interviews being the most frequently chosen method (e.g. Kane et al., 2009; Toubiana and Zietsma, 2017) and included on average 21 participants. The remaining 12.5% of articles used secondary data or took a mixed method approach (e.g. Chen and Kamal, 2016; Chen et al., 2017b).

2.4.2. Analysis by Theme

This section takes a more detailed look at the 73 journal papers published in IB and strategy journals. The following table (Table 2-3) shows the number of papers by theme to highlight the diffusion of research on technology use by strategy and IB scholars. The number of papers published in these journals is in stark contrast to the number of overall articles detailed in Table 2 and indicates the lack of research on digital communication and social technologies in the IB and strategy areas.

Table 2-3 Count of IB/Strategy Articles by Theme

Items per theme	**Total**
Marketing Strategy and Communications	5
Education and Research	1
Medicine, Healthcare and Natural Science Specific Use	0
Individual User Behavior	8
Adoption of (Social) Technology	2
Organizational Structure and Behavior	10
Macro and Market Focus	3
Tourism and Leisure Specific Use	1
Business, Management, Strategy and Internationalization	35
Entrepreneurial Management and Behavior	1
Supply Chain, Manufacturing and Logistics	2
(Social) Technology Company Perspective	2
E-commerce and Online Trading	2
Technology and Computer Science	1
Unrelated Content	0
TOTAL	**73**

Marketing Strategy and Communications: Of the five papers in this category, four deal with social media. This specific type of social technology has found increasing use and adoption by marketers due to the ease with which it allows companies to communicate with consumers, especially mobile social media (Kaplan, 2012). Kaplan and Haenlein (2010) highlight the cost and efficiency benefits of using social media in marketing. Only one of the studies contained empirical data, which conducted interviews within organizations to determine the sources on which managers decide their choice of sales channel, such as the perception of the need for marketing communication with their customers (Karamehmedovic and Bredmar, 2013).

Education and Research: Ghemawat's (2017) study on using online technologies, such as an open online course, to provide education was the only study in this category in an IB/strategy journal. Using secondary data, Ghemawat (2017) describes how higher education establishments need to address the opportunities that stem from using technology.

Medicine, Healthcare and Natural Sciences Specific Use: I identified no studies published in IB or strategy journals addressing this issue.

Individual User Behavior: There are a small number of empirical studies (six) in this theme focusing on social media, general communication technology, and cloud computing. Several studies in this theme focus on user behavior of social technology inside a business (Fulk and Connie Yuan, 2017; Trainor et al., 2014). Other studies delineate the adoption of social technologies by consumers and what businesses need to be aware of to increase use and interaction with the technologies they plan to use.

Adoption of Technology: There were two studies in IB journals that empirically investigate the adoption of e-commerce by small and medium enterprises (SMEs). These studies contribute to the broader understanding of technology adoption, something that is related to technology in different contexts (Belkhamza and Azizi Wafa, 2014; Daniel et al., 2002).

Organizational Structure and Behavior: With ten papers, this area represents the second largest theme for IB and strategy research. Four papers were theoretical conceptualizations without empirical data. These studies vary in their contribution from critiquing the epistemological view of studies researching the impact of IT use, to the management of knowledge through knowledge-management tools (Cormican and O'Sullivan, 2003; Markus and Robey, 1988). The other six papers used a variety of different empirical research methodologies such as interpretative case studies (Boudreau and Robey,

2005) to large-scale cross-sectional surveys (Grover, 1993). Brews and Tucci (2004) explore the effects of Internet-working on the organizational structure and collaboration behavior of multinational businesses. The authors find evidence that higher use of Internet-working within a business is associated with a reduction of internal hierarchies. Using a health system network as an example, Devaraj and Kohli (2003) found that the impact of IT on the firm is contingent on the use of IT, not the amount of investment into IT.

Macro and Market Focus: I obtained three articles from strategy journals and one from an IB journal that used secondary market or financial data in their analysis (cf. Bharadwaj et al., 1999b; Dewan and Kraemer, 2000). The strategy articles focus on the causal relationship between IT investments and firm or market performance. In their IB paper, Tang and Trevino (2010) examined the influence of ICT on the spatial distribution of foreign direct investment (FDI) based on a sample of 35 different countries.

Tourism and Leisure Specific Use: The single article in this category presents a case study in order to evaluate the effectiveness of using web-based technology to advertise tourism in Ho Chi Minh City (Bui et al., 2006). The authors argue that, in developing countries, hotels which are engaged in e-commerce activities outperform rivals that do not offer their accommodation services online. The focus thus lies more on the marketing-related use of technology rather than using technology as a means to develop a strategy or decide on the appropriate option for internationalization.

Business, Management, Strategy and Internationalization: With 35 papers, this theme is the largest one and also the principal focus of this study. In 19 articles there is evidence of research around some form of technology. However, in six of these papers references to technology were kept to a generic level such as IT or communication technology, with no mention of any specific technology (Larkin, 2014). The focus of one paper was on Internet use by businesses; it uncovered that business relationships are highly relevant when Internet-mediated transaction channels are utilized (Gabrielsson and Gabrielsson, 2011). Another study's focus was on technical terminology, namely throughput technology, and found that throughput technology can moderate the entry mode choice by service companies (Domke-Damonte, 2000). Studies that focused on particular social technologies such as Twitter (Kaplan and Haenlein, 2010) or social media in general (Sashi, 2012) examined the development of relationship creation with stakeholders outside the company, such as customers or business partners, rather than using the technology internally for strategy or IB purposes. In line with this approach to technology use, one article proposed and developed a search tool for organizations looking for innovation partners outside their local network. This tool can help businesses to expand the scope of their search (Meulman et al., 2018). Similarly, Alarcón-del-Amo et al. (2018) found that new technologies, such as social media, can benefit the overall performance of companies, especially when there is some degree of managerial involvement. Another stream of research within this theme investigates organizational creativity and how ICT-use can negatively moderate the relationship between the collection of knowledge and organizational creativity (Giustiniano et al., 2016).

I also identified several papers that investigated various aspects of technology use and the internationalization processes. For example, Pogrebnyakov (2017) described the internationalization process of businesses through Facebook. Rangan and Sengul (2009) demonstrated that internationalization and internalization of US manufacturing businesses are increasingly intertwined and coupled with the use of ICT. Also focusing on ICT, in this case, mediated via the Internet, Chen and Kamal (2016) assessed the impact of such technology on the business decision to reconstruct their supply chain across borders. Furthermore, there are a few studies concerned with how technology facilitates the internationalization process for high-tech start-ups or Internet portal providers (Chen et al., 2017a; Gabrielsson and Gabrielsson, 2004; Robles, 2002).

The remaining 16 articles range from theoretical papers that develop or expand existing IB or strategy process models (Kano and Verbeke, 2015; Tassabehji and Isherwood, 2014) to articles focusing on the strategic development or internationalization of technology-based companies (Brouthers et al., 2016) or investigate the impact of IT in general on corporate strategy (Morton, 1988). Others explore theoretically the business competencies that are required to use IT and information systems successfully (Feeny and Willcocks, 1998) or to disseminate the process through which users in a business make sense of a specific technology features within a business (Griffith, 1999).

Entrepreneurial Management and Behavior: The single paper in this theme contributes more to the entrepreneurial marketing field by highlighting relevant factors, such as e-business development and the establishment of competitive advantages, while delineating attitudinal barriers of individuals toward gaining required business skills (Fillis, 2005). Therefore, it has more of a learning focus.

Supply Chain, Manufacturing and Logistics: The one paper in this category provides an assessment of collective firm behavior through a case study of an industrial park in Oahu, Hawaii (Chertow and Miyata, 2011). The paper did not mention any specific technologies that are used in this collaboration process.

(Social) Technology Company Perspective: The two articles in this theme place the focus of their research not on how companies use technology, but on technology providers. One of the papers explored the factors that impact the internationalization decision made by a high-tech start-up (Cannone and Ughetto, 2014). The second paper provides some potential

strategies for traditional retail banks that face competition from online-only banks (Wright, 2002).

E-Commerce and Online Trading: The two identified studies in this theme investigate business models and how traditional physical stores can extend their business to the online realm (Cho and Tansuhaj, 2013; Mahadevan, 2000).

Technology and Computer Science: Taking a more technical stance, the one paper in this area tries to ascertain whether multinational enterprises can use knowledge management technologies to influence their performance which stems from the internationality of the business (Andersen and Foss, 2005). Building on ideas and concepts from knowledge management, the focus of this paper was more widely on information and communication technology.

Unrelated content: No studies published in IB or strategy journals were identified that could not be included in one of the themes above. Therefore, there are no unclassified articles.

2.5. Discussion

The review of the literature tends to indicate that research examining “new” digital communication and social technologies is rather scarce in the IB and strategy fields. While areas like marketing and information systems have found the impact of these new technologies to be essential components of their research agendas, presently IB and strategy scholars have shown limited interest in exploring this area. While some anecdotal evidence indicates that businesses have been using these technologies to assist with IB and strategy issues (Bughin et al., 2017), more systematic investigations of what is going on, what works and what does not, and theoretical exploration of potential uses of these new technologies, are yet to emerge. There are a few studies looking at some specific issues and/or technologies.

These papers will help provide a starting point as IB and strategy scholars embrace the many potential uses technology now offers and will offer in the future of the business world.

There are three potential reasons why ICT and social technology research in the IB and strategy fields is limited. First, there appears to be a lack of appropriate theory to help explain the impact of these new technologies. The IB and strategy literature tends to share many common theories to delineate the processes that firms undertake and the way a firm can improve performance. Among the most widely used are transaction cost analysis (TCA) (Williamson, 2010), the resource-based view (RBV) (Barney, 1991) and institutional theory (North, 1990). While these theories help to gain a better understanding of how firms interact with each other and with other stakeholders it is unclear where and how these new technologies fit. Most existing IB and strategy theories were developed for more traditional industries that faced very different restrictions (such as high travel costs and communications issues). New technologies have altered many of the foundations on which these theories were developed (how we do business and what a business looks like) and therefore require changes. For example, asset specificity and uncertainty are core concepts in TCA (Williamson, 2010). It is unclear whether, for example, mobile technologies are transaction-specific (especially for firms outside the mobile phone industry) or whether these technologies impact uncertainty or stand outside the TCA framework. From an RBV perspective, many of these technologies are common goods and therefore need to be combined with other firm-specific resources to provide an advantage. Current theory does not explain how and in what circumstances these technologies help firms generate an RBV advantage and when/where such technologies reduce advantages. Porter (2001) suggests that these new technologies (the Internet) may not impact the advantage at all but represent a different channel to undertake the same transactions. One vital question that results from this is whether Porter's (2001) stance remains valid. Finally, institutional theory helps explain the impact of the external environment on firms, yet it is unclear how these new technologies impact the political, normative and cognitive pillars (Hall and Soskice, 2001). This seems to apply both to the domestic setting (institutional voids) as well as to cross-national concepts (institutional distance). New technologies might influence all three aspects of the external environment by creating new challenges and opportunities for businesses.

Adaptation of current theories is one way forward, but the development of a new theory or the adoption of theories from other areas might also help. When Brouthers and colleagues wanted to examine the internationalization process of i-businesses (platform businesses on the Internet), they realized that existing theory needed to be rethought and so they developed a new theory, borrowing from the IB, strategy, and marketing literature (Brouthers et al., 2016). Alternatively, the information system and marketing disciplines have already developed theories to explain how many of these new technologies might be used in business. Among these theories are Venkatesh et al.'s (2003) unified theory of technology acceptance, and adoption and social presence theory (Short et al., 1976). Thus, one reason for the limited inclusion of new technologies in IB and strategy research is the lack of clear theory to help explain its impact.

Second, despite the growing interest in digital communication and social technologies, scholarly coverage of the topic may be hampered by a lack of data. There appears to be a large amount of market data for the use of social technology adoption and diffusion (e.g. Bughin et al., 2017; Bughin et al., 2019), yet to my knowledge, there is little data available on which technologies firms use or for what they are using these technologies. While the popular press may present some examples of businesses using social technologies in their strategy formulation process, there does not appear to be a large-scale secondary dataset that researchers can utilize. Consequently, the inclusion of digital communication and social technologies in IB and strategy research might involve more complex research since it will require the sourcing of primary data from firms. At this time, it is unclear which technologies firms have adopted and how they are using them in the IB and strategy process. This means that scholars need to undertake both case and survey data collection methods to gain a greater understanding of the current situation and how new technologies are (if at all) being used in today's businesses. Of course, to undertake this task, we need both some theoretical understanding of what to expect, as well as reliable measures. Fortunately, the information systems literature, for example, has a wide array of scales and indices at its disposal that are frequently used in empirical research. These scales range from measures of the perceived usefulness of technology to more macro-level factors such as the amount of IT investment (Davis et al., 1989; Goh and Kauffman, 2013). Equally, the marketing literature has made use of new measures such as customer sentiment in social media posts, online click-through rates, and basket value, which lead to the emergence of big data and allow scholars to deduce various aspects of consumer behavior or engagement with certain types of technology formats (e.g. Mallapragada et al., 2016).

Consequently, one way forward for research in IB and strategy is to produce some empirical work, developing new ideas and measures that can gain wider acceptance. There are important contributions to be made by both qualitative and quantitative research studies. Qualitative studies would be able to explore the use of technology in the IB and strategy process in depth and explain it from an interpretative angle. Such research would allow us to detect potential challenges in and the perceived usefulness of these new technologies that could inform our theoretical approach. Quantitative studies could be used to test the ideas noted in qualitative research, to develop new measures, and to test adaptations to existing theories of the strategic management process (SMP). This could provide a foundation for insights which would allow others to identify further areas of research and help managers gain a better understanding of what technologies can help create better performance, and what technologies create barriers to success. This research will be undertaken as part of the second study for this PhD research (Chapter 3).

My third explanation for the lack of research looking at the impact of new digital communication and social technologies in the IB and strategy area reflects the suggestions for future research found in existing papers. Often researchers look for new ideas in both research papers and papers devoted to new research ideas. Examples of this latter type include papers by Buckley et al. (2017) and Delios (2017). These papers contend that IB and strategy scholars tend to stick with existing theories and explore well-defined phenomena (Newbert, 2007). Nevertheless, when something new arises (the “grand challenges” in Buckley et al. (2017) for example), we as researchers are slow to respond. This seems to be especially true for the rise of digital communication and social technologies where few scholars have yet to tread (for exceptions, see Brouthers et al. (2016); Chen and Kamal (2016)). Instead, scholars appear to rely on the more established IB/strategy theories, as discussed above. Most of these were developed in a time when social technology use by businesses was non-existent or in its infancy and therefore they do not fully capture the added level or dimensions that are brought in by these new technologies (Buckley et al., 2017). As social technologies provide a novel aspect to IB and strategy it requires a degree of academic curiosity; to go beyond existing theories and not merely look for one additional independent variable, moderator or mediator (Delios, 2017). Instead, Delios advocates a more collaborative and embedded approach to studying these new phenomena so that “real learning can occur” (2017, p.395). Therefore, an over-reliance on existing theories and well-researched ideas inhibits the advancement of IB and strategy scholarship. Despite these three potential obstacles, there are many areas of research that can be explored to further our knowledge of how digital communication and social technologies have changed the business landscape and provided firms and managers with both opportunities and challenges.

2.6. Conclusion

In this chapter, the level and extent of research regarding the use of “new” digital communication and social technologies in the IB and strategy literature were explored. New technologies include the Internet and mobile-based technology such as cloud computing, communication platforms or enterprise social networks. By conducting a systematic review of the literature, I discovered that there is only a limited body of research in the IB and strategy areas looking at the use of these technologies in business. Many of the existing studies either take a more general stance toward technology or do not focus on specific internal processes of IB or strategy. I argue that IB and strategy scholarship needs to keep pace with the use and adoption of technologies so that it can help businesses identify what works and what does not. This will help inform managers as they wrestle with the proliferation of new technologies and try to implement them in their businesses. While there are a number of reasons why scholars may not have undertaken this research, there are equally several avenues open for further research, one of which I explore in an empirical study (Chapter 4). Since businesses continue to adopt and integrate these new technologies, it is important to fill these research gaps and provide evidence that can enhance business performance. This initial study outlined a range of relevant research topics that IB and strategy scholars can pursue to help managers make better decisions. In a world of growing interconnectivity and technological advancement, it is fundamental for managers to understand the impact of technology use, in order to reap the benefits of it while mitigating any negative effects.

The following chapter will present the methodology for the empirical work of the PhD thesis' research, which consists of two empirical studies of the adoption and use of digital communication and social technologies in the SMP.

Chapter 3 – Methodology of Empirical Studies

3.1. Introduction

3.1.1. Opening

The purpose of this chapter is to introduce and justify the chosen methodological approach for the two empirical studies of this PhD thesis. My systematic review of the literature revealed that there is currently a lack of empirical studies that explore the adoption and use of digital communication and social technologies by firms in their strategic management process (SMP). Additionally, there is an absence of any theory that enables researchers to draw out inferences of firm's strategizing and internationalizing using these digital communication and social technologies (Brouthers et al., 2016). My PhD research, therefore, intends to fill this gap through its two empirical studies. By collecting relevant data, this thesis makes a valuable contribution by uncovering this potential phenomenon. The field of strategy research previously brought forth a wealth of empirical work that now helps to elucidate several issues of the field. There are, thus, a variety of methodological precedents that help to inform and justify the decisions made for this study.

Building on previously conducted methodological approaches, this work draws on studies from the strategy and information systems literature. This is to combine several methodologies to design and conceptualize the most appropriate methodological approach to address the research questions of this study. As an exploration of the adoption and use of digital communication and social technologies represents an advance into a novel area, I chose a quantitative study for the first empirical study as it is concerned with explaining what types of digital communication and social technologies businesses use in the SMP: a quantitative study enables me to collect and analyze large-scale datasets and to develop and test new theories.

For both the first and second empirical study, I employed a quantitative research method to confirm and validate a series of hypotheses, based on a novel theory that I develop, with a larger and more generalizable sample. The advantage of conducting a quantitative study is that it allows me to detect and express any effects numerically. By providing the scales and measures I used in this chapter, I also ensure the replicability of this study.

Unlike quantitative research, qualitative research is concerned with the collection of in-depth, content-rich and highly informative empirical data to explore a specific research issue, understand the constructed reality of one or more individuals, and specify causal relationships to comprehend the meaning of such from the participant's perspective (Gibson, 2017). Given these characteristics of qualitative research, this type of data is also suitable for an exploration of a novel research issue. While it may appear intuitive that firms make use of the abundance of digital communication and social technologies that are readily available to them, there is only limited empirical evidence available that would confirm this. While a qualitative research method could be used to determine the use of digital communication and social technologies in the SMP employed by firms, it would not allow for any meaningful cross-case comparison. Therefore, the first empirical study, which explores the current use of digital communication and social technologies, adopts a quantitative research methodology that allows me to obtain an overview of the specific types of digital communication and social technologies used in the SMP. Additionally, the quantitative methodology allows me to establish whether using digital communication technologies for strategizing has an impact on performance.

A key limitation of qualitative research is its limited ecological validity and generalizability. A quantitative method allows me to test the initial findings against a larger sample in an effort to increase the external generalizability of this research. Quantitative data is more number-based, providing measures for variables across a larger number of individual observations or cases. This data can either stem from empirical sources such as questionnaires, structured observations or experimental studies, or secondary sources such as financial panel data or economic indices (Gibson, 2017). Formulating and testing hypotheses can thus enable this study to determine empirically and statistically valid associations between the various independent variables and the dependent and outcome variable. Moreover, using quantitative methods and statistical analysis aligns the study with previous empirical work in the strategic management literature.

3.1.2. Structure of this Chapter

The rest of this chapter is structured as follows. First, the methodologies for both the first and second empirical studies are introduced and theoretically justified. This is followed by the research design and the sampling strategy along with the participant invitation procedure. Afterwards, a discussion of the chosen measures and scales that constitute the dependent, independent, and control variables of the first study is given. I then proceed to discuss the measures for the second empirical study. This is then followed by an introduction of the approach to data analysis that I have chosen for both the first and second empirical studies.

3.2. Research Philosophy

This study adopts a critical realist stance to explore the knowledge of the extant causal construct relevant for this field of study. This denotes that while knowledge contains causal constructs of cause and effect, there are limited regularities in these across various cases (Sayer, 2000). This epistemological stance also has the advantage of not restricting the positivist boundaries of what counts as knowledge, namely, that the observed phenomenon is something that is expected to occur (Dessler, 1999). Given the exploratory and theory-developing nature of this study, adopting a positivist stance would, therefore, limit the generation of knowledge. Nevertheless, positivism *per se* does also work within a realist epistemology, such as quantitative work, as it can help to establish a general framework "for answering questions about trust and justification" (Dessler, 1999). In this regard, the positivist stance argues that research attempts to search for logical constructs within observable phenomena as opposed to value-laden propositions (Menand, 2001; Powell, 2003).

Nevertheless, realism also possesses its limitations: Popper (2014) suggests that realism reduces phenomena to sense-impressions. However, Popper (2014) also recognizes that intersubjectively perceivable objects, and thus phenomena, can be perceived by artificial and constructed means. Consequently, it can be argued that the question of reality and perceivability, and thus measurability, of an object or phenomenon does not affect whether an object or phenomenon is researchable (Powell, 2003). The notion of research impact is, therefore, more driven by ontological assumptions which run along the scale of hard reality to sense impressions (Powell, 2003).

Taking the question of research epistemology into the context of strategic management research, there are two core but conflicting positions when it comes to the emergence of knowledge. The first stance, the emergence of knowledge, has been defined by Ansoff (1991) who argues that a firm's interactions in the context of the company — the environment construct — "can be discovered and abstractly represented or objectified" (Aram and Salipante, 2003). On the other hand, Mintzberg (1990, 1991) argues that knowledge is both individual and local, thus specific, to the context and environment in which it emerged (Aram and Salipante, 2003). Resultantly, while Ansoff's (1991) conceptualization would allow for generalizing the findings of a piece of research, following

Mintzberg's (1990) conceptualization would prescribe a strictly qualitative methodology. In this study, I adopt Ansoff's approach as it is more aligned with past and current managerial practice in strategic management, taking into consideration the ongoing dynamic and potential challenges that companies face in negotiating the company–environment relationship (Ansoff, 1991).

3.3. Quantitative Methodology

3.3.1. Introduction

Both of my empirical studies make sole use of quantitative data with the aim to explore the adoption of digital communication and social technologies in the SMP within companies. Using quantitative data is a frequent methodological choice in strategy research that yields data that can be statistically analyzed (Grant, 2003). In line with the epistemological stance taken for the qualitative study, the quantitative studies equally take on a critical realist view of knowledge. As such, a survey method was chosen for these studies as it can aid the development of a theoretical framework based on the theories chosen for the first and second empirical studies (Dessler, 1999).

3.3.2. Purpose and Aim of Data Collection

The aim of the quantitative approach is two-fold. Firstly, in the case of the first empirical study, the quantitative method serves to obtain confirmation of the new theoretical angle I develop to capture the current use of different types of digital communication and social technologies in the SMP. Additionally, using a quantitative method with a larger sample size allows for more generalizable results with increased external validity. Secondly, in the case of the second empirical study the quantitative method allows me to measure several variables across a larger audience and use statistical analysis to determine significant associations. Consequently, the study not only benefits from an increased generalizability of its findings but, at the same time, improves its internal validity. By sending out the questionnaire to senior managers of various firms across the geographical sphere of the targeted countries, the risk of decreasing the study's internal validity, for instance through selection biases or diffusion of treatment, is minimized (Drost, 2011).

In order to limit the risk of incomplete data and a low response rate, I combined the questions for the first and second empirical study into one questionnaire. The questionnaire has been included in Appendix 2. The invitation letter and the subsequent emails were created using a dynamic mail merge approach based on the results of research undertaken by Sauermann and Roach (2013).

3.3.3. Research Design

The studies are set around a cross-sectional design. There are several reasons for this choice of research design. First, the main aim of both empirical studies is to obtain a "snapshot" of the current use and factors that can explain the adoption of digital communication and social technologies. Second, the studies are not intended to establish causal relationships, for which a longitudinal research design would be required. Third, previous studies that explored similar issues have also used a cross-sectional research design (Chau and Tam, 1997; Kuan and Chau, 2001; Oliveira and Martins, 2010).

The chosen quantitative research methodology for this study is an online survey method. Some of the key benefits of online surveys are that the cost associated with them is limited and the lead time is much shorter than with traditional, paper-based questionnaires or telephone surveys (Sauermann and Roach, 2013). Another benefit of using an online survey method is that it can easily be disseminated to a wider audience and multiple variables can be measured at once in a time-efficient manner and provide some empirical "real-world observation(s)" (Kelley et al., 2003). The shorter lead time is achieved by avoiding delays caused by postal transportation, and having data readily available in electronic form without the need to input or transform from physical to electronic. The latter also reduces the occurrence of data entry errors.

For this purpose, the questionnaire was first created using Microsoft Word in order to produce a version that could easily be amended and edited. Once this stage was completed, the questionnaire was set up on Qualtrics for final amendments and the conducting of both the pilot and the actual survey.

Nevertheless, there are some limitations to this methodology. First, surveys represent a more structured and inflexible methodology. They are limited in the exploration of various aspects of a research phenomenon. Especially with multiple choice or short-text questions, a survey methodology is unable to explore any themes or causal structures that may emerge during the data collection process. For this reason, the survey was preceded by a qualitative method that has this flexible and less structured approach (Gephart, 2004). Additionally, an extensive literature review of the desired issue was conducted to incorporate previously identified variables that are of potential relevance for the research model (Kelley et al., 2003).

Second, with most survey research strategies, the direct involvement of the researcher is limited. In the case of the chosen research strategy of this study, the questionnaires were distributed to the participants via the Internet which did not necessitate any personal contact between the researcher and the participant. This approach has some fundamental weaknesses, including the inability of the participant to ask questions for clarification or other issues such as unclear questions or instructions, or in case technical issues arise with the survey platform. These could all weaken the internal validity of the research and may lead to type I errors. To mitigate this problem I conducted a pilot survey, which was completed before the main data collection of the study.

Third, another common issue, with online surveys in particular, is a low response rate. Previous research has highlighted that the mean expected response rate for online surveys varies between 10% and 25% (Sauermann and Roach, 2013). A low number of responses can considerably reduce the generalizability of the findings of the research. Additionally, it can decrease the statistical power of the model, especially with a larger number of constructs within it. One of the main reasons why online surveys suffer consistently lower response rates could stem from the fact that online surveys can be conducted at a relatively low cost, thus enabling a broad range of individuals and organizations to conduct surveys. The result is that many individuals may develop some resentment toward the sheer volume of survey requests they receive, not just in their professional lives, but also their private ones. There are certain actions that can be executed to increase participation and so drive up the response rate for a particular survey. These range from contacting respondents on multiple occasions, to providing some incentive for participation. The Ethical Research Guidelines of King's College London discourage financial incentives, as they may cause a participant to participate only for financial gain and not for a genuine motive (Sauermann and Roach, 2013). As an alternative incentive, I offered to give the participants an executive summary of the main research findings and the opportunity to participate in an executive workshop hosted by King's College London. In order to take part in this workshop, the participants were directed, at the end of the main questionnaire, to an additional form through which they had to submit their email address. This was an optional step for the participant.

Another factor contributing to a low response rate can be the overall length of the questionnaire. Previous meta-analyses revealed that longer questionnaires suffer from lower response rates as participants might lose interest, struggle to continue to focus, or do not possess a sufficient amount of time (Galesic and Bosnjak, 2009). In their study, Galesic and

Bosnjak (2009) investigated whether the stated expected time required for the completion of the questionnaire has an impact on response rates. Through an experimental study, they could indeed determine that a longer announced completion time increases the participant's "perceived costs of participation" and consequently reduces the likelihood of successful participation and completion (Galesic and Bosnjak, 2009). Additionally, they determined that later questions suffer from lower data quality (Galesic and Bosnjak, 2009). These factors were subsequently considered in the designing of the questionnaire by placing the simpler, fact-based questions such as those about the company's industry and performance at the end of the questionnaire.

Finally, apart from the inability to ascertain causality in a theoretical framework (Hult et al., 2008), cross-sectional research designs are also more susceptible to common-method variance bias (Rindfleisch et al., 2008). In sections 4.3.3 and 5.4.3 I describe how I addressed this potential issue.

3.3.4. Sampling Strategy

I intended to send the questionnaire to manufacturing businesses in both the UK and Germany. Additionally, I conducted a small-scale pilot in other European countries to test the understandability and user-friendliness of the questionnaire. For this purpose, I constituted the sampling frame from different sources (Menz and Barnbeck, 2017).

3.3.5. Data Collection

3.3.5.1. Pilot

I conducted two different pilot studies for the actual questionnaire. I first conducted a more "qualitative" pilot where I met with individuals from the targeted population and asked them to complete the questionnaire while I was present with them. The aim of this pilot was to identify any areas of the questionnaire that might be unclear or were not explained sufficiently. I then conducted a more "quantitative" pilot with a small sample list of companies located in various European countries, but not in Germany or the UK. With this I wanted to test different means of contacting the targeted sample to determine which methods yielded the highest response rate.

For the qualitative pilot I downloaded a dataset of all actively trading companies registered in London and South East England, UK. I filtered all companies that have a minimum of 100 employees in order to obtain a less fragmented dataset. The search was conducted in August 2019 using the Financial Information Made Easy (FAME) database from Bureau van Dijk. Through this search I obtained a total dataset of 10,415 companies. Some companies had listed the names of multiple directors. I randomly assigned a number to each individual entry, that is each name, using the "rand" formula in Microsoft Excel. I then sorted the entries in ascending order, and I selected the first 110 contacts. These were then manually scanned for multiple entries per company, which was not the case. Then I examined the role descriptions of each individual entry that I got through the FAME database. I excluded entries whose role description did have any direct relevance to a senior managerial role such as "Retired" or "Medical Doctor". This led to the exclusion of four entries. I then contacted the remaining 106 contacts via email. I sent a reminder email out eight days later. Of those contacts, I had two positive responses from individuals with whom I then scheduled a time and date to conduct the pilot. I then took the next 100 contacts of the FAME database and scanned those as well for duplicate firms or irrelevant roles. This yielded a total of 96 contacts whom I subsequently contacted via email. From those 96 individuals, two individuals indicated their willingness to participate whom I subsequently met and asked to complete the questionnaire. As this randomized approach did not lead to a sufficient number of participants, I attempted to contact senior managers through the supervisors' and researchers' personal networks. This resulted in another three individuals being interviewed.

The outcome of this pilot included changing the names of the four types of digital communication and social technologies into less academic and technical terms. Additionally, I added more examples (e.g. stakeholders) and rephrased some questions.

After this first stage of the pilot I proceeded with the distribution of the online questionnaire to a list of senior managers and executives located in firms across Europe. I obtained a list of contacts through a database previously used by Menz and Barnbeck (2017). After excluding all contacts based in Germany and the UK and those that had moved roles and were no longer in a role where they were directly involved with their company's strategy, I had a total mailing list for the pilot of 264 individuals. The first invitation mailing was sent out on October 17, 2019 via email. I distributed the questionnaire via the mailing function provided by Qualtrics. Additional follow-up emails were sent out on October 23 and 29. This direct approach via email only resulted in seven started surveys and four finished surveys, with 92 bounce-backs: an overall response rate of 2%.

As this approach was below my expectations, I then sent a physical letter to the first 57 individuals in this list from whom I had not already received a response or a bounce-back. I obtained their company's addresses through the company's online website or third-party online phonebooks and Yellow Pages equivalents. The physical letter was posted on

November 11, 2019 and the subsequent email containing the link to the online questionnaire on November 14. A first reminder was sent out through Qualtrics on November 15. This resulted in two additional completed questionnaires.

I sent out a further reminder manually via Microsoft Outlook using mail merge on November 19, 2019 from which I received three further responses. I also noticed a sharp increase in the number of bounce-backs (11) that were previously not reported through Qualtrics. In total, five questionnaires were completed from this sub-list, yielding a total response rate of 10.8%.

Following this observation, I sent out a physical letter to the remaining 61 individuals that had not opted out, completed the questionnaire or been noted as invalid through the previous mailings. Those letters were sent out on November 25, 2019 and an email containing the questionnaire link was sent out on December 3, 2019 with a follow up on December 4. I conducted this mailing through Outlook again as I obtained a more accurate picture about the number of bounce-backs. I received a total of 12 bounce-backs but also four new responses. This resulted in a response rate of 8.1%.

Additionally, I received correspondence from five individuals either informing me that they did not wish to participate or informing me about a change of role and introducing me to the current holder of their former role. I subsequently sent out generic questionnaire links to the two individuals who indicated that they would be willing to participate.

I also created a paper version of the questionnaire, which I posted out to a sub-list of 32 individuals. These were taken from the pool of participants that I first contacted through a letter. I sent out the questionnaire on December 5, 2019 and by the end of February 2020 I had received one response.

As of February 2020, I had a total of 16 recorded responses, two of which were incomplete, leaving me with a total of 14 recorded responses. Out of the 264 contacts I had attempted to make, I received 116 bounce-backs. In total, I obtained a response rate of 8.8% from this pilot sample list. I noticed that the greatest yield of responses was obtained by sending out a physical letter and then multiple follow-up emails containing the questionnaire link. I therefore proceeded with this approach for the main contact list.

3.3.5.2. Main Survey

3.3.5.2.1. UK Sample

I purchased a database from Electronic Marketing. The database contained the names, role description, firm name and email addresses of chief executive officers (CEOs), chief financial officers (CFOs), chief strategy officers (CSOs) and business planners in British manufacturing firms. The list contained 1,589 individual contacts in 1,280 different firms, giving an average of 1.2 contacts per firm. I posted the introductory letter on January 13, 2020 to everybody in this list. Through the posting of the letters alone I obtained seven completed responses, three contacts requesting to opt out, and one response saying my request has been passed on to another individual in the firm. Using the Qualtrics platform, I generated an individual link for each participant. This allowed me to track who had completed the survey so I would not be contacting them again.

A couple of days later on January 16, 2020, I sent out the email containing the link to the online survey. I received 69 bounce-backs. These contacts were then subsequently dropped from the data collection. A further 19 individuals contacted me requesting to opt out of the study. For 42 contacts, I received an automated response that the individual was either out of the office, no longer working at the firm, or on maternity- or on some other form of long-term leave. In 29 of those 42 cases the automated response contained the contact details for an alternative contact, such as the individual's successor or a colleague. I contacted all those individually which resulted in two completed questionnaires and one opt-out. Another 19 contacts responded to me, referring my questionnaire invitation to another colleague, asking questions about the study or simply notifying me that they would complete the study at a later date. Of those 19, nine subsequently completed the survey. In total after the first round of emailing to the 1,589 contacts I received 36 responses.

Given that in some instances a contact at one of the companies may not have received the email after they read the letter, I sent this first email out again on January 21, 2020. I received an additional nine bounce-backs and eight further participants on the sample opted out stating time constraints or company policies that prohibited participation. In 12 instances I received a response saying that my request had been passed on, or automatically forwarded to a different individual. In total I obtained a further 68 responses from this mailing.

The first follow-up email was sent out a week later, on January 28, 2020. For those individuals with whom I have been in contact individually, for instance through using contact details from an automated response, I sent the first follow-up email out on either February 4 or 5 as I had made the initial contact with those individuals later than the first mailing. From the first follow-up I only obtained one additional bounce-back. A further five individuals informed me that they would like to opt out. Through the first follow-up I obtained 16 further responses.

The second follow-up to my mailing list went out on February 3 as I tried to vary the day and time of the various mailings in order to boost my response rate (Sauermann and Roach, 2013). Through the second follow-up I received another four opt-outs but also another 22 completed surveys.

In the meantime, I had received an email from two participants telling me that they experienced issues accessing the questionnaire on Qualtrics. I sent them the generic and impersonal questionnaire link instead. Additionally, for the second mailing, a fresh set of individual links were created in case the participants had opened the questionnaire on a different device. However, there was the possibility that several other participants had experienced this issue and not contacted me. Therefore, I combined the third and final follow-up with the chance to send all contacts in my sample list the generic link which would circumvent the technical issue experienced by some of the respondents. On February 6 I sent out this final follow-up. I received one bounce-back and two opt-out requests. Two respondents confirmed with me that they completed the survey. As the links were generic, I could not track how many individuals responded in this instance.

In total, I received 163 complete responses, 86 bounce-backs, 44 automated responses from which I was unable to determine an alternative contact, and 26 formal opt-out requests. Out of the total sample list, this yielded a response rate of 11.4%.

3.3.5.2.2. Translation

Before I commenced with the German data collection I translated the questionnaire, invitation letter and emails from English to German. Even though English is commonly understood and spoken in Germany, my aim was to increase the understanding of my constructs and questions by using the participants’ native language. I based the translation on the equivalence paradigm (Pym, 2007), meaning that I tried to find words or phrases with equivalent meaning in German. However, this approach is not without its critics, especially in regard to relying solely on back-translations (Brislin, 1970). For this reason I combined the back-translation approach and embedded it in the so-called “team translation” (Brislin, 1970; Douglas and Craig, 2007; Chidlow et al., 2014). This approach prescribes the input from a range of individuals, such as bilinguals and monolinguals.

The first phase of the translation was done by the researcher and one of the supervisors who are both fluent to native level in both English and German. Meetings were held to discuss variations in the translation and to find a consensus. As there are various limitations in regard to relying solely on back-translations, such as its over-reliance on subjectivity (Sechrest et al., 1972); I embedded the back-translation as one stage in my translation process. I asked two native German speakers who had not previously seen the English version or been involved in the research to each translate half of the questions from German back to English. The majority of the back-translated questions were the same or used very similar wording to that which I had used in the English original. However, there were a few questions where there were some discrepancies between the original English translation and the back-translation. This could potentially indicate some issues with the German translation. Those questions were then revised in their translation by the translation team and sent to a third native German speaker who had not been previously involved in the translation process and is based in Germany. Through a discussion including all three translators, the final version of the German translation was agreed.

As the style of communication in German exhibits certain characteristics which are not used in English (e.g. a higher degree of formality in form and salutation), the invitation letter and emails were not translated as a direct equivalent. While the content in terms of the information and instructions were the same, the introduction and explanation of other aspects of the data collection (e.g. voluntariness, approach, and anonymity) were introduced in slightly different ways. This was done to avoid confusion and to reduce the "foreign" sound any equivalent translations would have had. The approach to translating these writings was through a first draft by the researcher which was then discussed with one of the supervisors and a third researcher who is based in Germany.

3.3.5.2.3. German Sample

Due to the higher level of data protection legislation in Germany, I was unable to obtain a similar list of directors and company executives for German businesses. Therefore, I downloaded a dataset of actively trading German manufacturing firms (Industry Sector C Manufacturing Industries in the German Industry Classification Scheme WZ 2008) with 1,000 or more employees. I included all directors who were listed with their name and role description. My initial dataset contained 17,799 individual entries for 1,189 companies with a mean of 15 entries per company. As the dataset contained large variation of role and job title descriptions, I manually checked each company and scanned for the entries of the executives (e.g. CFO, CEO, CSO) or head of IT. If more than one individual per company fitted those criteria, I randomly selected one of those individuals. For every other firm, I selected two or even three individuals, especially if a firm had ten or more eligible entries that matched my criteria. This was to align the overall characteristics of the German list to that of the UK list. Once the manual scan of the list was completed, I had a list of 1,210 contacts in 1,187 firms.

While the postal addresses for the firms were included in the dataset, I still needed to obtain the personal email addresses for each of the chosen contacts in each company. For this I used an online Internet platform called *Neverbounce* which is an online tool that tests the validity of email addresses. Neverbounce produces four different outcomes: “valid” for email addresses that can be confirmed as functional; “accept all” where the server accepts all incoming emails and thus the platform is not able to definitely confirm whether the email address is valid; “unknown” where the platform is unable to confirm the validity either way; and “invalid” where the email address is not functional.

By testing a set of common email address formats such as “firstname.surname@company.de” and others, I was ultimately able to obtain 1,199 usable email addresses across 1,082 firms. In total, I went through ten cycles of guessing email addresses. If an email address was classed as “invalid” I guessed another alternative format. If I still was unable to obtain a valid result, I referred back to my original sample list and chose an alternative contact that fitted my sampling criteria. I followed this approach as there could be multiple reasons as to why a contact was invalid. One of the reasons could be that the individual I was guessing the email address for was no longer employed at the company. Because of the technical settings of the email server of some companies, Neverbounce is unable to provide a definite “valid” result in all cases. Additionally, there were some cases for which I obtained an “unknown” or “accept all” result for multiple email address formats.

After I completed this preparatory task, I possessed a final sample list of 1,199 contacts. 556 (46%) of those were classed as “valid”; 481 (40%) were classed as “accept all”, and 162 (14%) were “unknown”. Consequently, there was a risk that for more than 50% of my contacts, I would not be able to contact the individual via email.

In an effort to replicate the proceedings of data collection in the UK, I sent out a physical letter to all the individual contacts on this list. In order to boost my response rates, I sent the letter through the University of Cologne as I anticipated that a German higher education institution might have higher recognition than King’s College London among the sample. I sent out the letters on March 3, 2020. As of March 12, I had nine letters returned as the address was either no longer active or the person to whom the letter had been addressed was no longer with the firm. Additionally, I received one phone call from an individual informing me that the particular company was no longer active. From this mailing I also obtained seven completed questionnaires.

On March 5, 2020 I sent out the first invitation email to the participants. As I was using a large number of guessed emailed addresses I received a significantly higher number of bounce-backs than I did with the UK list. In total I received 276 bounce-backs or automated responses that the company's server settings had classed the email as spam and therefore rejected it. Despite the high number of bounce-backs, I still obtained eight completed responses from contacts whom I could not contact by email, meaning, they only responded to my letter. One individual opted out of the data collection. Due to the high number of bounce-backs I attempted to obtain an email address for one of the remaining alternative contacts in the same firm for 54 of the bounce-backs. In 21 instances, I was able to send through an email which did not result in a bounce-back. Despite this effort though, I was unable to obtain a completed questionnaire from one of these. In total I obtained another 30 completed questionnaires from this first mailing.

Similar to the UK sample, I re-sent the first invitation email a couple of days later, on March 9, 2020. I did this as in some instances the initial invitation letter might not have arrived at the time of the first email being sent out. I obtained a request for opting out from 14 further individuals. I also received 39 additional bounce-back notifications or an email notifying me that my email had been classed as suspected spam and consequently been rejected by the server. I attempted to identify alternative email addresses or changed the email I wrote slightly so that it would not be detected and captured by the company's spam detector. In 11 instances this was successful. In three cases I received an automated response that the individual I contacted had left their company. Through this second mailing I managed to obtain another 30 responses, bringing the total to 67 responses.

On February 25, 2020 the German state of North Rhine-Westphalia, located in the far west of Germany, reported its first case of the novel COVID-19 respiratory disease. By the time of my first follow-up on March 13, 2020, the number of cases in the state increased to 1,433 with other states in Germany also reporting rapidly increasing numbers of cases. Increasingly, the state and federal governments were putting measures in place to reduce the spread of the disease. Consequently, businesses were starting to feel more of a strain and impact on their daily operations. I expected that the growing impact of the new pandemic to affect the remaining data collection by reducing the number responses. Accordingly, I received emails from three companies indicating their interest into the study but also stating that they were currently preoccupied with dealing with the impact of the pandemic. I therefore decided that it was no longer appropriate to contact businesses while the unprecedented situation was unfolding.

In total, by March 27 I had obtained 73 responses, 33 opt-outs and 340 bounce-backs, letter returns and notifications that the individual had left the firm. This gave me a total response rate of 9.8% which was below my target of 10%.

3.3.5.2.4. The Invitation Letter

The invitation letter that was sent out to the participants via the post outlined the purpose and aim of the research and encouraged participation by offering the participants an executive summary of the results if they wished. As an additional incentive, I invited the participants that completed the questionnaire to a day-long executive workshop at King's College London on digital strategizing. The letter, along with any subsequent correspondence, was personalized for each participant stating their full name in the letter, and then only their first name in the UK; and using the full name and salutation for the German participants as the proper choice of the salutation has a significant impact on the response rate (Sauermann and Roach, 2013). I also advertised the potential benefits of this research project for senior managers by detailing how learning more about the use of digital communication and social technologies could be of benefit for the participant. Further, I notified the participant in the letter that in the following days I would send an email to them containing the link to the questionnaire. Nevertheless, I already included an abbreviated link to the questionnaire in the letter in case the participant would already like to complete the questionnaire.

After a set number of days, I sent out an invitation email and then sent a further three follow-up emails out to the participants in order to motivate a response (Sauermann and Roach, 2013). It is advisable that researchers employ a flexible and dynamic research strategy for the questionnaire and invitation-email design features over the survey's life cycle, the survey's life cycle being the time from the initial invitation up to the conclusion of the data collection (Sauermann and Roach, 2013). The follow-up emails were intentionally sent out on a different weekday, as previous research on survey responses has demonstrated that there is an increased likelihood of achieving higher response rates if there is some variation in the weekday on which the participants are contacted (Sauermann and Roach, 2013). Additionally, the invitation text was altered in the subsequent reminder emails. One of the main reasons why it is advisable to change the wording from participation invite to the follow-up emails is that it "may appear more genuine and signal that the researcher invests time and effort into the relationship, while repeated contacts that are identical may quickly become irritating" (Sauermann and Roach, 2013).

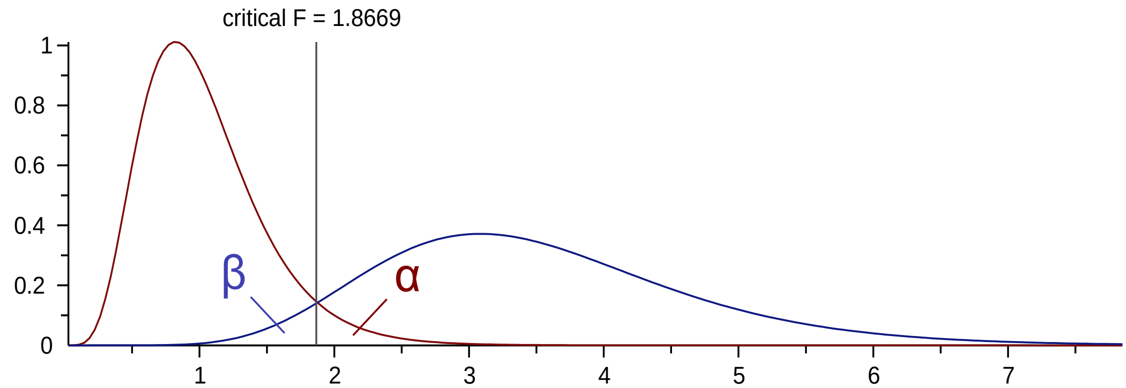
3.3.5.2.5. Power Analysis

To compute the ideal sample size that needed to be achieved, I performed a power analysis for both the linear regression model of the first empirical study and the structural equation model for the second empirical study. For the first empirical study, I had a total of one independent variable per model and 12 control variables. I therefore performed the power analysis with 13 covariates.

The first step in the power analysis was to set out the targeted effect size. As the first empirical study uses a regression for the analysis, I used the R^2 as an index for the effect size. To obtain an indication for a targeted effect size I searched for quantitative studies on strategic planning and decision making that had a similar rationale to my study and were published in high-ranking journals such as the *Strategic Management Journal*, *Management Science, Academy of Management*, and *Long Range Planning.* I identify 26 studies. Of these, 11 studies performed some form of regression analysis, reported the R^2, and yielded significant results. In studies with more than one model, for instance, with different dependent variables, I computed the mean R^2 of all reported models. This gave me a mean effect size of $\bar{R}^2 = 0.2762$. I subsequently used this in the power analysis to compute the minimum required sample size to detect such an effect, that is to have a significant deviation from zero. The mean sample size of those 11 studies was $\bar{n} = 536$. However, this included one study which used panel data with a dataset of 4,048 observations. If only primary studies were included the mean sample size was $\bar{n} = 185$.

I used the program GPower (Faul et al., 2009) to conduct the power analysis. Using the R^2 allowed me to determine the effect size for the f^2 which is at $f^2 = 0.3815451$ which would represent a large effect (Cohen, 2013). Given the nine predictors and an alpha of .05 for a power of .95, the required sample size would be n = 71 in order to reach a critical F of 1.8669463 df [13, 68] (see Figure 3-1).

Figure 3-1 Critical F: First Empirical Study

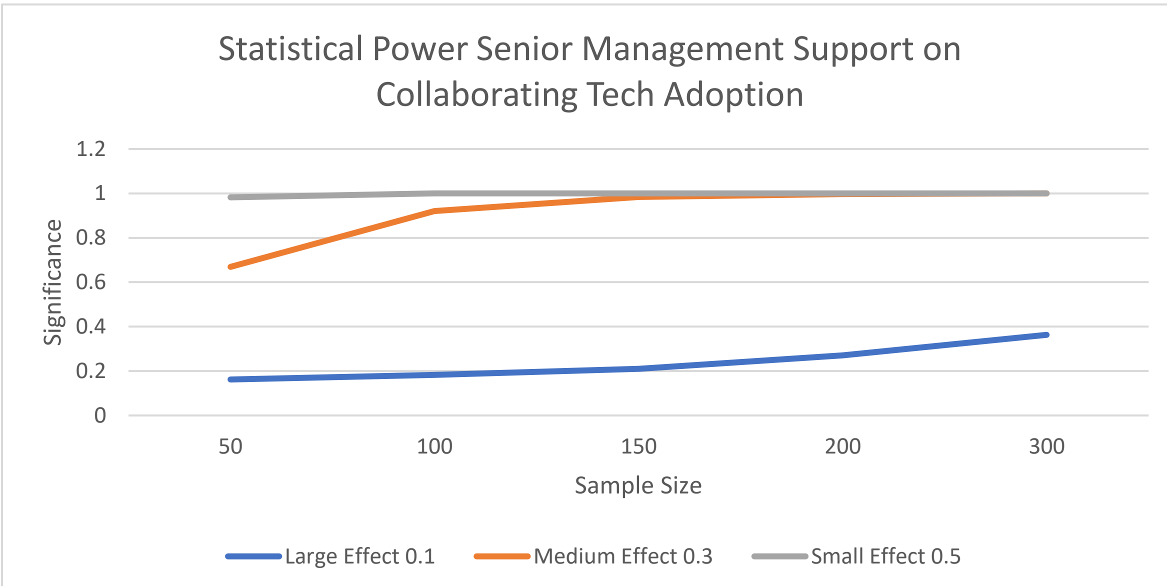


For the second empirical study, I considered the χ^2 fit and root mean square error of approximation (RMSEA) as the main indices for the effect size of the structural equation model (Maydeu-Olivares, 2017). For this purpose I conducted a Monte Carlo simulation with Mplus (Muthén and Muthén, 1998-2017) to determine the degree of statistical power given a set sample size, that is, determining the sample size required to a set level of probability at which I am able to identify a certain effect (Davey and Savla, 2010).

My proposed theoretical framework, based on the technology–organization–environment (TOE) model (Tornatzky and Fleischer, 1990) consisted of 11 latent variables measured through a total of 44 measures. I ran the Monte Carlo simulation using the MONTECARLO command and using the model population command to specify the parameters of the population from which the samples are taken (Muthén and Muthén, 2019). I constructed the model setting of all my factor loadings at a standardized value of .8 and set the factor indicators at .36 (Muthén and Muthén, 2002). Additionally, I set the factor variances to 1.0, following the standardized process for this type of simulation. I conducted the simulation under normally distributed continuous factors that do not have missing data. I did that as my dataset is unlikely to possess a significant proportion of missing data due to forcing the answers in the questionnaire. I ran the simulation with 1,000 samples for a number of different sample sizes (50, 100, 150, 200, 300) and each of the three main effect sizes of .1, .3, and .5 to simulate a small, medium and large effect (Cohen, 2013).

The graphics below display the results of the simulation (Figure 3-2). Given the results, I can anticipate detecting a medium to small statistically significant effect with a sample size of 100-150 observations.

Figure 3-2 Monte Carlo Simulation Results for Collaborating Technology Adoption as Dependent Variable



Both of the priori power analyses signified that I could expect to detect a significant statistical effect if one was given.

3.3.6. Measures: First Empirical Study

In total, my dataset consisted of 189 primary and secondary variables with 239 observations. With the aim of reducing the number of variables and to obtain a more reliable measure for the theoretical constructs, I performed a principal component factor analysis with the variables. Afterwards, I assessed the reliability for each construct using Cronbach's alpha. I considered the correlation coefficient each item possesses with the composite scale, and with the composite scale with that item excluded. Apart from computing the alpha for the composite with one item excluded, I primarily considered the alpha of the composite if all items were included, and then compared it with those that load above the 0.5 threshold.

Before I conducted the factor analysis, I also assessed the relationship between the variables for each of the constructs in order to determine whether the sample possessed sufficient strength. I used the custom command .factortest in Stata which computes the Kaiser–Meyer–Olkin (KMO) test and Barlett's test of sphericity. The table below (Table 3-1) displays the results of these tests for each of the constructs. The results of Barlett's test of sphericity report the χ^2 and the degrees of freedom.

Table 3-1 Sample Strength Tests

Results of KMO Measure and Barlett's Test of Sphericity

Construct	**KMO**	**Barlett's Test**
ratc	.710	404.436[10]**
polbc	.485	53.778 [6]**
dynmc	.670	222.873[10]**
munic	.645	181.717[10]**
qualpe	.740	219.600[6]**
quanpe	.744	478.602[6]**
subpe	.690	477.126[3]**

ratc= Rational behavior; polbc= Political behavior; dynm= Dynamism; muni= Munificence; corru= Corresponding technology use; broau= Broadcasting technology use; aggru= Aggregating technology use; collu= Collaborating technology use; qualpe= Qualitative business performance indicators; quanpe= Quantitative business performance indicators; subpe= Subjective business performance indicators; ** indicates statistical significance at the .000 level.

With the exception of one construct, polbc, all the key constructs for the first empirical study are above the 0.5 threshold of the KMO. The majority of my constructs are even above the 0.7 threshold which indicates a strong amount of sampling adequacy (Kaiser, 1974). The significance of the χ^2 indicates that the correlation matrix of my measures is not an identity matrix, which is a matrix for which the measures for each construct are not intercorrelated. As the majority of the constructs in the dataset are acceptable, I proceeded with the actual factor analysis. I considered only the rotated factor loadings in case the measures loaded onto more than one factor, using an orthogonal rotation with the Kaiser normalized matrix.

3.3.6.1. Dependent Variables

3.3.6.1.1. Business Performance

The dependent variable for the first empirical study is business performance. In particular, this study considers the relative business performance — that is, the level of performance compared to the individual company's competitors (Powell, 2003). One way in which this could be done is through the use of real objective business performance indicators that could be obtained through a company's account. Where possible I obtained such indicators through secondary databases. In some cases though this was not feasible due to the anonymous nature of my questionnaire. Additionally, many of the companies that were in my sample frame are not public and as such are not obliged to publicize their accounts. As this study considers companies from multiple countries, differences in accounting standards may also make comparison difficult, especially since I also have companies reporting in different currencies (Hult et al., 2008). Consequently, I also used subjective business performance indicators in this study which find frequent use in both the strategy and IB literature (Tippins and Sohi, 2003).

Business performance was measured with a total of 11 items. The first three were taken from Dess and Robinson's (1984) study which determined whether there is a link between subjective measures of business performance and objective indicators. The results of that study also justify the use of subjective business indicators, should objective ones not be feasible (Dess and Robinson, 1984). The participants were asked to indicate their firm's relative performance on a five-point Likert scale ranging from “lowest 20%” to “top 20%” for the firm’s total sales growth, after-tax return on assets, and overall firm performance. Asking such questions also has the advantage that this controls for industry effects (Dess and Robinson, 1984).

However, one limitation of Dess and Robinson’s (1984) scales is that they are predominantly focused on financial performance indicators. I therefore included a supplementary scale that utilizes additional organizational performance indicators as the effect of using digital communication and social technologies may not be limited to financial performance (Olson et al., 2005). For this, I used the performance indicator scales given by Brouthers et al. (2000) who used scales from three previous studies. As in Brouthers et al. (2000), the participants had to indicate how satisfied they were with each of the following performance indicators on a 10-point scale. The indicators were sales level, sales growth, market share, profitability, reputation, market access, marketing and distribution (Brouthers et al., 2000). Similar scales have also been used by Delaney and Huselid (1996). The first four items were then grouped into quantitative performance indicators and the latter four items into qualitative performance indicators loading onto two different factors.

3.3.6.1.1.1. Factor Analysis and Reliability Testing

The Dess and Robinson (1984) scale loaded onto one factor which explains 82% of the variance (Table 3-2).

Table 3-2 Principal Component Factor Analysis: Subjective Performance Indicators (Dess & Robinson, 1984)

Variable	**Factor 1**
subsale	0.8522
subroa	0.9194
subover	0.9468

subsale= Total sales growth relative to other firms; subroa= Return on assets compared to other firms; subover= Overall firm performance relative to other firms.

As all variables loaded into one factor above the 0.5 threshold, I assessed the reliability of this factor using Cronbach's alpha (Table 3-3).

Table 3-3 Reliability Test for Subjective Performance Indicators (Dess and Robinson, 1984)

Variable	**Correlation Item with Scale**	**Correlation Item with Scale Excluded**	**Alpha**
subsale	.8563	.6937	.9210
subroa	.9200	.8055	.8285
subover	.9424	.8683	.7736
Test Scale			.8907

subsale= Total sales growth relative to other firms; subroa= Return on assets compared to other firms; subover= Overall firm performance relative to other firms.

As the alpha for the construct lies above the 0.6 threshold, I used all items in the computation of the construct for subjective quantitative firm performance indicators (subpe).

The two constructs which I obtained from (Brouthers et al., 2000) loaded onto two factors as anticipated. Factor 1 explains 33% and factor 2, 31% of the variance (Table 3-4).

Table 3-4 Principal Component Factor Analysis: Subjective Performance Indicators (Brouthers et al., 2000)

Variable	**Factor 1**	**Factor 2**
subsall	*0.8840*	0.2387
subsalgr	*0.8945*	0.1653
submarsh	*0.6627*	0.4699
subprof	*0.6160*	0.3466
subrep	0.2666	*0.6625*
submarac	0.1782	*0.8328*
submark	0.2079	*0.7250*
subdis	0.3059	*0.6186*

subsall= Satisfaction sales level; subsalgr= Satisfaction sales growth; submarsh= Satisfaction market share; subprof= Satisfaction profitability; subrep= Satisfaction reputation; submarac= Satisfaction market access; submar= Satisfaction marketing; subdis= Satisfaction distribution of product & services.

As the two factors each consist of four items that loaded above 0.5, I computed the alpha for two constructs, factor 1 as quantitative performance (quanpe) indicators and factor 2 as qualitative performance indicators (qualpe) (Table 3-5).

Table 3-5 Reliability Test for Quantitative Subjective Performance Indicators (Brouthers et al., 2000)

Variable	**Correlation Item with Scale**	**Correlation Item with Scale excluded**	**Alpha**
subsall	.8742	.7716	.7650
subsalgr	.8608	.7301	.7798
submarsh	.8176	.6792	.8035
subprof	.7595	.5581	.8576
Test Scale			.8442

subsall= Satisfaction sales level; subsalgr= Satisfaction sales growth; submarsh= Satisfaction market share; subprof= Satisfaction profitability.

As the alpha for the construct lies above the 0.6 threshold, I used all items in the computation of the construct for subjective quantitative firm performance indicators (quanpe) (Table 3-6).

Table 3-6 Reliability Test for Qualitative Subjective Performance Indicators (Brouthers et al., 2000)

Variable	Correlation Item with Scale	Correlation Item with Excluded Scale	Alpha
Subrep	.7206	.5108	.7074
submarac	.8148	.6470	.6315
submark	.7753	.5361	.6990
Subdis	.7115	.4913	.7173
Test Scale			.7481

subrep= Satisfaction Reputation; submarac= Satisfaction Market Access; submar= Satisfaction Marketing; subdis= Satisfaction Distribution of Product & Services.

As the alpha for the construct lies above the 0.6 threshold, I used all items in the computation of the construct for the subjective qualitative performance indicators (qualpe).

3.3.6.2. Independent Variables (Instrumented Variable)

3.3.6.2.1. Digital Communication and Social Technology Use/ Adoption

With the main objective being to determine whether the adoption and use of digital communication and social technologies has a positive significant impact on business performance, I measured the type of digital communication and social technologies that the firm might or might not use in its SMP. However, despite it being an independent variable, I anticipated that the use of digital communication and social technologies depended on a series of other factors, such as the level of rationality, political behavior, and participation intention. As such, I expected that the variables I presented to capture the usage of digital communication and social technologies would be endogenous and thus instrumented variables. Due to the sheer number of different platforms, brand and product names of digital communication and social technologies, I conducted a search to identify a current and relevant grouping or categorization of these technologies. There is, though, a lack of any such classification that spans the entire bandwidth encompassing several different formats, software, applications and individual functions of all these digital communication and social technologies. The current literature offers more granular classifications, for instance of social media, which for this study is one type of a digital communication and social technology (Baptista et al., 2017). For example, Razmerita et al. (2014) categorize different social media, such as social networks or microblogs, by the level of control and interaction these possess. Other classifications of social media use different features to draw out the boundaries between the different types, such as the degree of openness or how conversations between individuals are facilitated (Mayfield, 2008). Kaplan and Haenlein (2010) developed a framework of social media classification based on media richness, social presence and self-presentation theory.

Resultantly, I had to develop a more comprehensive and inclusive classification of digital communication and social technologies that also covers other frequently used technologies such as emails, video conferencing, and instant messaging. Using two established theories, I created a two-by-two matrix that specifies four types of digital communication and social technologies. I used media synchronicity theory to denote the transmission speed of data convergence, while media interactivity theory denotes the degree of control.

3.3.6.3. Types of Digital Communication and Social Technologies

Overall, the term I chose for this project to capture as many different technologies and their associated affordances is very broad and, subsequently, might mean something different for each person or business. Therefore, it is necessary to identify some form of classification that could be used for my research in order to meaningfully group the various formats, software and applications that are available to businesses. In particular, in the light of this being a comparative study, I had to ensure that my classification terminology was meaningful and comprehensible to both a British and a German audience.

The current literature offers a great variety of classifications of social media, a sub-group of digital communication and social technologies (Baptista et al., 2017). For instance, Razmerita et al. (2014) categorize different social media, such as social networks and microblogs, by the level of control and interaction they possess. Other classifications of social media use different features such as the degree of openness or how conversations are facilitated (Mayfield, 2008). Kaplan and Haenlein (2010) develop a framework of social media classification based on media richness, social presence and self-presentation theory. There is, though, little evidence for a meaningful classification that spans all digital communication and social technologies as a superordinate category; this would also then necessitate an inclusion of all social media. Several studies that contain some form of social media classification base their types of social media on that of Mayfield (2008). Mayfield's (2008) classification includes different social media and divides them as follows: social networks, blogs, wikis, podcasts, forums and microblogging, and content communities. This classification, however, leaves out other frequently used social technologies such as email, video conferencing, and instant messaging. Hence, there is a need for a more comprehensive classification of social technologies that includes these. The purpose of this section is to present a two-by-two framework that classifies social technology according to media synchronicity and media interactivity.

3.3.6.3.1. Media Synchronicity

Media synchronicity theory takes on a practical outlook which denotes that individuals use one medium of technology over another based on their need to achieve synchronicity of communication. This is with the aim to enhance the performance of the communication they intend to pursue (Dennis et al., 2008). Synchronicity originally denotes a psychological phenomenon as described by Carl Gustav Jung (Donati, 2004). More contemporary understandings of synchronicity are situated in the context of team and group work. The focus lies on the timeliness and coordination of a team member's input and output (Harrison et al., 2003), and the seeming undetectability of any causal relationship between those inputs and outputs. At the same time, this exchange between inputs and outputs possesses a meaningful relation (Oxford English Dictionary, 2021), referring to the degree to which inputs and outputs are interdependent and not occurring at random.

Consequently, media synchronicity refers to the coordination of inputs and outputs enabled by communication media. Communication between two or more individuals is also one the key functions enabled by digital communication and social technologies as they can facilitate human interaction (Fox, 1974). One of the core premises of media synchronicity theory is the understanding that communication is a device to build a common understanding collaboratively constructed by those involved in the exchange. Therefore, media synchronicity theory focuses on the performance of communication and not the choice of a medium through which this communication is conducted (Dennis et al., 2008). This means that an individual's perception of media is determined by the performance of the communication that can be obtained by using this particular medium.

Unlike the better-known media richness theory (Kahai and Cooper, 2003), the focus of synchronicity theory is thus on the conveyance and convergence processes of information through communication facilitated by media, rather than focusing on the information needs of a task (Dennis et al., 2008). It can therefore be used to meaningfully classify social technologies based on high and low media synchronicity, as some social technologies enable a higher degree of synchronicity than others.

As digital communication and social technologies are able to transmit information between one or more individuals, they have the capacity to allow conveyance processes to take place. These technologies are able to transfer varying amounts of information between individuals and groups (Dennis et al., 2008). However, there are technological differences between different types of digital communication and social technologies in terms of how well these can transfer larger amounts of information and achieve true synchronicity at the same time (Dennis et al., 2008). For instance, when a larger amount of information is transferred, individuals might be more likely to use technologies with lower synchronicity in order to give the recipient more time to process, analyze and develop an appropriate response (Dennis et al., 2008). At the other end of the spectrum, information convergence processes are more concerned with the transmission of "higher-level abstractions of information and negotiations of these abstractions to existing mental models, suggesting that individuals will have a greater need to quickly transmit and process smaller volumes of information to develop a shared understanding" (Dennis et al., 2008). During these convergence processes, media with high synchronicity are more useful as they provide individuals with the opportunity to derive sense and understanding from the information with which they are presented (Dennis et al., 2008).

While the academic theory denotes that media synchronicity is the coordination of inputs and outputs, the more common understanding of synchronicity emphasizes the time component. In the context of electronic files and media that are stored, for instance, on an online cloud platform, the word "synchronizing" is often used to describe the process of uploading or aligning the additions, redactions and changes made to the document opened on a computer to that stored on the cloud. For example, a manager in a firm opens a document stored on the company's cloud platform. Technically speaking, the computer from which the manager accesses this file temporarily stores the document on the manager's computer so that they can work with the file. If the manager makes alterations to the document, these will only be stored on the local downloaded copy of that document and can only be seen by individuals who also have access to this same file on the same computer. However, through intermittent or continuous synchronization of the document on the computer with the file saved in the cloud, the alterations executed on the temporary file on the computer align or synchronize with the actual file on the cloud. If another person accessed the same file, they would see those alterations made by the manager straightaway. In this regard, the understanding of synchronicity can be denoted as a social technology's ability to display changes to the shape, format or content at the same time as the changes are being made.

Most available cloud technology platforms allow multiple users to make changes to files simultaneously. For instance, several individuals can work on one spreadsheet at the same time with the changes being immediately perceivable to all those working on it. This would be the equivalent to those individuals working on the same spreadsheet on one computer. In light of this, I extend our understanding of media synchronicity to denote a digital technology's ability to instantly transmit changes to a medium's content format or shape. For instance, video conferencing would be one digital communication technology that could be classed as high in synchronicity. When two or more individuals are connected with an Internet-mediated communication platform such as Skype, Zoom or Microsoft Teams, any changes made on one side of the link are immediately transmitted and then perceivable by the recipients. More precisely, the moment one communication partner speaks, the microphone and camera equipment capture the changes to the sound and imagery and transmit them to the output technology such as a screen and speakerphones.

Synchronicity is not limited to the instantaneous perceivability of changes to the shape, format or content of a medium sent from one individual and then received by another, however; these changes can also be transmitted simultaneously in a bi-directional manner.

We experience these moments in video calls when we start talking over the words of somebody else who is talking to us. In the context of digital communication and social technologies, it can be said that this bi-directional flow of changes being made to a document or a medium may manifest itself in the shape of two or more individuals being able to exhort influences, thus being able to make instantaneous perceivable changes to the shape, format or content of a medium, such as a document saved on a cloud.

In contrast, there are also media which are low in synchronicity, and thus, can be considered asynchronous. This applies to email, social media posts or blogs. Even though current hardware and physical infrastructure such as optic fiber and fast Internet connections in many parts of the Western world enable individuals to receive emails or messages almost instantly after they have been sent, I argue that these technologies are still not synchronous in the same sense as, for example, video conferencing, since the changes made to an email before it is sent are not immediately perceivable by the recipient. Indeed, we do not see emails intended for us while they are composed, edited and drafted as all we see is the result of the process. Similarly, social media posts are also only perceivable as the end result after it has been published, as we cannot perceive the process of it being typed and edited. Consequently, asynchronous media afford more editability than synchronous media (Treem and Leonardi, 2013). Another example is wikis: while a wiki page may grant editability rights to a large group of people, these changes need first to be made and then publicized before they become perceivable to others (Arazy and Gellatly, 2012). Asynchronous media such as aggregating technologies can mitigate the occurrence of production blocking as they allow individuals to contribute to media in their own time (Stieger et al., 2012).

Since there are some noticeable differences among social technologies in their ability to display perceivable changes made to a medium in terms of their timing, synchronous or asynchronous, there is also to some extent a requirement to consider the other non-editing or non-changing individuals that perceive those changes. According to the theory of social presence, certain forms of computer-mediated technologies can transmit a sense of presence of other people better than other technologies (Standaert et al., 2016). For example, video conferencing may evoke a stronger sentiment that a person is physically close to us, as we are able to see their face, expressions and hear their voice in a similar manner to a face-to-face conversation. In reality though, this person could be geographically very distant from us. One could argue that those social technologies, which are high in synchronicity, such as video conferencing or telepresence, may also exhibit a higher degree of social presence than those that are asynchronous.

In most cases, digital communication and social technologies with high media synchronicity require more than one individual to be engaged with them, in order for a meaningful exchange to take place (Kahai and Cooper, 2003). It would be rather meaningless for one person to conduct a video conference call with just themselves. Thus at least one other person needs to be engaged in the video call and have access to the necessary hardware and software that enables them to participate. Only in this setting is there another person that can perceive the changes being made to the medium, such as the sound and imagery. For multi-user, collaborative file editing, there do not need to be two or more people using the file at the same time in order for there to be any meaningfulness in the endeavor. Another individual might access the file after the changes are made and still derive meaning from it. However, my definition of synchronicity of digital communication and social technologies does not denote that the changes must be immediately perceived by somebody else, as the focus is on the potentiality — on whether a specific technology possesses the capability to display changes being made to the medium immediately. Written conversations, such as emails, text messages or social media posts, would be much less practical if they were to display changes made to them straight away. The purpose of these more asynchronous social technologies is that they afford more editability to its users. In contrast, digital communication and social technologies can be valuable to firms as they allow individuals to provide immediate feedback at the moment they receive a piece of information. As there are considerable differences in how synchronous digital communication and social technologies can be used, I classify all available technologies as low and high in media synchronicity as they offer different affordances that could be of relevance for the SMP.

3.3.6.3.2. Media Interactivity

Along with other terms used to describe technologies or technological features, media interactivity has received more attention since the 1990s when communication technologies became more widely available (Sundar, 2004). Interactivity is a term that is often associated with newer technologies which encompass the focal digital communication and social technologies (Kiousis, 2002). Generally, media interactivity can be defined as "a measure of a media's potential ability to let the user exert an influence on the content and/or form of the mediated communication" (Jensen, 1998). Similarly, other scholars follow the understanding of media interactivity as a technological feature (Saffer et al., 2013; Sundar et al., 2003). In a previous attempt to classify digital communication and social technologies based on the level of interactivity, Razmerita et al. (2014) noted that some media such as blogs are typically controlled by one individual and, therefore, exhibit a lesser degree of interaction. A wiki, for instance, represents more of a collective format as it is typically edited and expanded by more than one individual. Hence it possesses a lesser degree of individuality and a higher involvement in regard to the level of interaction.

While there might be some kind of consensus in certain industries as to what exactly qualifies as an interactive medium, such as in advertising, the academic literature takes on three distinct understandings of media interactivity (Ariel and Avidar, 2015). The first understanding of media interactivity follows the notion of perceived interactivity, with a focus on the experiences of the user (Newhagen, 2004). The second understanding regards interactivity as a process in which two or more users exchange information with one another (Kelleher, 2009; Stewart and Pavlou, 2002). The third considers interactivity solely as a technological feature (Markus, 1987; Rust and Varki, 1996; Sundar, 2004).

When it comes to measuring perceived interactivity of media, it needs to be considered that the perception of different media depends on the character, frame of mind, and other factors of the individual (Sundar, 2004). Additionally, placing emphasis on the perception of interactivity would lead to a study of people rather than technology (Sundar, 2004). For the purpose of this study, media interactivity is seen as a technological feature and, as such, it varies across different types of social technology, depending on their high or low content of media interactivity (Ariel and Avidar, 2015; Kiousis, 2002; Sundar, 2004). A previous classification attempt in high and low interactivity media made by Jensen (1998) can be used to guide the categorization for this study.

While I regard synchronicity as the ability of digital communication and social technologies to allow changes to shape, format or content to be instantaneously perceivable, I base my understanding of interactivity on that stream of the literature which refers to interactivity as the degree to which a technology allows one or more individuals to make changes to shape, format or content of a medium. For instance, most electronic written communication such as emails, social media posts or blog entries are usually only written by one person. Undoubtedly, many social technologies, including email, allow the recipient to respond to it in some way. However, the recipients are unable to make changes to the shape, format or content of the email which they originally received, which remains under the control of the original sender. In contrast to that, collaborative document editing exhibits a much higher degree of interactivity as those who have access to and possess control over a particular document can make changes to the original. Similarly, in a video conference call, all participants can have an active influence on the style, content, and manner of the conversation taking place. Therefore, unlike media synchronicity, which has more of a temporal component, interactivity is focused more on the extent of control that an individual can have over a particular medium.

Wikis are another form of social technology that exhibit a high degree of interactivity. The core concept behind wikis is that a large number of individual can contribute to the entries and shape the overall purpose and knowledge contained in it (Arazy and Gellatly, 2012). While there could be a larger degree of complexity in regard to access and editability rights, the key argument which remains is that wikis are typically set up as a collective medium (Arazy and Gellatly, 2012) that facilitates a greater number of individuals and allowing them to change the shape, format and content of its interlinked page. The classification of social media, especially those that are used in companies, such as Microsoft Yammer, require a more careful dissection of their affordances in order to assign them to the correct category as the affordances may be perceived differently from one company to another (Treem and Leonardi, 2013). On the one hand, with social media the ultimate control typically lies with the individual rather than that of a larger group, who possesses the control of creating one particular social media post or entry at a time. This also includes the editing of the information of one's personal profile page or composing a social media status update. On the other hand, the overall appearance of a profile page with its different postings from various individuals and the content of the group pages is something which can be changed by a collective of individuals. Consequently the overall control of the shape, format and content lies within the remit of more than one individual and thus, I classify social networks such as Yammer as high in interactivity.

3.3.6.3.3. Toward a Classification of Digital Communication and Social Technologies

With the aim of obtaining a meaningful categorization of digital communication and social technologies, various existing types and platforms are categorized into a two-by-two framework. The two dimensions in this framework denote the level of media synchronicity (high/low) and the level of interactivity (high/low). I created a taxonomy for each of the four categories of digital communication and social technologies that aids the meaningful differentiation of the distinct variations in media synchronicity and interactivity of the various technologies. Using previous classifications of technologies along these two dimensions, such as Dennis et al. (2008) and Jensen (1998), helped to inform me about the categorization of this framework (Figure 3-3).

Figure 3-3 The Four Types of Digital Communication and Social Technologies

		Interaction	
		Non-real time	*Real time*
Control	*Individual*	**Corresponding** Technology that allows one person to generate and edit content before dissemination. Examples are email, microblogs, blogs or content pages.	**Broadcasting** Technology that allows one person to generate content that is disseminated live while being edited or generated. Examples are webinars and live streams.
	Shared	**Aggregating** Technology that allows multiple people to generate and edit content, but one person at a time. Examples are wikis, forums, online communities, clouds, or project and team management platforms.	**Collaborating** Technology that allows multiple people at the same time – with changes being immediately perceivable – to generate and edit content that is disseminated live while being generated or edited. Examples are video conferencing, Office365 or Google Docs.

After I developed the first version of the classification, I produced a simple questionnaire where participants were asked to sort in a list of 14 frequently used digital communication and social technologies such as email, video conferencing, internal social networks (e.g. Yammer) and wikis. I first distributed this among academics and PhD students in the King's College London Business School. Using the mode as the main measure, I was able to achieve a 50% agreement[1] across the 14 different technologies. I also tested the first version of the matrix with 25 second-year undergraduate students in the Fashion Business

[1] I computed the agreement by totalling the number of technologies where the mode equalled my intended classification and divided this by the total number of technologies in my questionnaire (14).

School at the London College of Fashion, University of the Arts London. With this student sample I achieved 57% agreement. I subsequently modified the two-by-two and worked on both the names of the categories and the descriptions incorporating some of the verbal feedback that I obtained from both the academics and the students.

I proceeded to test the second version with 61 summer school undergraduate students who attended the International Business module at King’s College London. The students came from various backgrounds, including several students from non-business or technology disciplines. Here the agreement was only at 43%. This could be caused by several factors, among which was the fact that the majority of the test students had not previously studied at higher education level in English and may therefore have had difficulties understanding the questionnaire.

Based on the feedback I obtained from the questionnaire pilot, I simplified the names of the categories as these were deemed too technical by two of the pilot participants. They were then presented with the simplified terms, which they found understandable and intuitive. I further tested the version with the simplified terms with 179 undergraduate students at King’s College London who were all from different faculties. I achieved correct classification with 11 out of 14 technologies. The three technologies that were not correctly identified were subsequently added to the two-by-two as an example, resulting in the final version of the classification.

For measuring the degree to which firms use digital communication and social technologies in the SMP, it was necessary to develop my own scales for this research. Following the specifications of formative indicator construction of Diamantopoulos and Winklhofer (2001) for the development and validation of scales, I created a set of 28 items based on a seven-point item scale, measuring how often the companies are using each one of the four types of digital communication and social technologies. This ranged from “never” to “always”. Using my categorization of digital communication and social technologies, I structured the items for this section around typical activities that are associated with strategic management in companies. I did not make any explicit mention of an order in which firms undertake these activities as this may vary from company to company. Additionally, including the complete scope of the potential digital communication and social technologies use across the various activities associated with strategic management helps to obtain reliable latent variable that provides an indication for the adoption of a certain type of technology in the SMP as a whole (Diamantopoulos and Winklhofer, 2001). The selection of activities that I included was based on a systematic review of previous studies that considered strategic planning or strategy formulation in firms (Grant, 2003; Pettigrew, 1977; Citroen, 2011). The following table represents an overview of the various identified stages and activities that previous theoretical and empirical work uncovered (Table 3-7).

Table 3-7 Stages of the SMP

No	Author(s)	Journal	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Empirical
1	Pettigrew (1977)	*International Studies of Management & Organization*	" Identification of the set of dilemmas faced by an organization over time"	" Analysis of the dilemmas that become a focus for organizational interest and of those that are suppressed"	" Specification of the individuals or subgroupings that seek to define alternative dilemmas as worthy or organizational attention"	" Study of the demand by those individuals and sub groupings that certain dilemmas be discussed, and of the attempts to mobilize power in support of those demands"	" Specifica-tion of the outcomes of these processes demand-generation and power-mobilization and their implementation as the patterns of thinking about, evaluating, and acting upon the world, i.e. as strategy"	" Considera-tion of the relationship between strategy formulation and strategy implementation "				No
2	Tyran et al. (1992)	*MIS Quarterly*	Goal formulation	Environmental analysis	Strategy formulation	Strategy evaluation	Strategy implement-tation	Strategic control				Yes
3	Citroen (2011)	*International Journal of Information Management*	Preparing the decision making	" Seeking of information from external and internal factors"	" Specification of alternatives"	" Narrowing down ideas"	" Making a decision"	Seeking more information or feedback				Yes

No	Author(s)	Journal	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Empirical
4	Platts and Gregory (1990)	*International Journal of Operations & Production Management*	" Strategy identification: Assessment of current strategy"	" Environment analysis: Identification of opportunities and threats"	" Resource analysis: Assessment of principal skills and resources available to close the gaps identified in the next step"	" Gap analysis: Comparison of the organizations' objectives, strategy and resource against the environment opportunities and threats to determine the extent of change required in the current strategy"	" Strategic alternatives: Identification of the options upon which a new strategy may be built"	" Strategy evaluation: Evaluation of the strategic options to identify those that best meet the values and objectives of all stakeholders, taking into account the environmental opportunities and threats and the resources available"	" Strategy choice: Selection of the options for implement-tation"			No
5	Mintzberg et al. (1976)	*Administrative Science Quarterly*	" The identification phase in strategic decision making"	" The developmental phase"	" The selection phase"							Yes
6	Shrivastava and Grant (1985)	*Strategic Management Journal*	" Identifying and framing the problem"	" Setting out objectives and assessing all available options"	" Analyzing and choosing one option"							Meta Analysis

No	Author(s)	Journal	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Empirical
7	Grant (2003)	*Strategic Management Journal*	Planning guidelines forecasts scenarios and assumptions strategy targets and directives	" Draft business plans"	" Discussions with corporate"	" Revised business plans" *Can lead to either stage 5 or 6*	" Annual capital and operating budgets"	" Corporate plan"	" Approval by board"	" Annual performance targets"	" Performance appraisal"	Yes
8	Hofer and Schendel (1978)	Book	" Strategy identification"	" Environmen-tal analysis"	" Resource analysis"	" Gap analysis"	" Strategy alternatives"	" Strategy evaluation"	" Strategy choice"			No
9	Glueck (1976)	Book	" Appraisal (determine environmental threats and opportunities:	" Choice phase I (consider strategy alternatives)"	" Choice phase II (choose the strategy)"	" Implemen-tation"	" Evaluation"					No
10	Mazzolini (1981)	*Long Range Planning*	" Decision-need identification"	" Search for alternatives for action"	" Investigation of courses of action"	" Review and approval"	" Implemen-tation"					Yes

No	Author(s)	Journal	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8	Stage 9	Empirical
11	Schwenk (1984)	*Strategic Management Journal*	“ Goal formulation, problem identification”	“ Strategy alternatives generation”	“ Evaluation and selection”	“ Implemen-tation”						No
12	Shrivastava (1985)	*Journal of Business Strategy*	Problem formulation	Generation of alternatives	Consensual understanding	Strategic choices						No
13	Cohen and Cyert (1973)	*The Journal of Business*	Formulation of goals	Analysis of environmental effects	Establishing quantitative targets	“ The microprocess of strategy formulation”	“ Gap analysis”	“ Strategic search”	“ Selecting the portfolio of strategy alternatives”	“ Implemen-tation of the strategic program”	“ Measure-ment, feedback and control”	No

Based on this literature review, the activities included were: mission statement formulation and review; external scanning; internal scanning; generating and evaluating potential strategy alternatives; strategy implementation; and strategy control/evaluation. These were all single measure items and as such I did not need to compute the factor loadings.

3.3.6.4. Instrument Variables

3.3.6.4.1. Rationality of Strategic Decisions

I expect that the degree of rationality firms display in their strategy making has a significant impact on whether and how much firms use digital communication technologies in the SMP. The previous strategy literature has drawn out a link between rationality in strategic decision making and its effectiveness. Researchers concluded that a more rational approach to the strategy making process has a positive association with a firm's performance or decision making effectiveness (Priem et al., 1995; Elbanna and Child, 2007a). It should be noted that the majority of these studies considered mostly strategic decision making instead of the wider strategy making or strategy formulation process (Schwenk and Shrader, 1993; Elbanna and Child, 2007b). However, a review of these studies revealed that they are often using terminology or asking questions in regard to the process of strategic decision making which are similar to those described in the strategy making process as a whole; for instance, the gathering of information, which corresponds to the scanning of the firm's internal and external environment (Elbanna and Child, 2007b), analysis and evaluation of different options (Priem et al., 1995), and making a decision by choosing one of the options (Goll and Rasheed, 1997; Goll and Rasheed, 2005). These are similar to some of the activities that are commonly associated with the SMP as a while. Consequently, I consider the extent of rationality in the strategic decision making process to be a reliable proxy for the degree of rationality in the entire SMP.

I base my understanding of rationality on that of rational choice theory (Cabantous and Gond, 2011) which outlines the process of how decisions are made in three stages. The initial stage requires the comprehensive outlining of the problem for which a decision needs to be made and the generation of a list of options, for which the firm needs to engage in some form of collecting of information to obtain some indications that are essential in the estimation of the likely success of each option (Feldman and March, 1981). Afterwards, a rigorous comparison of all these options should occur through some form of formal analysis (Langley, 1989). Resultantly, the notion of rationality in the context of strategy manifests itself "through the practices of individuals intending to be rational as they make strategy" (Jarzabkowski and Kaplan, 2015).

I expect firms that are intending to be more rational in their strategic decision making, are more likely to be users of shared-control digital communication and social technologies, such as aggregating and collaborating technologies. This follows the logic that rationality is often achieved through the participation of a greater number of individuals, so as to detect mistakes and avoid individualistic and political behavior (Goll and Rasheed, 1997). Additionally, a greater accumulation of knowledge from multiple sources, as facilitated by the two shared-control digital communication and social technologies, is also a typical aspiration associated with greater rationality to avoid a sporadic and haphazard approach to gathering information (Eisenhardt and Zbaracki, 1992).

Using an adapted version of the scales used by Dean and Sharfman (1996) to determine the extent of rationality in strategic decision making, I included the following five items measured on a seven-point scale. Measured from "not at all" to "extensively": (1) How extensively does your firm look for information in making strategic decisions; and (2) How extensively does your group analyze relevant information before making a strategic decision?

Measured from “not at all” to “very important”: (3) How important are quantitative analytic techniques in making strategic decisions? Measured from “mostly intuitive” to “mostly analytical”: (4) How would you describe the process that has the most influence on your firm’s strategic decisions? And finally, measured from “not at all effective” to “very effective”: (5) In general, how effective is your firm at focusing its attention on crucial information and ignoring irrelevant information?

3.3.6.4.1.1. Factor Analysis and Reliability Testing

The items of this scale loaded onto one factor, the percentage of variance this factor explains is 54% (Table 3-8).

Table 3-8 Principal Component Factor Analysis: Rationality in Strategic Decision Making

Variable	**Factor 1**
rat1	0.8253
rat2	0.7855
rat3	0.6607
rat4	0.8006
rat5	0.5576

rat1= How extensively does your firm look for outside information?; rat2= How extensively does your firm analyze information before making a strategic decision?; rat3= How important are quantitative analytic techniques in strategic decision making?; rat4= How intuitive or analytical is the process that the most influence on the firm’s strategic decision making?; rat5= How effective is the firm at focusing on critical and ignoring irrelevant information?

Since all my items are loading onto one factor with the loadings all above 0.5 I performed a reliability test with all the variables (Table 3-9).

Table 3-9 Reliability Test for Rationality in Strategic Decision Making

Variable	Correlation Item with Scale	Correlation Item with Scale Excluded	Alpha
rat1	.7838	.6472	.6974
rat2	.7429	.5916	.7164
rat3	.7180	.4829	.7621
rat4	.8123	.6703	.6840
rat5	.5720	.3703	.7822
Test Scale			.7721

rat1= How extensively does your firm look for outside information?; rat2= How extensively does your firm analyze information before making a strategic decision?; rat3= How important are quantitative analytic techniques in strategic decision making?; rat4= How intuitive or analytical is the process that the most influence on the firm's strategic decision making?; rat5= How effective is the firm at focusing on critical and ignoring irrelevant information?

With an overall reliability of 0.7721, I computed the composite of construct (ratc) using all items.

3.3.6.4.2. Political Behavior

As the process of formulating and executing the business strategy, particularly in larger companies, tends to involve some form of allocating and committing financial and other resources, individualistic and personally motivated behavior could potentially occur (Pettigrew, 1977). In this study, I understand political behavior to be certain tactics, such as intentional change and control over vital insights and information (Pettigrew, 1973; Elbanna, 2006). Such behavior can then act as some kind of counterforce to the more rational approach that goes beyond the upper managerial levels (Guth and Macmillan, 1986). The assumption that strategic planning is dominated by rational thought also fails to recognize that there are various stakeholders within and outside a company who may pursue different and often conflicting goals (Gray and Ariss, 1985). Therefore, to avoid the occurrence of political behavior or to mitigate its impact on the strategy formulation, often some kind of consensus is sought on a continuous basis with all the major stakeholders that are involved (Narayanan and Fahey, 1982).

In their study of strategic decision making effectiveness, (Dean and Sharfman, 1996) present the detrimental impact of political behavior. In the context of this study, I expect that organizations in which political behavior is more prevalent in the SMP will make a more prominent use of single-controlled digital communication and social technologies. Managers wanting to pursue their own interests are probably more likely to keep other individuals less involved in the SMP and may attempt to keep the strategy process more closed and less transparent. This would be more easily facilitated by individually controlled technologies such as email or announcement platforms as these give other individuals less of a chance to respond or contribute. This use of technology could thus exclude certain groups within a company, such as middle managers, from being involved and choosing their stance in the strategy process (Guth and Macmillan, 1986).

To measure the extent of political behavior in the SMP, I adapted Dean and Sharfman's (1996) scales for measuring political behavior in strategic decision making. Similar to measuring the degree of rationality, I use the adapted scales as a proxy to obtain an indication of political behavior in the SMP as a whole. The following four items were all measured on a seven-point scale. Measured from "own goals completely" to "organizational goals completely": (1) When making decisions, are those involved in the strategy process primarily concerned with their own goals or with the goals of the firm? [reverse coded]. Measured from "not at all" to "completely": (2) To what extent are people open with each other about their interests and preferences in the strategic decision? [reverse coded]; (3) To what extent are strategic decisions affected by the use of power and influence among those involved in the strategy process?; and (4) To what extent are strategic decisions in your firm affected by negotiation among those involved in the strategy process?

3.3.6.4.2.1. Factor Analysis and Reliability Testing

My scale to measure the extent of political behavior in the SMP loaded onto two factors. Factor 1 explains 36% of the shared variance and Factor 2, 29.1% (Table 3-10).

Table 3-10 Principal Component Factor Analysis: Political Behavior in the SMP

Variable	Factor 1	Factor 2
polb1r*	0.8142	-0.1181
polb2	0.4985	0.6393
polb3	-0.2430	0.8592
polb4r*	0.6855	0.0430

*Variable is reverse coded. polb1r= To what extent are those involved in the strategy process open with their interests?; polb2= To what extent do power and influence play a role in strategic decision making?; polb3= To what extent are strategic decisions affected by negotiation between the stakeholders?; polb4r= Are those involved in the strategic decision making more concerned with their own goals or that of the organization?

Subsequently I determined the reliability of the two factors consisting of the variables which loaded above 0.5. I also tested the reliability of the factor with all variables involved (Table 3-11).

Table 3-11 Reliability Test for Rationality in Strategic Decision Making

Variable	Correlation Item with Scale	Correlation Item with Scale Excluded	Alpha
polb1r*	.5866	.1834	.2422
polb2	.6746	.3081	.0821
polb3	.4257	-.0109	.4575
polb4r*	.6091	.2137	.2049
Test Scale			.3216

*Variable is reverse coded. polb1r= To what extent are those involved in the strategy process open with their interests?; polb2= To what extent do power and influence play a role in strategic decision making?; polb3= To what extent are strategic decisions affected by negotiation between the stakeholders?; polb4r= Are those involved in the strategic decision making more concerned with their own goals or those of the organization?

The alpha for the first factor consisting of polb1r and polb4r is at 0.4393 and the alpha for the second factor, consisting of polb2 and polb3 at 0.2930. As the composite consisting of all variables is also below the 0.6 cut-off, I decided to measure this construct with polb3 alone.

3.3.6.4.3. Participation Intention

With the growing interest in open strategy practices (e.g. Whittington et al., 2011), I expect that a firm's willingness to include more individuals from across the firm in the SMP is associated with a higher business performance. Participation intention is the extent to which top management wants to involve other internal and external stakeholders of the business for some or all stages of the SMP (Tannenbaum and Massarik, 1950; Baptista et al., 2017; Mitchell, 1973). To measure participation intention, I used a previously constructed scale by Dyson and Foster (1982) who investigated the effectiveness of participation in strategic planning. Whereas Dyson and Foster's (1982) study measured the current degree of involvement, I adapted the scales to measure a firm's intention of involving more stakeholders in the firm's SMP in the future. The items to measure the degree of participation for each variable were directly taken from Dyson and Foster (1982) using a seven-point scale. The items used were: (1) The degree to which the firm wants to involve their stakeholders in the strategy process; (2) The degree to which the firm wants to communicate the various aspects of the strategy process with their stakeholders; and (3) The degree to which the firm wants to involve other stakeholders in the SMP in their firm.

3.3.6.4.3.1. Factor Analysis and Reliability Testing

My scale to measure the intention to involve other stakeholders in the SMP loaded onto one factor, which explains 74% of the shared variance (Table 3-12).

Table 3-12 Principal Component Factor Analysis: Participation Intention

Variable	**Factor 1**
partint1	0.8840
partint2	0.7901
partint3	0.8945

partint1= Degree to which firm wants to involve stakeholders in strategy process; partint2= Degree to which firm wants to communicate various aspects of strategy to stakeholders; partint3= Degree to which firm wants to involve stakeholders in strategic decision making.

Since all my items are loading onto one factor with the loadings all above 0.5, I performed a reliability test with all the variables (Table 3-13).

Table 3-13 Reliability Test for Participation Intention

Variable	**Correlation Item with Scale**	**Correlation Item With Scale Excluded**	**Alpha**
partint1	.8921	.7175	.7060
partint2	.7851	.5751	.8416
partint3	.8904	.7417	.6778
Test Scale			.8186

partint1= Degree to which firm wants to involve stakeholders in strategy process; partint2= Degree to which firm wants to communicate various aspects of strategy to stakeholders; partint3= Degree to which firm wants to involve stakeholders in strategic decision making.

As the reliability of the composite is above the 0.6 threshold, I computed the composite of this scale using all three of my variables.

3.3.6.5. Control Variables

3.3.6.5.1. Dynamism

Companies are operating and generating their strategy in the context of a particular environment. This is constituted by several agents and factors such as the direct competitors and the company’s customers. The environment also includes wider, macro factors such as the economy and technological advancements in a specific area (Scott, 1987). To take account of the associated environmental factors, this study measures two dimensions at the firm level: dynamism and munificence.

Dynamism denotes the degree to which environmental shifts can be predicted. Dynamism reveals itself "in the variance in the rate of market and industry change and the level of uncertainty about forces that are beyond the control of individual businesses" (Baum and Wally, 2003). Previous research such as the review of Hutzschenreuter and Kleindienst (2006) has highlighted the impact on competitive behavior in dynamic environments (Robert Mitchell et al., 2011). Additionally, previous scholarly work has also highlighted the importance of environmental dynamism in research determining the impact on business performance (Garg et al., 2003).

To measure dynamism in this study I used Baum and Wally's (2003) scale which consists of five items. Using a seven-point Likert scale ranging from "strongly disagree" to "strongly agree", the scales were directly adopted except for one that made an explicit reference to the industry in which Baum and Wally (2003) conducted their study. This was altered to a more general expression as there were firms from various industries represented in the sample frame. The following items were used: (1) Frequency of change of products to keep up with competitors; (2) Products and services are becoming quickly obsolete in our industry; (3) Actions of competitors are quite easy to predict [reverse coded]; (4) Consumer tastes are fairly easy to forecast in our industry [reverse coded]; and (5) Technology changes very quickly in our industry.

3.3.6.5.1.1. Factor Analysis and Reliability Testing

My scale for dynamism loaded onto two factors. Factor 1 explains 39% of the shared variance and Factor 2, 29% (Table 3-14).

Table 3-14 Principal Component Factor Analysis: Dynamism

Variable	Factor 1	Factor 2
dynm1	0.8537	-0.0803
dynm2	0.8263	0.2143
dynm3r*	0.0613	0.8232
dynm4r*	0.1631	0.8005
dynm5	0.7029	0.2345

*Variable is reverse coded. dynm1= Firms must frequently change products & practices; dynm2= Products/services become quickly obsolete; dynm3r= Actions of competitors are easy to predict; dynm4r= Consumer tastes are fairly easy to forecast in our industry ; dynm5= Technology changes very quickly in our industry.

For my reliability testing I tested the two factors individually as well as both factors combined as per the table below (Table 3-15).

Table 3-15 Reliability Test for Dynamism

Variable	Correlation Item with Scale	Correlation Item With Scale Excluded	Alpha
dynm1	.7040	.4404	.6240
dynm2	.7915	.6194	.5332
dynm3r*	.4924	.2793	.6808
dynm4r*	.5574	.3322	.6637
dynm5	.7223	.4922	.5948
Test Scale			.6758

*Variable is reverse coded. dynm1= Firms must frequently change products & practices; dynm2= Products/services become quickly obsolete; dynm3r= Actions of competitors are easy to predict; dynm4r= Consumer tastes are fairly easy to forecast in our industry ; dynm5= Technology changes very quickly in our industry.

The reliability for my first factor is 0.7260 and for the second factor 0.5367. Given that the first factor is more reliable than the scale using all variables (Table 3-15), I used dynm1, dynm2 and dynm5 to compute the composite variable (dynmc).

3.3.6.5.2. Munificence

Munificence denotes the degree to which a company's environment can facilitate a firm's growth. This is often exhibited through a general growth in its industry's sales (Baum and Wally, 2003). As in the case of dynamism, previous work has identified that munificence plays a significant role in the strategy–performance causal relationship (Goll and Rasheed, 1997). Moreover, the review article by Hutzschenreuter and Kleindienst (2006) identified munificence as an environmental factor that influences strategy-related processes within firms (Hutzschenreuter and Kleindienst, 2006). As a company's success may thus be influenced by the degree in which the environment it operates in enhances its growth, I included munificence as a relevant construct in my model.

To determine the extent of munificence in the company's environment, I used Baum and Wally's (2003) five-item scale. The five items did not require any further adaptation for use in this study and were therefore taken directly from the original publication. Similar to the dynamism questions, a seven-point Likert scale ranging from "strongly disagree" to "strongly agree" was used. The five items included were: (1) There are few external threats to the survival and well-being of the firm; (2) The markets of the firm are rich in capital investment; (3) Economic development programs offer sufficient support for the business community of the firm; (4) Markets are rich in profitable opportunities; and (5) The firm operates in a threatening business environment [reverse coded].

3.3.6.5.2.1. Factor Analysis and Reliability Testing

The scale for munificence loaded onto two factors: Factor 1 explains 36.4% of the shared variance and Factor 2, 28.3% (Table 3-16).

Table 3-16 Principal Component Factor Analysis: Munificence

Variable	Factor 1	Factor 2
muni1	0.1068	0.8368
muni2	0.8496	-0.0331
muni3	0.7104	0.2363
muni4	0.7542	0.1493
muni5r*	0.1198	0.7990

*Variable is reverse coded. muni1= There are few external threats to the survival and well-being of the firm; muni2= Markets are rich in capital investment; muni3= Economic development programs give sufficient support to businesses in the community; muni4= Markets are rich with profitable business opportunities; muni5= The firm is operating in a threatening business environment.

Consequently, I performed the reliability testing for those two factors individually as well as with all factors combined (Table 3-17).

Table 3-17 Reliability Test for Munificence

Variable	Correlation Item with Scale	Correlation Item With Scale Excluded	Alpha
muni1	.6153	.3396	.6193
muni2	.6542	.4018	.5874
muni3	.6718	.4688	.5600
muni4	.6692	.4522	.5650
muni5r*	.6138	.3380	.6200
Test Scale			.6431

*Variable is reverse coded. muni1= There are few external threats to the survival and well-being of the firm; muni2= Markets are rich in capital investment; muni3= Economic development programs give sufficient support to businesses in the community; muni4= Markets are rich with profitable business opportunities; muni5= The firm is operating in a threatening business environment.

The reliability for Factor 1 is 0.6814 and for Factor 2, 0.5525. Given that the first factor is more reliable, I used muni2, muni3 and muni4 to compute the composite variable for my study (munic).

Apart from the above constructs, there were numerous other relevant variables that I wanted to control for in the model. This includes *the return on assets*, *the firm's age*, *R&D spending*, *number of employees*, *percentage-share of sales made in foreign countries*, *the* *number of countries the firm operates in*, *the size of the strategy team*, and *a country* and *industry category dummy variable.*

To obtain a measure of the return on assets, I downloaded the last available six years (last available year until last available year minus five years) from FAME for the British firms and Amadeus for the German firms. This was not possible in all cases as some firms are not required to report their financial performance and for others I was unable to determine from which the firm the data was from. Following on from previous work on organizational experience and firm age and its significance to innovation adoption (Coad et al., 2016; Messeni Petruzzelli et al., 2018), I also included a question in my survey to obtain an indication of the firm's age, by asking for their founding year. Where possible I supplemented this information with data from databases and used this to compute each firm's age in years; I then included the natural logarithm of the age as a control variable in the analysis. To control for any potential effects of increased spending on technology use and adoption, I asked the participants to provide the percentage-share of the total amount of revenue spent on research and development activities. Additionally, I asked for the total number of employees worldwide. Where possible I relied on the more objective data from the database. As there was a great amount of variation in the number of employees between participating firms, I computed the natural logarithm of this variable and included it as a control variable in the analysis. I obtained further data about each firm's age from the corresponding database (FAME for British firms and Amadeus for German firms). I downloaded the last available six years of the number of employees (last available year until last available year -five years). To obtain a proxy indication about the extent of internationalization, I asked the number of countries, including the domestic country, in which the firm had a physical presence. In addition to this, I asked for the percentage-share of total revenue made internationally. To obtain a proxy for the degree of organizational complexity, which equally impacts how a firm strategizes and operates (Arregle et al., 2016), I asked for the number of physical locations of the firm, that is any offices, warehouses or retail stores that the company had worldwide. An increase of complexity in the operations of a company is also a driver of the complexity of the business strategy (Cara et al., 2017).

I also asked firms to state the number of employees they had working in business-strategy or corporate development specific roles (Menz and Barnbeck, 2017). Additionally, I included one dummy variable depending on the sample (UK or Germany) and whether the firm had a manufacturing or service-based focus. To obtain a categorial variable for the industry I first asked the participants to indicate their industry category according to the UK Standard Industrial Classification (SIC) and the German WZ 2008. I specifically asked for the primary industry category, which is where the company of the participant generates the largest percentage-share of their total revenue. I then asked for the industry sector within their stated category. As some firms may be prominently located in more than one industry, I gave an option to state an additional secondary sector, which is where the firm has the second largest percentage-share of total revenue. In some cases, I was able to assign the industry code to the respondent as this information was contained in the databases that I obtained. The primary industry category was treated as a dummy variable in the subsequent analysis.

3.3.7. Measures: Second Empirical Study

3.3.7.1. Dependent Variable

3.3.7.1.1. Use (Adoption) of Digital Communication and Social Technologies

For the second empirical study, the adoption of digital communication and social technologies is the dependent variable. The majority of studies that use the technology–organization–environment (TOE) framework measure adoption as a binary variable (Low et al., 2011; Chau and Tam, 1997; Kuan and Chau, 2001). To increase the accuracy of my measures I only focused on collaborating technologies for the second study, excluding the other three types of digital communication and social technologies.

The original TOE framework as set out by Tornatzky and Fleischer (1990) contained only one construct that could be denoted as a dependent variable: technological innovation decision making. Later work such as Thong (1999) then marked the transition to using the TOE to study technology adoption at the firm level.

I included the data obtained from questions relating to the first empirical study as a dependent variable for the second study as well — that is, the degree of current use of collaborating technologies throughout the various stages of the SMP. Using these results allowed me to determine the antecedent factors of collaborating technologies' adoption. This approach is similar to the one taken by (Zhu et al., 2006b) who differentiated between three stages of technology: assimilation: initiation, adoption and routinization. In most technology adoption studies, the actual technology adoption is measured through a simple binary yes/no answer. In the case of my study, I used a scale variable representing the use of collaborating technologies across various activities in the SMP. This provided a more accurate picture of the extent of the adoption of this specific type of technology in the SMP.

3.3.7.2. Independent Variables

There are four sets of independent variables in this study. These are located in the technological, organizational and environmental contexts, in addition to one mediating variable located outside these contexts.

3.3.7.2.1. Technological Context

The technological context is one of the three key elements of the TOE framework. It encompasses the current technological status of the organization and displays whether there is the potential to integrate a novel technology given the existing technologies used in the firm. Consequently, I included three factors in the technological context: *technology readiness*, *technology integration,* and *perceived benefit.* I measured technology readiness with three items on a seven-point Likert scale ranging from “strongly agree” to “strongly disagree” taken from (Venkatesh and Bala, 2012), which I adapted to the technologies in question in this study. The three items included were: (1) The firm’s current ICT systems can support collaborating technology that is needed for the firm’s strategy process; (2) The firm has the ICT infrastructure that they need to implement collaborating technology; and (3) The firm has in-house expertise to implement collaborating technology.

To determine the extent to which the current SMP was already integrated with the existing technological infrastructure of the firm, I adapted the two items measured on a seven-point scale previously used in a technology adoption study by Zhu et al. (2006b). The two items used were: (1) The firm’s SMP is electronically integrated with the internal databases and information systems; and (2) The firm’s databases and information systems are electronically integrated with those of their suppliers and business customers.

In order to measure the perceived benefit, I adapted Venkatesh and Bala’s (2012) six items on a seven-point scale to the particular context and technology of this study. These six items were: (1) Collaborating technologies can improve coordination with different individuals involved in the strategy process; (2) Collaborating technologies can increase the efficiency of the firm's strategy process; (3) Collaborating technologies can increase the costs associated with the firm's strategy process [reverse coded]; (4) Collaborating technologies cannot improve the firm's strategy process [reverse coded]; (5) Collaborating technologies can reduce the number of errors and misunderstandings in the firm's strategy process; and (6) Collaborating technologies can improve the sharing of information among those involved in the strategy process. To ensure that I captured all possible perceived benefits which could stem from collaborating technologies I added one additional item which I created myself: (7) Collaborating technologies can help the firm to increase the scope of strategy-relevant information that the firm gathers.

3.3.7.2.2. Organizational Context

The second element within the TOE framework is the organizational context, for which I included a total of seven variables. I incorporated three variables deployed in previous studies using the TOE: *strategy process compatibility* (Venkatesh and Bala, 2012), *global scope* (Zhu et al., 2003; Zhu and Kraemer, 2005; Hsu et al., 2006) and *firm size* (Zhu et al., 2003; Zhu et al., 2006a; Zhu and Kraemer, 2005). Additionally I included two variables which are novel in this context: *strategic decision speed*, and *participation intention*.

Strategy process compatibility denotes the degree to which the use of collaborating technologies would be compatible with the firm's SMP. I used Venkatesh and Bala's (2012) scale for this and adapted it so the wording was relevant for the context of this study. Unlike in the original study, I placed this variable in the organizational rather than the technological context of the TOE framework as the strategy process is more organizational than technological. I expect the compatibility of collaborating technologies with the existing strategy to predict the adoption of collaborating technologies as some firms may have a closed strategy process which would not require any collaboration to take place. Consequently, there may be not much of a need to use technologies that could facilitate collaboration. To measure this construct, I used the following four adapted items on a seven-point scale: (1) Collaborating technologies would be compatible with the firm's current strategy process; (2) Collaborating technologies would fit well with the firm's existing strategy process; (3) the firm would have to change their current strategy process to be able to use collaborating technologies [reverse coded]; and (4) Collaborating technologies would not interfere with the firm's current exchange of files, data and information in their strategy process.

The firm's size is one of the more disputed variables in TOE studies as scholars disagree about the effect of firm size on technology adoption (Zhu and Kraemer, 2005). Indeed, it seems intuitive that larger firms with their inevitably greater amount of bureaucracy and number of organizational layers may not be as flexible in adopting collaborating technologies, as these would require the company to reshape at least part of their social interactions mediated by technology, due to the high level of interactivity collaborating technologies afford (Hsu et al., 2006; DeSanctis and Poole, 1994; Oliveira and Martins, 2010). While some studies have found no significant impact of firm size on technology adoption (Oliveira and Martins, 2010), others have found a positive effect of firm size (Aboelmaged, 2014) and others a negative effect (Zhu and Kraemer, 2005). In that regard, the effect of firm size on the adoption of a technology could be bi-directional and hence I included it as a control variable in this study. I measured firm size by asking the participants to state the number of employees in their company.

While the firm's global scope may be a variable omitted from previous studies, I decided to include this variable in the model as it is a valid proxy for organizational complexity (Zhu et al., 2003). The firm's global scope denotes the degree to which the business is operating and achieving financial returns in foreign countries. I expect that firms with a larger global scope are more likely to adopt collaborating technologies since these allow various individuals, irrespective of their geographical location, to work together and contribute information, data, and analytics in real time and at a low cost. To obtain a measure I asked a set of two different questions, mimicking the approach of Zhu et al. (2006b): (1) The percentage of total sales made in foreign countries; and (2) The number of countries in which the firm had a physical presence, such as offices, warehouses, stores, plants, etc.

I understand the strategic decision speed to be the length of the time period it takes a firm to make a strategic decision from the identification of a problem to the actual commitment to a set course of action (Eisenhardt and Zbaracki, 1992). Previous work done on this variable has found that firms, especially those that are operating in highly dynamic and munificent environments, perform better if they can make strategic decisions faster than their direct competitors (Kownatzki et al., 2013). Resultantly, I expect that firms which are already satisfied with their current strategic decision making speed are more likely to adopt collaborating technologies as it could help them to maintain this speed advantage. In particular, the real-time affordance of collaborating technologies allows firms to gather information and obtain results instantaneously. The literature related to strategic decision speed provides one approach to measure speed by using short-text scenarios after which firms need to indicate how long it would usually take them to make a decision in the presented scenario (Baum and Wally, 2003). Using this approach, however, would have significantly increased the time required to complete the questionnaire and subsequently could have caused a decline in response rate. Using the work of Eisenhardt (1989a), I created my own scale to measure the speed of the strategy process as a whole. I devised the following three items on a seven-point Likert scale: (1) The firm considers the speed at which they make strategic decisions to be faster than their competitors; (2) The firm's competitors make strategic moves faster than the firm does [reverse coded]; and (3) The firm's current strategy process allows the firm to react faster to things than the average in their industry.

With the growing interest in the practice of open strategy (c.f. Whittington et al., 2011), I expect that a firm's willingness to include more individuals from across the firm in the SMP is associated with an increased willingness to adopt multi-user technology in the process as it can facilitate a higher degree of inclusion and openness. To measure strategy participation, I used a previously constructed scale by Dyson and Foster (1982) who investigated the effectiveness of participation in strategic planning. Whereas Dyson and Foster's (1982) study measured the current degree of involvement, I adapted the scales to measure a firm's intention of involving more stakeholders in the firm's SMP in the future. The scale to measure the degree of participation for each variable was directly taken from the source using a seven-point scale ranging from "not at all (top management only)" to "all identifiable stakeholders". The items used were: (1) The degree to which the firm wants to involve their stakeholders in the strategy process; (2) The degree to which the firm wants to communicate about the various aspects of the strategy process with their stakeholders; and (3) The degree to which the firm wants to involve other stakeholders in the SMP in their firm.

3.3.7.2.3. Environmental Context

The environmental context of the TOE framework encompasses exogenous factors that can potentially predict a firm's intention to adopt a certain technology. Previous TOE studies frequently include competition intensity (Zhu et al., 2006b; Zhu et al., 2006a; Zhu and Kraemer, 2005; Zhu et al., 2003) and regulatory factors (Zhu and Kraemer, 2005; Zhu et al., 2006a). The competitive intensity is often measured in regard to the perception and performance of those that are in direct competition to the firm (Zhu et al., 2006a) In this respect it encompasses the *dynamism* and *munificence* of the environment, which I measured also for the first empirical study. I expect that companies which are operating in more dynamic environments are more likely to adopt collaborating technologies in their SMP as they can enable firms to react more speedily to trends and disruptions in the environment in which they operate. In regard to munificence, I anticipate a reversed effect — that is, firms which operate in highly munificent markets are less likely to adopt digital communication technologies. Since I expect firms to seek superior performance by enhancing their SMP through the use of collaborating technologies, firms may not perceive there to be a need to alter their existing non-technological approach to strategizing. Antithetically, firms that are operating in less munificent industries may feel more encouraged to adopt collaborating technologies to boost their business performance and sustain their business growth.

To measure dynamism in this study I utilize Baum and Wally's (2003) scale which consists of five items. Using a seven-point Likert scale ranging from "strongly disagree" to "strongly agree", the scales were directly adopted except for one item which made an explicit reference to the industry in which Baum and Wally (2003) conducted their study. This was altered to a more general expression as there were firms from various industries represented in my sample frame. The following items were used: (1) The frequency of change of products to keep up with competitors; (2) Products and services are becoming quickly obsolete in our industry; (3) Actions of competitors are quite easy to predict; consumer tastes are fairly easy to forecast in our industry; and (4) Technology changes very quickly in our industry.

To determine the extent of munificence in the company's environment, Baum and Wally's (2003) five-item scale is used. The five items did not require any further adaptation to this study and were, thus, directly taken from the original publication. Similar to the dynamism questions, a seven-point Likert scale ranging from "strongly disagree" to "strongly agree" was used. The five items included were: (1) There are few external threats to the survival and well-being of the firm; (2) The markets of the firm are rich in capital investment; (3) Economic development programs offer sufficient support for the business community of the firm; (4) Markets are rich in profitable opportunities; and (5) The firm operates in a threatening business environment.

Additionally, I included in my model the impact of the *network effects* associated with collaborating technologies on the adoption intention. Network effects denote the phenomenon that certain technologies gain in value for the user, the more people are using the technology (McIntyre and Subramaniam, 2009). Collaborating technologies provide a good example of network effects. One of the main functions of collaborating technologies is that they facilitate simultaneous use by multiple individuals. Hence, the more people are using a particular collaborative technology, the greater the improvement to communication flows and increase in efficiency — for instance, by avoiding working on an obsolete version of a document. Additionally, with a growing number of the so-called "installed base" (Strader et al., 2007), the greater the chance that supplementary technologies are developed, for example, additional functions and features. Therefore I expect that the more people are using these technologies in the external environment and the more prominent the network effects for collaborating technologies, the higher the likelihood of adoption. To measure this I adapted Strader et al.'s (2007) scale of perceived network effects. Similarly to the current study, the work of Strader et al. (2007) measured the impact of perceived network effects on the acceptance of communication technology. The three items that they used were: (1) Many firms in the participating firm's industry use collaborating technologies in the strategy process; (2) Many employees in the participant's company use collaborating technologies; and (3) Many of the respondent's peers use collaborating technologies.

3.3.7.3. Mediating Variable

Following the hypotheses of the second empirical study, I anticipate that the organizational context and the environmental context are mediated by the degree of *top management support* — that is, the extent to which the collective top management team (TMT) is in a position of advocating and promoting the use of collaborating technologies. A significant mediating effect would confirm the work of Chen et al. (2015) who found a significant mediation of top management support in the adoption of technology. This mediation reflects the general authority and chain of command in many firms where the top management makes key decisions, such as implementing a new technology. This particularly applies to the use of technologies in the SMP, as this is a key process ensuring and maintaining the future competitiveness of the company (Chandler, 1962 (1975 printing); Porter, 1996). To measure the degree of SMT support I adapted the scales used by (Chen et al., 2015) who investigated the adoption of big data analytics in the supply chain. Using a seven-point Likert scale ranging from "not at all" to "it is among the highest priorities," I included the following three items in my questionnaire: (1) Does the SMT promote the use of collaborating technologies in the SMP; (2) Does the SMT create support for collaborating technology initiatives within the organization?; and (3) Has the SMT promoted collaborating technology use as a strategic priority within the organization? Unlike a regular Likert scale ranging from "strongly agree" to "strongly disagree", the seven-point scale used for these questions did not have a label for each point, following the approach of the original scales.

This might pose a risk that the data would be of lower quality as the participants might be unsure what each point on the scale related to. However, previous research shows that items which have labels for each measurement point are not significantly more certain and do not contribute any more to the avoidance of uncertainty than those that only have two labels for the highest and lowest score (Churchill and Peter, 1984).

3.3.7.4. Control Variables

Similar to the first empirical study, there is a list of control variables that I included in my model. These include the *industry*, and *country* in which the firm is located. To obtain a categorical variable for the industry, I first asked the participant to indicate their industry category according to the UK SIC. Similarly, for my German version of the questionnaire, I asked the participants to state their category based on the German WZ 2008. I specifically asked for the primary industry category, which I explained to be where the firm generated the largest percentage-share of its total revenue. I then asked for the specific industry sector within the selected industry category. As some firms may be prominently located in more than one industry, I gave an option to state an additional secondary sector, where the second largest percentage-share of total revenue was generated. In some cases, I was able to assign the industry code to the respondent as this information was contained in the databases which I obtained.

3.3.8. Data Analysis

At the end of the data collection, the responses were directly exported from Qualtrics into a Microsoft Excel spreadsheet. Following on some cleaning of the dataset, such as ensuring the reverse coded questions are correct, assigning labels to the individual values, the data was prepared for statistical analysis. For the analysis, I used Stata Version 16 to run my descriptive, pre-tests and regression analyses. I used Mplus Version 7 for the covariance-based structural equation modeling (SEM). I chose this approach as in instances where it is difficult or impossible to collect longitudinal data, researchers can use SEM models that allow for an enhancement of drawing out causal inferences (Hult et al., 2008).

Firstly, I combined my sample data with the data of my population and performed a series of preliminary tests such as computing the measures of central tendency, skewness and kurtosis to establish normality of the distributions. Given the dataset exceeds 30 observations, I also assumed normality based on the central limit theorem. I also compared a series of means such as the number of employees and turnover. To reduce that level of variance, I computed the logarithm for both of these variables.

Once I established that, I performed a series of descriptive statistics for the variables I had collected. As I used multi-item scales I assessed the reliability and validity of my constructs by considering Cronbach’s alpha to assess the internal consistency. Moreover, for my SEM model, I assessed the convergent and discriminant validity by assessing my constructs and scales against the three main criteria outlined by Fornell and Larcker (1981) using the average variance extracted (AVE) as the core index to determine this. Alongside this, I performed a confirmatory factor analysis (CFA) to test the unidimensionality of my adopted and constructed scales (Gerbing and Anderson, 1988). This helped to determine the reliability of my constructs before those were inserted in my regression model and SEM (Chin et al., 2008).

To test the hypotheses of the first empirical study I performed an instrument variable (IV) regression with the use of the four types of digital communication technology as the endogenous variable. In the second regression, I used quantitative and qualitative business performance as the dependent variable. Among the instrumented variables are rationality and the extent of political behavior in the SMP of the firm. Additionally, I controlled for a number of factors such as the firm's size and the number of physical locations. I first performed a confirmatory factor analysis (CFA) to test the unidimensionality of my constructed and adopted scales (Gerbing and Anderson, 1988). This also helped to determine the reliability of my constructs before those were inserted into the regression.

Following the main analysis of the second study, I performed a series of diagnostic statistics such as the identification of unduly influencing observations and assessing the overall model fit throughout the process. To determine if the factors load as theorized, I also performed an exploratory factor analysis. I then computed the SEM using the construct of latent variables with "collaborating technology use" as the main dependent variable. As the estimator, I used "maximum likelihood". To aid in the computation of the confidence intervals for the significance testing I performed bootstrapping with my sample. To estimate the fit of the model I computed the model's χ^2 and RMSEA ($\hat{\varepsilon}$) as well as the standardized root mean residual (SRMR). As there are certain limitations to those two fit indices, such as the noncentral chi square distribution, I also computed the Bentler comparative fit index (CFI) as an incremental fit index (Kline, 2016). I computed two goodness-of-fit indices, the absolute RMSEA and the more incremental Tucker–Lewis index (TLI) (Hsu et al., 2006; Taylor and Todd, 1995; Tucker and Lewis, 1973). I also tested for outliers in the dataset.

Moreover, I computed a series of diagnostic statistics such as testing for heteroscedasticity, multicollinearity and homogeneity of variance. I also considered the variance inflation factor (VIF) to detect any outlying cases (Venkatesh and Bala, 2012).

3.3.8.1. Non-response Bias and Common-Method Variance

Non-response bias denotes the phenomenon whereby the group of participants who were invited but did not respond vary significantly from those who were invited and did respond (Armstrong and Overton, 1977). I therefore used Armstrong and Overton (1977) extrapolation tests by comparing early and late responders with one another. This is a frequently chosen approach by strategy researchers (c.f. Andrews et al., 2009) and in technology adoption studies (c.f. Aboelmaged, 2014). Additionally, I obtained the median performance and firm size from firms that did not respond through databases such as FAME and compared these with the median performance and firm size variables of firms that did respond (Chen et al., 2015).

Common-method variance bias derives from the fact that one participant completes the scales measuring both the dependent and independent variables at the same time since there is only one point of data collection (Rindfleisch et al., 2008). There are three tactics which could be employed in this study to avoid the occurrence of the common-method variance bias. One of these is to implement a longitudinal research design. Due to the temporal lag in obtaining responses, researchers can draw out causal inferences about observable phenomena (Ployhart and Vandenberg, 2010). In particular, the element of temporal order — that is, the timeline along which observable cause and effect relationships occur — can improve the confidence intervals obtained from the dataset as representational of the actual population (Rindfleisch et al., 2008). However, several assumptions challenge the supposed superiority of longitudinal research. In several instances, the time an event occurs can vary significantly from the time that is recorded (Granger, 1980). Therefore, there can be no guarantee that a longitudinal research design is able to fully capture the intended effect. Additionally, there could be an issue of temporal erosion (Einhorn and Hogarth, 1986). Temporal erosion denotes the phenomenon whereby “causes that are temporally distant from their effects are more difficult to establish than those that are proximate” (Rindfleisch et al., 2008). Resultantly, the confidence intervals might be hampered by a longitudinal research design.

Another way through which common-method variance bias can be avoided is to embed some secondary or other externally validated data into the analysis (Podsakoff et al., 2003). One of the frequently included variables in strategic management research is business performance (c.f. Powell, 1992). This was not feasible in the case of my study, as the data was not always obtainable for each firm or was out of date. Previous work has determined that the business performance stated through objective measures is significantly and highly positively correlated with the subjective business performance stated by senior managers (Dess and Robinson, 1984; Hult et al., 2008). Setting out the business performance as a dependent variable in the first empirical study can, therefore, mitigate the impact of common-method variance bias.

Additionally, statistical tests can be performed that can indicate the prevalence of common-method variance bias such as Harman’s one-factor test (Zhu and Kraemer, 2005). Moreover, performing more advanced statistical analysis and tests such as instrumental variable (IV) regressions or SEM can make the model and relationships between the individual factors so complicated and incomprehensible to a respondent that they cannot easily identify them and influence them through their responses (van Witteloostuijn et al., 2020).

3.3.8.2. Secondary Data Obtained

Using databases such as FAME and Osiris I was able to obtain a set of complementary secondary data that I matched up with my primary dataset. The secondary data included dates of incorporation. In cases where only the year was given I set the date to the June 31 of that year. If the month and year were given, but no specific date, I set it to the first of that respective month.

3.3.8.3. Robustness Check & Quality of Dataset

Another key procedure I performed in regard to the models was to check for their level of robustness. The term "robustness" has several meanings in the context of statistical analysis (Bradley, 1978). With a robustness check, I determined how the main variable's regression coefficient was impacted by the addition and removal of other regressors as part of the step-wise hierarchal approach (Lu and White, 2014). Using the Stata commands .rcheck and .checkrob, I could determine if the data was robust enough to enable the inference of statistically significant associations (Lu and White, 2014).

To improve the quality and internal validity of the dataset compiled through the questionnaire, I supplemented the dataset with a set of variables which I could obtain through databases such as FAME and Amadeus. I downloaded a dataset similar to the existing one. I then matched the additional information to the data I got from my respondents. I was able to do this in a number of cases as some of the respondents in the UK sample had completed the questionnaire through the generic link. These included *company turnover* for the last reported financial year, *return on assets*, *number of employees* and *debt-to-equity ratio* to determine the company's financial performance, the size of the firm and its liquidity, as these have an impact on its adoption and use of digital communication and social technologies (Li and Richard Ye, 1999). Additionally, as I collected some of these data through the questionnaire, I am in a position to compare the subjective and objective performance indicators to see if they are aligned with each other.

Using a larger set of data has also allowed me to determine whether my sample possesses similar characteristics to that of the population. This in turn underlines the generalizability of my findings to the wider population (Powell and Dent-Micallef, 1997).

3.4. Summary

In this chapter I detailed the methodological approach I selected for this thesis. I first discussed and justified the chosen epistemological perspective to explore the research topic. I then detailed how I went about the data collection for both my British and German sample using an online questionnaire survey method. I also explained how I identified and downloaded the appropriate secondary data to complement the primary data obtained from the questionnaire. Additionally, I described the measures I used for my variables and tested the factor loadings and reliability for the first empirical chapter (Chapter 4). Due to the different statistical analysis chosen for the second empirical chapter (Chapter 5) I included the results of the factor analysis in that same chapter along with the main results of the analysis (Section 5.4.4). I also detailed procedures with which I ensure non-response bias and common method bias are not effecting the validity of my result. I perform these measures in the subsequent empirical chapters (Chapter 4 and Chapter 5).

Chapter 4 – The Use of Digital Communication and Social Technologies in the Strategic Management Process and its Impact on Firm Performance

4.1. Introduction

Many studies indicate that firms which undertake a formal strategic management process (SMP) are able to generate competitive advantages that lead to superior performance (Armstrong, 1982; Kudla, 1980; Wolf and Floyd, 2017; Andrews et al., 2009; Boyd, 1991; Pearce et al., 1987; Powell, 1992) because the process enables business leaders to establish some structure and understanding of the complexity of their business and the environment in which they operate (Heracleous, 1998; Yoo and Digman, 1987; Chia and Holt, 2006). The formalized SMP typically consists of a chain of actions: formulating a mission statement, analyzing and scanning both the external and internal firm environment, generating and evaluating the various strategic options available and choosing one, implementing the strategy and, finally, evaluating and controlling the implemented strategy (Tyran et al., 1992; Ginter et al., 1985). More recent research focuses on the benefits that can emerge from taking an "open strategy" perspective through the inclusion of multiple stakeholders in the SMP (Adobor, 2019; Mack and Szulanski, 2017). Scholars have argued that this "opening-up" of the process potentially results in a more effective strategy process due to an increased amount of information available, access to novel ideas, different opinions, and insights as more individuals are involved in the SMP (Whittington et al., 2011). Additionally, an increase in transparency of the strategy process reduces the opportunity for politically motivated, and personal gain-seeking behavior (Appleyard and Chesbrough, 2017).

Nevertheless, our understanding of the SMP, the factors that improve its outcome, and the link to firm performance particularly in larger businesses are still unclear (Wolf and Floyd, 2017) as recent research focused mostly on small businesses (c.f. Williams Jr et al.,

2014) or public organizations (c.f. George et al., 2019). One important factor that might help improve the SMP and open it up to more participants is the use of new digital communication and social technologies like email, video conferencing, and more dynamic platforms such as Slack, Microsoft Teams or internal social networks. Previous research anticipated the rise of such digital technologies and how companies are increasingly adopting them in various parts of their business (Müller and Stocker, 2011). Business processes, which were previously carried out manually, are now mostly performed in the digital environment, a process known as *digitalization* (Bloomberg, 2018). Extant research has already noted the importance of digital communication and social technologies in areas such as marketing (c.f. Kannan and Li, 2017); business operations (c.f. Botthof and Hartmann, 2015) and accounting (c.f. Sutherland, 2018).

Scholars have only recently begun to explore the extent to which businesses are using digital communication and social technologies in the SMP (e.g. Aten and Thomas, 2016; Plotnikova et al., 2020; Weiser et al., 2020), mostly as a means to open up the process. Early work by Bjelland and Wood (2008) investigates how IBM uses a system of internal interlinked webpages to ask their employees to contribute and generate new ideas to key strategic questions. Yeaney (2011) and Stieger et al. (2012) describe the use of wikis within firm's SMP and how it allows businesses to build on the employees' collective knowledge base. Matzler et al. (2014) detail how HypoVereinsbank and Daimler facilitate their open strategy process to develop potential new business ideas and models using an internal online platform. Further, Luedicke et al. (2017) and Heracleous et al. (2018) demonstrate the use of emails, blogs and webinars to coordinate the involvement and contribution of different stakeholders in key strategic issues, such as the future direction of the company.

Yet the use of digital technologies in the SMP creates some issues. Hutter et al. (2017) explore how there are different types of participation behavior among Siemens' staff regarding the use of online platforms in the firm's strategy process. After examining the Swedish firm Ericsson, Plotnikova et al. (2020) theorize that conflicts can arise from using an online community for strategy development, particularly with regard to involving individuals from different hierarchical levels. Researching a UK-based organization's use if digital tools to facilitate open strategy processes, Morton et al. (2020) identify four specific modes in which firms undertake this. Splitter et al. (2021) demonstrate that involving more people through open strategy measures can lead to the weakening of involvement of other groups within businesses, such as middle managers. While these studies provide some rich insights into how digital communication and social technologies are used in the SMP, the generalizability of these studies is somewhat limited and a more wide-scale, comparative study of this phenomenon is needed. Additionally, none of these studies have determined whether using digital technologies has an impact on firm performance. Subsequently, the research question I intend to address in this chapter is: *How does using digital communication and social technologies in the SMP impact firm performance?*

I address the research question by developing a new theory to explain how specific types of digital communication and social technologies can be used in the SMP to improve firm performance. By means of a large-scale quantitative survey of British and German firms, I am able to determine how much each of the four technology types (corresponding, broadcasting, aggregating, and collaborating) is used by firms in each of the six SMP areas and thus test my ideas. To enhance our understanding, I classify available technologies into four types as outlined in Chapter 3 (corresponding, broadcasting, aggregating, and collaborating) based on their level of interactivity and synchronicity affordances (Deuze, 2006; Dennis et al., 2008). Building on the existing SMP literature and our understanding of how each of the stages can improve business performance, I argue how this improvement can be facilitated through the use of digital communication and social technologies. I theorize that specific technology types will lead to better performance for each of the six stages of the SMP (mission statement formulation, external and internal scanning, generation and formulation of strategic alternatives, implementation, and control and evaluation of the strategy).

I contribute to the SMP and digitalization literature in two important ways. First, although previous SMP research has noted that firms which engage in each of the six stages in a specific manner — for example, involving more people or by building consensus, thus potentially enhancing their SMP compared to their competitors (Hautz, 2017; Homburg et al., 1999) — it does not look at how precisely digitalization can improve this process or whether it leads to an increase in business performance (Tavakoli et al., 2017). I develop and test a new theory that suggests digitalization can improve the SMP because it can help businesses to implement the recommendations raised by previous scholarly work on various practices surrounding the six stages of the SMP. With this new theoretical approach, I combine research on digital technology, the SMP, and open strategy to add to our knowledge. By theorizing that the use of certain types of digital communication and social technologies in specific stages of the SMP improves business performance, I align my research with previous studies that have attempted to determine the value of the SMP in business, which has been an ongoing debate in the literature (Wolf and Floyd, 2017). Moreover, I contribute to the strategy-as-practice and open strategy literature (Morton et al., 2020; Hettich and Kreutzer, 2021; Doeleman et al., 2021), as I focus on how the use of digital technology in the SMP can facilitate the inclusion of different stakeholders of the firm in these processes.

Additionally, I provide evidence that such an inclusion can enhance the process (Adobor, 2020; Brielmaier and Friesl, 2021).

I also contribute to the digitalization literature by developing the notion that different digital technologies are useful at different stages of the SMP. Scholars and advocates of digitalization have previously described how the digitalization of different parts of a business can enhance its effectiveness and thus contribute positively to overall business performance (Hazlehurst and Brouthers, 2018). Despite this, previous research has either not specified the technology, or looked at it very broadly — for example, Information Technology (c.f. Bharadwaj et al., 1999a), or only considered one or two specific technologies such as PowerPoint and Telepresence (c.f. Kaplan, 2011; Standaert et al., 2016). In this paper, I broaden our understanding of the use of digital technologies in two ways. First, I capture the breadth of communication and social technologies using a classification based on the technology's level of interactivity and synchronicity. In this way, I consider a large number of specific technologies that managers can use to improve the SMP of their firm. Second, much of the digitalization literature assumes that digital technologies in general and the overall process of digitalization are useful everywhere in the firm (Rossato and Castellani, 2020; c.f. Joensuu-Salo et al., 2018). However, I theorize that specific digital communication and social technologies are more effective at certain stages of the SMP than others, providing theoretical explanations as to why this is the case. In these ways, I advance the digitalization literature, especially as it applies to the SMP.

4.2. Theory and Hypothesis Development

The SMP continues to be important businesses, serving a variety of different purposes (Wolf and Floyd, 2017). In this study the SMP is conceptualized as a six-step process, based on the work of Hofer and Schendel (1978) and others (Tyran et al., 1992; Pettigrew, 1977; Platts and Gregory, 1990; David, 2011; Kaplan and Norton, 2008b). These steps are: (i) mission statement formulation; (ii) external environment analysis; (iii) internal environment analysis; (iv) generating and evaluating strategic alternatives; (v) strategy implementation; and (vi) strategy control and evaluation. While the results of empirical research exploring the link between the strategic planning process and business performance are mixed (Miller and Cardinal, 1994; Powell, 1992), studies continue to find a significant relationship (Boyd, 1991; Thune and House, 1970; Armstrong, 1982). Yet the question remains: how can this process be improved?

4.2.1. Open Strategy Theory

Wolf and Floyd (2017) have called on researchers to consider different theoretical understandings and approaches to strategic planning research. One such theoretical perspective is open strategy theory (Seidl et al., 2019). This theory suggests that companies open up their strategy process to more individuals through participation by different managerial and hierarchical levels of employees in one or multiple stages of the SMP (Andersen, 2004; Whittington et al., 2011; Morton et al., 2020). This "openness" leads to two potential benefits, both of which might result in improved firm performance. First, increased participation can lead to a greater sharing of information, which in turn can increase the effectiveness of outcomes for the strategic decisions top management makes (Tannenbaum and Massarik, 1950; Brielmaier and Friesl, 2021; Morton et al., 2020). Open strategy can increase the creativity and innovativeness of ideas, reveal new insights and information, as well as improve employee commitment to and acceptance of the strategy (Adobor, 2019, 2019; Hutter et al., 2017; Hautz et al., 2017; Hautz, 2017). Thus, instead of strategy being the task of a small group of top managers (Pittz and Adler, 2016), the process itself is opened up to more individuals.

The second potential benefit of adding an open strategy perspective to the SMP lies in reducing the occurrence of political behavior. “Political behavior” refers to the individualistic gain-seeking behavior that can occur in the SMP; those involved in the SMP might pursue a personal agenda that is aimed at increasing the value, financial gain or power of those involved (Pettigrew, 1977). Such behavior can lead to a reduction in the effectiveness of the SMP (Dean and Sharfman, 1996). Opening the SMP up to enable more stakeholders to participate can provide a greater degree of transparency as strategy makers may find themselves in a position where they have to justify and be accountable for the strategic decisions that they make (Schnackenberg and Tomlinson, 2016). Thus, increased transparency could result in higher performance because political behavior is reduced and strategic decisions are more likely to align with stakeholder interests (Yakis-Douglas et al., 2017).

But how can firms achieve an open strategy process without encountering significant problems, like delays in decision making and increased complexity (Adobor, 2020)? On the one hand, the academic literature has described cases of firms that engage in open strategising using non-technological and more analogue ways of including people, for instance through the use of visual plans (Doeleman et al., 2021) or recruiting staff internally to participate in a series of meetings and presentations (Splitter et al., 2021). On the other hand, there are cases that show how firms’ use of digital communication technologies has opened up avenues to engage in open strategy processes (Morton et al., 2020; Plotnikova et al., 2020; Doeleman et al., 2021). Exploring each of the six stages of the SMP and building on previous case-based research (Bjelland and Wood, 2008; Yeaney, 2011; Stieger et al., 2012; Matzler et al., 2014; Luedicke et al., 2017; Heracleous et al., 2018; Hutter et al., 2017; Plotnikova et al., 2020; Morton et al., 2020; Splitter et al., 2021), I develop and test the idea that firms can use different types of digital communication and social technologies at different stages of the SMP to engage in open strategy processes for specific stages of the SMP (Doeleman et al., 2021). These technologies allow the firm to significantly increase participation in the SMP and open the process to other stakeholders (Adobor, 2019). Firms that take this technology-led open strategy approach, I theorize, will achieve greater business performance that those that do not.

4.2.2. Mission Statement Formulation

The mission statement is often considered to be the starting point of the SMP. It sets out the basis of any further strategic decisions the firm has to make, as the mission statement details the firm's current position, future direction, and its corporate values (David and David, 2003). Mission statements provide members of the firm, and those in the firm's wider value-creating network, with an explicit set of directions that provide purpose to all individuals involved with the business (Pearce and David, 1987). Often firms that do not have a mission statement may be unaware of the direction in which they are heading as they lack an overall aim toward which they are progressing (Bailey, 1996). The mission statement encapsulates the purpose of the firm, its *raison d'être* (Ireland and Hirc, 1992), and provides the firm with an effective tool to manage the complexity and uncertainty of the environment in which it operates (Ireland and Hirc, 1992). Moreover, the mission statement acts as an important means of communication with which the firm can establish and position itself clearly with its stakeholders (David, 1989). The wording of the mission statement is something which receives great managerial attention in some organizations, as businesses intend to engage employees and utilize the statement as a managerial device to instigate or prevent organizational change (Swales and Rogers, 1995).

The underlying assumption of firms undergoing the effort to (re)formulate a mission statement is, of course, an expectation that it will result in some form of measurable positive return for the firm in question. Yet research in this area has either shown no significant relationship between mission statement (re)formulation and planning, (David, 1989), a positive relationship in small and medium enterprises relationship between mission statement (re)formulation and planning (Taghi Alavi and Karami, 2009) and in large businesses (Pearce and David, 1987) or research provided inconsistent results (Bart, 1997). In a meta-analysis of 14 studies on this subject, Desmidt et al. (2011) were able to demonstrate that there is a small positive relationship between having a mission statement and a firm's financial performance. Others have examined the content and process of developing a mission statement. These studies tend to find that the actual content of the mission statement is more important than the mere presence of it in a firm (Bartkus et al., 2006; Braun et al., 2012). But there is conflicting evidence as to whether it is simply having a mission statement, or whether the content, the process by which the mission statement is formulated and how individuals feel about it, is what allows firm to achieve better financial returns than firms that do not have a mission statement, or have one that is lacking in content or process. I theorize that using digital communication and social technologies to involve more individuals in the mission statement (re)development process is related to better firm performance because it improves both the content of and commitment to the mission.

Digital communication and social technologies such as aggregating technologies enable firms to involve more individuals in the formulation of the mission statement, which in turn is related to a higher degree of identification with the mission statement on the part of those involved. Through the technologies' shared-control affordance, employees are able to contribute and add to previously posted ideas and comments. A classic example is a firm's internal forum where comments and posts are organized in "threads". This ensures that discussions are transparent and traceable (Stieger et al., 2012). Similarly, other aggregating technologies such as wikis can be used to develop a mission statement, or pool ideas about which direction the employees think the company should take in the future (Stadler et al., 2020). The advantage of aggregating technologies is that they work better in an asynchronous setting (Stieger et al., 2012). The benefit of asynchronous technologies is that they provide employees with a greater degree of flexibility about when they access the software to make their contributions. In any businesses, employees from different departments may be available at varying times during the day or week. Employees that work remotely, for instance on client sites or in manufacturing or other roles, may not regularly work on a computer or other device through which they can access the aggregating technology. But technologies that work asynchronously allow greater flexibility in terms of when the employees are able or chose to participate. Additionally, asynchronous technologies allow greater editability, that is, an employee can change and alter their contribution before it becomes visible to others. As Williams Jr et al. (2014) and Mullane (2002) suggest, one way to improve the effectiveness of the mission statement is through greater inclusion of different managerial levels, something that aggregating digital technologies can facilitate.

The mission statement also serves as a communication tool of the company's strategy (Klemm et al., 1991). As the value of the mission statement is not only derived from the content and way it is formulated (Braun et al., 2012) but also from the influence it has on the behavior of stakeholders (Bart, 1997), the inference one can draw from this is that a greater general awareness of the mission statement and its importance can also be beneficial in intensifying the business performance-enhancing effect of the mission statement. I theorize that aggregating technologies also enhance performance by increasing employees' and designated others' access to the mission statement and related information. For instance, companies may run a set of wiki-style pages containing information about the mission statement, its meaning and how it can be of relevance in the daily working life within the organization, and to outside stakeholders such as investors, suppliers and customers. I therefore expect that the positive effects of formulating and using a mission statement as part of a firm's SMP are reinforced through the use of aggregating technologies. Thus my first hypothesis states:

H1: The use of aggregating technologies for the (re)formulation of the mission statement is significantly associated with higher business performance.

4.2.3. External Environmental Scanning

The external environmental scanning stage of the SMP denotes the systematic scoping of the various factors, forces and components that exist outside the firm (Barringer and Bluedorn, 1999) to ensure the firm’s long-term survival (Lawrence, 1981). This stage is typically considered together with the internal scanning of the firm’s environment which I discuss in the following section (Tyran et al., 1992; Pettigrew, 1977; Platts and Gregory, 1990; David, 2011; Kaplan and Norton, 2008b). External scanning entails a focus on the realm exogenous to the firm, anything which is taking place that is outside the firm’s direct control (Culnan, 1983). For instance, macro-economic developments, consumer preferences, political and legislative changes, environmental components or wider technological shifts, but also the firm’s competitors’ pricing, promotion and products (Farh et al., 1984; Beal, 2000). The purpose of scanning the external environment is to detect anything that could either threaten the firm’s ability to operate profitably or something that would pose an opportunity which the firm could benefit from (Helms and Nixon, 2010).

External environmental scanning forms a vital component of the SMP. Previous work has found that firms which undertake external environmental scanning also have higher business performance (Boyd and Fulk, 1996; Daft et al., 1988) because such scanning aids them in the aligning of their strategy to the dynamics and forces within the environment in which they operate (Beal, 2000; Lang et al., 1997). Research has noted that higher performance also seems to be related to better and more extensive external environmental scanning. For example, Subramanian et al. (1993) found a positive relationship between external environmental scanning and business performance among US firms which implemented a more advanced environmental scanning system. I theorize that digital communication and social technologies help firms achieve better performance in the external scanning function by allowing strategy makers to compile relevant information about the external environment from the firm's employees and other stakeholders in a timely and cost-efficient manner and help overcome managerial biases in the scanning process.

There are several ways in which firms can enhance their external scanning process through the use of digital communication and social technologies. One of these improvements is to bring in more individuals, so gaining a more diverse set of insights and perspectives. Using aggregating technologies can help the firm to achieve this objective. Intuitively, it may seem rational to involve individuals from throughout the company and maybe even core suppliers and customers instead of relying on the assessment and insights of a few experts or strategy makers to deliver the required and accurate information based on which the strategy is developed. Several other departments in businesses, such as HR (Lauzen, 1995), also engage in external scanning and may produce information relevant for strategy makers. Yet such involvement would be costly and time-consuming if businesses were to undertake this using, for instance, a process of meetings and reports. Thus, it may not be surprising that Hambrick (1982) uncovered that top executives tend to focus only on their own personal network instead of utilizing the existing knowledge networks within their firms. I suggest that through the use of aggregating technologies (Denyer et al., 2011), companies can more cost-effectively and quickly tap into the expertise and insights that exists across the managerial levels (Whittington et al., 2011). Internal aggregating platforms can further act as a "digital memory" through which the various materials and content can be shared (Razmerita et al., 2014). Aggregating technologies could thus play an important role in the firm's knowledge management systems (Davenport, 2000) and allow a firm to successfully capture external trends by maintaining a database with all trends and factors that are relevant for the company and the industry it is in.

The second way that using aggregating technologies in the external scanning process can lead to improved performance is by reducing managerial and cognitive biases. For instance, managers often suffer from the perception that any scanning they perform leads necessarily to a reduction in uncertainty the business faces; or they fail to recognize a looming issue from their company's perspective and so overlook some vital trends or factors that exist in the external environment (Barringer and Bluedorn, 1999; Ketokivi and Castañer, 2004). Additionally, as human individuals, strategy makers also have a natural limit as to how much information they can process: the amount of data available about the external environment is beyond what a small number of individuals can capture and interpret (Garg et al., 2003). With aggregating technologies, businesses are able to set up a platform through which all employees can participate in this process and contribute any information they possess about the external environment. This resonates with earlier work in the field that found that this mechanism of dispersing the external scanning task is linked to higher business performance and reduces the occurrence of biases (Stieger et al., 2012; Yasai-Ardekani and Nystrom, 1996). Surowiecki (2014) argues as well that a larger number of individuals bringing information can prove to be smarter, solve problems and might even be better at making forecasts about future developments, which are essential activities for SMP-related tasks such as environmental scanning (Stieger et al., 2012). This would then help to address the cognitive limitations and biases that can influence the external environmental scanning when this process is left to strategy makers or top management only. Nevertheless, one question that arises from this is to what extent this information is processed and passed on to relevant people within the organization, as the same factor of the natural cognitive limit to the quantity of novel information that strategy makers can absorb and mentally process is again relevant here. Indeed, Haefliger et al. (2011) point out that the Internet as well as social software raise the risk of strategically important information becoming available to individuals both inside and outside the organization, potentially in great abundance. But with a specific type of digital technology — that is, aggregating technologies — that problem could be mitigated through the establishing of roles such as facilitators who summarize and review the information posted on the aggregation technology for top management (Stieger et al., 2012). As this dispersion of tasks and limiting of biases is also linked to a higher business performance (Boyd and Fulk, 1996; Daft et al., 1988; Jain, 1984; Subramanian et al., 1993), I hypothesize:

H2: The use of aggregating technologies for external environmental scanning is significantly associated with a higher relative business performance.

4.2.4. Internal Environmental Scanning

Internal scanning focuses on the environment which exists inside the firm and is thus concerned with examining issues within the direct control of the firm (Hambrick, 1982). These could be, for instance, patented technologies, specialized assets, a responsive supply chain or possessing a diversified portfolio of different products, services, or R&D resources (Beal, 2000). Internal scanning allows the firm to detect strengths and weaknesses it possesses through which it can defend itself from threats or capitalize on opportunities (Helms and Nixon, 2010). Alongside external environmental scanning, internal environmental scanning forms a vital component of the SMP as previous work has found that firms which undertake both internal and external environmental scanning also have higher business performance (Boyd and Fulk, 1996; Daft et al., 1988). Moreover, internal scanning allows the strategy makers to understand the current setup of their firm, comprised of a mixture of different resources and capabilities (Barney, 1991). This allows the strategy makers to then identify the fit, or lack thereof, between the external environment and the internal environment (Miller, 1992), allowing the firm to identify the appropriate course of action in the next step which enables the firm to place itself in a competitively advantageous position.

Internal scanning is an important activity as part of the strategy process (Garg et al., 2003). Previous studies have highlighted its association with a higher business performance (Boyd and Fulk, 1996; Daft et al., 1988). The reason for this is that it is important for directors, strategy makers and senior managers to be aware of their firm's capabilities in order to be successful in matching the internal strengths of the company with the opportunities in the external environment (Garg et al., 2003). Internal scanning also allows the company to identify what resources within the company are relevant for the creation of value to its customers (Sirmon et al., 2007). I theorize that by using digital communication and social technologies to perform internal environmental scanning companies are able to perform this process better which in turn leads to a higher performance.

One of the core challenges with internal scanning is to mitigate the occurrence of cognitive biases that can occur if the scanning is left up to a small group of managers and strategy makers (Barringer and Bluedorn, 1999). Particularly when it comes to identifying strengths and weaknesses, individuals are more likely to fall into over-confidence and over-optimism, crediting themselves with a greater ability to manage certain situations than they actually have, or having a false sense of control over factors which actually lie beyond their control (Kahneman et al., 1982). Thus there could be a real risk that strategy makers and managers may lose touch with what is actually taking place inside their business, something which has led to many failures and collapses in the past (Pendell, 2018). Aggregating technologies allow businesses to collate and store information about knowledge, expertise, skills and resources in an accessible manner (Majchrzak et al., 2013). Through co-creation of knowledge while also allowing peer-feedback and approval (Arazy and Gellatly, 2012), aggregating technologies also represent a valuable means to reduce the occurrence of cognitive biases (Stieger et al., 2012). Additionally, aggregating technologies in corporate environments can be set up with restrictions and limits imposed so that, for instance, certain sections are only accessible to a certain group of individuals within the firm (Arazy and Gellatly, 2012). Thus an aggregating technology can be a platform through which strategy makers can inform themselves about their business and deepen their insights into what is happening in their business (Arazy and Gellatly, 2012). For instance, employees can provide updates on the progress of certain development projects or offer insights into the skills that a department has developed or successes it has experienced in certain areas. Equally, strategy makers can identify weaknesses — for instance, when problems or issues are reported by means of the platform.

Another challenge associated with internal scanning is how best to transmit information to the individuals that need it for the formulation of the business strategy (Baum and Wally, 2003; Alexander, 1985). In most businesses, there appears to be an over-reliance on the more traditional means of communication such as corresponding technologies — for example, email, despite its limitations: in particular, that individuals often feel overwhelmed by the amount of emails they receive and subsequently may miss some vital information (Reinke and Chamorro-Premuzic, 2014). Additionally, face-to-face meetings may not always represent the most effective form of information sharing and convergence (Dennis et al., 2008). Given the widespread use of email in the modern business world (Chui et al., 2012), using email alone cannot sufficiently explain differences in business performance as they do not represent a rare resource, according to the resource-based view (Barney, 1991). I therefore theorize that for internal environmental scanning aggregating technologies enhance the effectiveness of this process, and thus positively impact business performance. As in the cases of mission statement (re)formulation and external scanning, the advantage of using aggregating technologies at this particular stage of the SMP is the value that can be derived from a great number of individuals contributing to the process. The asynchronous nature of aggregating technologies enables them to meet the various communicative needs of employees within a given company (Lines, 2005). Aggregating technologies can thus allow strategy makers and top management to collate vital information about their organization which can be used in assessing the firm's strengths and weaknesses, by easily accommodating multiple individuals to access the technology and to participate, due to its shared-control affordance. Research into the corporate use of aggregating technologies, such as wikis, has highlighted that aggregating technologies can also remain engaging over a longer period of time, maintaining a consistent level of participation from employees (Treem and Leonardi, 2013). Given the importance of internal scanning to the SMP (Garg et al., 2003) and the association with higher performance, I suggest that there is potential for aggregating technologies to improve the efficiency of the process, I hypothesize that:

H3: The use of aggregating technologies for internal environmental scanning is significantly associated with a higher relative business performance.

4.2.5. Generation and Evaluation of Strategic Options and Alternatives

After they have established a mission and scanned the external and internal environments, businesses then typically develop a set of different strategic options they can pursue (Tyran et al., 1992; Pettigrew, 1977; Platts and Gregory, 1990; David, 2011; Kaplan and Norton, 2008b). This stage allows strategy makers to consider the various options available to them to set out the course of direction for their company, navigating the growing complexity and uncertainty that exists in many industries today (Bracker, 1980). Based on the outputs of the previous three stages, this stage allows the strategy makers to generate various strategic options and to make a decision, following a common pathway in strategic management (Wooldridge and Floyd, 1990). The feasibility of the strategic options that are available to the firm depend on internal conditions and factors in the external environment in which the firm operates (Miller and Friesen, 1978; Sirmon et al., 2007). Generating and evaluating the different strategic options also involves the actual making of a strategic decision, which represents a commitment of the firm's resources such as cash, work-power or entering into contractual obligations (Robert Mitchell et al., 2011).

Unlike the previous stages, generating and evaluating different strategic options marks the point at which the future set of actions for the company are outlined and decided (Harrison, 1996). As decisions are undertaken by businesses, irrespective of size, the literature on this stage of the SMP is not so much concerned with whether making strategic decisions is beneficial for performance, but with the potential factors that influence this process. The literature has identified two traditional ways in which strategic decisions are made: firstly, based on rational choice after following a set and organized process; and secondly, based on the bargaining and debating of different stakeholders and individuals with special interests within the business (Tyran et al., 1992). Inherently, both of these approaches come with two problems. As human individuals, we are limited in the way in which we can act rationally, as our minds and thinking are influenced by various biases (Kahneman et al., 1982). Additionally, as in most larger companies and businesses vital strategic decisions are made in a group, disagreement and conflict can also lead firms to settle on compromises which may not represent the best strategic choice. I theorize that by using digital communication and social technologies for generating and evaluating different strategic options strategy makers can both avoid certain cognitive biases in their strategy process and facilitate the building of consensus among core decision makers; they are thus able to perform this process better which in turn leads to a higher performance.

As human decisions are generally influenced by social and emotional processes, the dynamics and pressures which occur in a social context can especially foster certain behaviors that decrease forecast accuracy (Olsen, 2010) such as herding behavior (Pons-Novell, 2003; Rülke et al., 2016). This is particularly noticeable in situations which are stressful and demanding (Soll et al., 2015). Individuals engage in herding behavior as it provides some psychological benefit to them through means of confirmation from other individuals as well as becoming part of a group which would be wrong collectively (Landberg, 2003; Olsen, 2010). Herding occurs when social pressures or incentives lead individuals to follow the actions of others instead of relying on their own personal assessment of a situation (Salamouris and Gulnur Muradoglu, 2010). As herding as a cognitive bias only occurs in social contexts (Forbes, 2009), I theorize that those firms that use digital communication and social technologies which are low in interactivity and synchronicity — that is, corresponding technologies — are able to enhance the effectiveness of this stage of the SMP. Since corresponding technologies such as email limit the control and exposure of information being transmitted between individuals, there is less risk of herding occurring as individuals can submit their decisions and perspectives without being exposed to those of others. Additionally, Dobusch and Kapeller (2018) observed that in the open strategizing process of Wikimedia the important stage of making of strategic decisions also involved the least number of other individuals. Consequently, I theorize that firms which use corresponding technologies for generating and evaluating the different strategic options and deciding on one, perform better.

Apart from preventing cognitive biases, one other element with which technology use can help is the building of consensus among strategy makers. Extant work looking into this stage of the SMP has highlighted the importance of consensus among those making the final strategic decision by choosing one from among the various strategic options available. Strategic consensus denotes the degree of agreement over a set commitment of resources or objectives (Boyer and McDermott, 1999; Kellermanns et al., 2005). Scholars have been able to establish a link between consensus and subsequent firm performance (Dess, 1987; Hrebiniak and Snow, 1982; Welsh and Slusher, 1986; Wooldridge and Floyd, 1990) and have identified several factors which contribute to the building of consensus in the strategy process. Two key factors were, firstly, following a structured SMP (St. John and Rue, 1991) and, secondly, increasing the level and flow of communication (Rapert et al., 2002). I theorize that these two factors can be achieved through the use of corresponding technologies and that, subsequently, the firm will be in a position to enhance the effectiveness of this stage of the SMP. Corresponding technologies, through their single control, allow for a more structured approach to communicating and involving others. For instance, emails are usually sent to a select number of individuals and do not allow much collaboration to take place, but rather facilitate an exchange of ideas, passing back and forth information and content. As such, corresponding technologies allow strategy makers to build consensus, which then in turn increases the effectiveness of the SMP and thus drives firm performance. Resultantly, I hypothesize that:

H4: The use of corresponding technologies for the generation and evaluation of strategic options is significantly associated with a higher relative business performance.

4.2.6. Strategy Implementation

Once a firm has set out its objectives and its plan of the strategic actions it would like to pursue, it progresses to the strategy implementation stage of the SMP in which the firm executes the strategy that was decided on in the previous stage (Cohen and Cyert, 1973). Strategy implementation is the stage at which the strategy changes from a mere plan into concrete actions and behaviors such as product research or acquisition of new assets such as buildings or shares (Adobor, 2019) or providing a novel service for customers (Kaplan and Norton, 2008b). For business practitioners, the implementation, or execution, of the business strategy is more important than having formulated a successful strategy as this stage is practical rather than hypothetical in nature with real-world results becoming apparent over time to the company's stakeholders (Olson et al., 2005). Several scholars regard strategy implementation to be fundamentally linked to the internal structures and organization of the company, rather than external factors (Venkatraman and Camillus, 1984). Such internal structures and organization include the internal systems (Chandler, 1962 (1975 printing)), the management system (Lorange and Vancil, 1977) and the company's reward system (Stonich, 1981). Indeed, empirical work has highlighted that successful strategy implementation is supported by aligning the structure of the organization, such as employee training, to that of the company's strategy (Olson et al., 2005).

Since the 1980s, scholarly activity has uncovered a wide variety of mechanisms and factors that firms can implement in their strategy execution in order to improve the effectiveness of this stage and ultimately implement the intended strategy more successfully (Alexander, 1985; Hutzschenreuter and Kleindienst, 2006; Lehner, 2004). For instance, work by Ketokivi and Castañer (2004) determined that companies that develop a strong sense of commitment to the strategy among their employees can drive goal convergence — that is, aligning the employees' individual ambitions and goals with that of the strategy for the company (Hautz, 2017). This goal convergence supports the company in its effort to align the company's strategic direction and the participation of the employees in this process. As such, it is important that the strategy is effectively communicated across the organization. Additionally, another problem that can prevent successful strategy implementation is resistance stemming from various managerial levels, in particular middle management (Guth and Macmillan, 1986). I theorize that by using digital communication and social technologies in the implementation of the business strategy, companies can successfully address the issue of aligning their employees with the strategy and mitigate some of the issues around resistance, so improving the effectiveness of their strategy implementation and ultimately increasing their business performance.

In his early work, Alexander (1985) identified several inhibitors that could prevent the successful implementation of a firm's strategy: insufficient definition and concretization of the actions required for implementation; a lack of communication from the top management of the firm about the problems which require strategic attention; changes in the business for which role and task lists were not clearly set out; failure to actively involve in the implementation stage those involved in the previous stages of the SMP; and finally, problems arising during the implementation were not anticipated during formulation. Several of these issues can be attributed to inadequate communication that leaves individuals in the organization potentially confused, unsure or relying on their own interpretation — especially when strategy documents are issued to them written in "corporate" language which may not be readily understandable to everybody in the organization. Matzler et al. (2014) highlighted that a lack of understanding of the strategy within companies contributes to a poor performance in the implementation stage. Therefore, I theorize that firms which use broadcasting technologies at this stage of the SMP are able to address these communication issues as they allow strategy makers to more effectively communicate their strategy throughout the organization. Broadcasting technologies with their wide reach and easy accessibility can be used to communicate and disseminate the strategy throughout the company (Choudhury et al., 2019). Through broadcasting technologies, strategy makers and top management can use various platforms that allow them to articulate and detail the various aspects of the business strategy to a potentially infinite number of individuals to enhance the effectiveness of this stage (Alexander, 1985). For instance, by using webinars or live-streams, company directors can present the strategy and detail the changes it requires while also allowing audience members some sort of participation by, for instance, posting questions on a virtual question board. Broadcasting technologies can also accommodate the use of analytical tools such as audience engagement, potentially allowing strategy makers to obtain further data on the understanding of the strategy (Chrąchol-Barczyk, 2018). This is particularly useful as strategy makers may suffer under the biased assumption that the quality of their strategy-related communications is actually higher than it is in reality (Shimizu, 2017).

Another issue that is frequently raised regarding strategy implementation is the resistance from employees to the new, imposed strategy, in particular from middle management. Middle managers could insist on alternative options to the ones selected or simply resist the strategic choice that has been made (Guth and Macmillan, 1986). In order to overcome resistance to change or strategic actions, leadership and so-called change agents play a vital role; companies without designated change leaders face significantly more resistance (Lines et al., 2015). Additionally, the facilitation of the change process is an important factor in managing any potential resistance (Dent and Goldberg, 1999). I theorize that broadcasting technologies serve an important function as they, as a key communication tool, allow a designated individual or leadership team to act as a visible agent of change, communicating and facilitating the changes — for instance, through regular livestreams and updates on the progress that has been made. This can transmit a stronger sense of agency and autonomy in how the strategy is implemented, signaling a stronger sense of leadership to all stakeholders involved, instead of relying only on written updates. Resultantly, I theorize that broadcasting technologies with their live broadcasting function have a stronger appeal to individuals than asynchronous communication platforms, such as email, in transmitting a sense of leadership. Therefore, I expect firms that are using broadcasting technologies to be more efficient in the implementation of their strategy and thus perform better. Hence I hypothesize:

H5: The use of broadcasting technologies for the implementation of the strategy is significantly associated with a higher relative business performance.

4.2.7. Strategy Control and Evaluation

The final stage of the SMP includes any actions and activities associated with the subsequent review and evaluation of the formulated and implemented strategy (Tyran et al., 1992; Pettigrew, 1977; Platts and Gregory, 1990; David, 2011; Kaplan and Norton, 2008b). With "evaluation" I refer to the formal process in which the firm establishes channels and procedures to assess the extent to which the implementation of the strategy and the resultant outcomes have been successful in achieving the strategic objectives and the firm's mission. Additionally, in this stage I include any activities associated with the control of the strategy — that is, the means and mechanisms through which the strategy makers ensure that the outcomes of the strategy are as originally intended, controlling the implementation and course of action (Tyran et al., 1992; Wolf and Floyd, 2017; Lorange and Vancil, 1977). As strategy control mechanisms are also described as evaluation tools, I combine these two items into one stage of the SMP. With strategic control systems in place, companies can monitor several aspects, such as the progress on projects, financial figures, revenue for specific products or brands, industry data and press coverage, and an HR-related control system to monitor individual performance and support career development (Simons, 1991).

In most cases, businesses have several control measures in place to monitor their strategy implementation (Miller, 1987). Previous research has shown that greater and more proactive control and evaluation of the SMP contribute to the firm's achievement of its strategic objectives (Ittner and Larcker, 1997) and thus put the firm in a position in which it can achieve a higher business performance. Means to control the strategy range from simple financial or performance targets (Daft and Macintosh, 1984), establishing control of work activities (Miller, 1987) to setting up behavioral and outcome controls (Govindarajan and Fisher, 1990). On the one hand, in a study of computer and automobile companies Ittner and Larcker (1997) found that providing excessively detailed actions and plans and thus trying to control too much can potentially result in a negative impact on firm performance. On the other hand, evaluations based more on measures of quality such as the level of service provided were found to be more positively associated with a better firm performance (Ittner and Larcker, 1997), as managerial control systems can allow firms to interactively respond to any sudden developments and changes in regard to the strategy (Simons, 1991). Additionally, managerial control systems foster the development of future strategic ideas and initiatives (Marginson, 2002). Thus firms which are able to optimize their control systems, moving beyond simple targets, but also overly rigorous methods, are in a better position to enhance the effectiveness of this stage of the SMP. I theorize that using digital communication and social technologies to establish control systems that allow a high amount of quality measurement while not mandating strict prescription about how to implement the strategy allows firms to perform this stage more efficiently.

Strategic control measures also act as a means to motivate employees (Daft and Macintosh, 1984). One way in which firms can do this is to shift some of the strategic control from top management to those responsible for setting and maintaining the technologies that are used for the SMP overall (Hautz et al., 2017). If strategy makers use technologies that facilitate the sharing of control, such as collaborating technologies, firms can successfully delegate strategic control. In particular, businesses with more complex value chains do not have to rely on managing the trade-offs of the various control mechanisms, but can actively delegate control so that one individual or manager does not have to take responsibility for a complicated system of several control mechanisms and measures (Simons, 1991). Additionally, as collaborating technologies function in real time, they allow instantaneous updates of information which can be useful for monitoring data and enable strategy makers and those to whom control has been delegated to make better-informed decisions. Collaborating technologies can provide a useful platform to which multiple individuals can provide relevant information and other input, or compile and work on reports and inputs simultaneously, which allows strategy makers to monitor the unfolding and progression of the strategy that they have set out. I theorize that firms which use collaborating technologies for the strategy control and evaluation stage of the SMP are thus able to achieve a higher performance. As strategic control measures are typically non-financial in nature (Bungay and Goold, 1991), firms need to set up a system that is separate to their accounting and sales software, or runs in conjunction with the these. For this purpose, collaborating technologies can be used in a multitude of ways — for instance, to facilitate video conferences, for multi-user document editing and general team collaboration. This allows strategy makers to engage with a greater number of employees throughout the firm and, through this process, collate data and information that can subsequently be used to detail the various strategic control systems, so enhancing this process (Simons, 1995), and thus improve business performance.

Strategy control systems are not just used to monitor, for instance, the quality of a manufacturing output or the expansion of market share (Bungay and Goold, 1991), but they can also play a vital role in controlling the behavior of the individuals within a company. Behavioral control measures refer to mechanisms that firms use to ascertain the methods which individuals use in performing their assigned tasks and role (Piercy et al., 2003). Govindarajan and Fisher (1990) describe how a firm uses behavioral measures that assess the quality of the interaction of the firm's managers with customers. Measuring such interactions can be enhanced by the use of collaborating technologies, for instance through customer surveys or colleagues providing peer-feedback on each other, that they feed into a central, shared-control system. With their shared-control functionality, collaborating technologies can also be used for colleagues to exchange feedback or share examples of best-practice. As such, behavioral controls allow managers to ensure that the individual actions and the behaviors of individual employees help the company overall to achieve its set strategic action (Tannenbaum, 2013). Behavioral controls also provide stability and can ultimately result in routinization which increases predictability and thus they enhance the process of planning future strategic actions (Liao, 2005). Collaborating technologies can help firms to achieve this as they can provide a current "picture" of the behavioral control measures of the employees for the strategy makers. Monitoring individual members of staff, especially in large international companies, is a very complex undertaking, but collaborating technologies can simplify this process as they are more accessible and open than, for instance, corresponding technologies. As they are, unlike aggregating technologies, also functioning in real time, new measures and behavioral guidelines can be updated instantaneously and feedback can be provided more easily than with other types of digital communication technologies. As this allows businesses to increase their planning process and also helps to align the employees' behavior to that of the company's organizational control, I theorize that firms that use collaborating technologies for this stage of the SMP will perform better. Hence I hypothesize:

H6: The use of collaborating technologies for the control and evaluation of the strategy is significantly associated with a higher relative business performance.

4.3. Methodology

To test my hypotheses, I conducted an online survey among British and German manufacturing businesses. The UK and Germany represent suitable locations to test my ideas in a comparative manner as they are representative of different business cultures, with Germany being representative of other continental European countries (Berg et al., 2018). German companies also tend to be more inclusive with their customers and suppliers in the strategic planning process (Ittner and Larcker, 1997). Furthermore, these two countries differ in their level of digitalization, with the UK slightly less advanced than Germany according to the Euler Hermes Digitalization Index 2019 (Dib, 2019).

The data for the British sample came from a survey of 1,280 firms taken from a database of manufacturing businesses in the UK purchased from a private provider. I conducted an online data collection in January 2020. After three rounds of reminders I received a total of 163 usable responses, giving me a response rate of 11.4%. Data for the German sample came from a survey of 1,187 active manufacturing firms according to the German industry classification (Industry Sector C) and with at least 100 employees, taken from the Amadeus Database. The data was collected online in March 2020 but the process only resulted in 76 responses (a response rate of 9.8%) as the collection effort was terminated after the first round when the COVID-19 pandemic required businesses to focus all their attention on crisis management. This resulted in a total sample of 239 completed questionnaires.

The responses I received from British firms were made by CEOs or equivalent (14.1%), CSOs (0.6%), CFOs (27.6%) or other executive directors (23.9%), senior managers (20.3%), middle managers (7.36%) and divisional managers (3.1%). Marketing directors, data protection officers or senior finance directors completed the remaining 3.1%.

The responses I received from German firms were made by CEOs or equivalent (38.16%), CFOs (4%) or other executive directors (14.47%), senior managers (14.47%), middle managers (6.58%) and divisional managers (14.47%). IT directors and executive assistants completed the remaining 7.89%.

On average, the British firms in my sample operated in 13.61 countries, including their home country, and had 46.8 physical locations such as offices, factories, warehouses or stores. At the time of data collection, the mean age of the British firms was 59 years with a mean number of 5,668.76 employees worldwide. The German firms in my sample operated on average in 14.51 countries, including their home country, and had 49.71 physical locations such as offices, factories, warehouses or stores. At the time of data collection, the mean age of my German firms was 81 years with a mean number of 7,934.7 employees worldwide.

4.3.1. Dependent and Independent Variables

For this study the dependent variable is business performance which I measure through a combination of subjective and objective performance indicators. I use the subjective constructs developed by Brouthers et al. (2000). Respondents were asked for the level of satisfaction on a ten-point scale for eight different performance indicators (sales level, sales growth, market share, profitability, reputation, market access, marketing and distribution). Using subjective performance indicators follows the general trend in the IB literature (Hult et al., 2008). These scales loaded onto two factors which possess a Cronbach alpha of .8442 and .7481 respectively. For our objective performance indicators we use the return on assets (ROA) obtained through secondary databases from Bureau van Dijk Financial Information Made Easy (FAME) for the UK and Amadeus for Germany (Dess and Robinson, 1984; Menz and Barnbeck, 2017).

To measure my independent variables on technology use I asked how frequently the strategy makers use each of the four types of technology, corresponding, broadcasting, aggregating and collaborating, for each of the six stages of the SMP. These were single scale items measured on a seven-point scale ranging from "never" to "always".

4.3.2. Control Variables

I controlled for a number of variables that past research has indicated as influences on firm performance (Baum and Wally, 2003; Dean and Sharfman, 1996; Dyson and Foster, 1982; Menz and Barnbeck, 2017). First, I examined issues related to the firm's external environment. Research indicates that external factors impact firm performance. Dynamism, for instance, measures the amount and force of change in a company's respective industry (Miller and Lin, 2015). Subsequently, firms that are operating in highly dynamic environments may suffer some shortfalls with their performance, while at the same time being in a position in which they can drive their organizational learning through trial and error, for instance through the use of strategic pivots (Pillai et al., 2020). The scale for dynamism was adopted from Baum and Wally (2003) and loaded onto two factors. I selected the first factor with a higher loading and an alpha of 0.7260. Munificence indicates the extent of opportunities to expand and grow within the firm's external environment (Baum and

Wally, 2003; Dess and Beard, 1984). As such, munificence is characterized as distinctive as it is a specific construct that can be used to explain difference in firm performance across different industries (Rajagopalan et al., 1993). As my sample consists of manufacturing firms located in different industries, I controlled for this to explain differences in business performance (Goll and Rasheed, 1997; Goll and Rasheed, 2005; McArthur and Nystrom, 1991). The scale for munificence was adopted from Baum and Wally (2003) and loaded onto two factors. I selected the first factor with a higher loading and an alpha of 0.6814 as the other factor is less reliable (alpha = 0.5525) and has only two items rather than three that go above the 0.6 cutoff point.

I also controlled for issues related to internal processes that impact a firm's ability to create a competitive advantage and gain superior performance. Rationality in strategic decision making indicates the degree to which strategic decisions are made based on analytical methods. The scale for rationality in strategic decision making was adopted from Dean and Sharfman (1996) and loaded onto one factor with an alpha of 0.7721. Political behavior in the SMP indicates the extent to which strategy makers make decisions considering their personal goals or that of the company. The scale for political behavior in the SMP was adopted from Dean and Sharfman (1996) and loaded onto two factors. As the loadings for these factors were all below the 0.6 cut-off, I decided to measure political behavior with a single measure as outlined in Chapter 3. Participation intention indicates the extent to which the strategy makers of a company are willing to include other individuals in the SMP.

Participating in strategic management can either mean that an individual within a business is becoming part of the SMP or gains a share of — that is, responsibility for, the complete SMP. This means that any open strategy process is to a great extent built upon an exchange of communication between individuals, whether that is through face-to-face contacts or through the use of technologies that facilitate such an exchange. Furthermore, some of the earlier literature on middle management involvement has already noted that the inclusion of middle managers in the early stages of the SMP can reduce the risk of subsequent failure in the implementation stages of the strategy (Wooldridge et al., 2008). Hence, I expect there to be a direct link between top managers' intention to include more individuals in the SMP and the use of different types of digital communication and social technologies in the various stages of the SMP. In their study of participation in and the effectiveness of strategic planning, Dyson and Foster (1982) found that measuring participation in the SMP in a simple way allowed them to detect meaningful results. Therefore, an adapted version of their scale was used for this study as a control variable. The scale to measure this was taken from Dyson and Foster (1982) and loaded onto one factor with an alpha of 0.8186.

Furthermore, I controlled for firm size measured using the number of employees as a proxy (Calof, 1994). Moreover, I included a control variable for the two different countries using a dichotomous variable (0 = UK; 1= Germany).

4.3.3. Common-Method Variance and Non-Response Bias

To avoid common-method variance and to increase the internal validity of findings, especially over time, objective business performance indicators are preferable to subjective business performance indicators. However, objective business performance indicators such as the ROA and turnover are not always available for each firm, depending on the rules regarding disclosure of financial information. Consequently, it is common practice to use subjective performance indicators instead (Dess and Beard, 1984; Tippins and Sohi, 2003), which have been found to be consistently positively correlated with objective performance indicators (Brouthers et al., 2000; Dess and Robinson, 1984). However, as I was able to obtain objective financial information from some of my companies, I included these as a control variable as well. In particular, I used the mean ROA of the previous six years, which is a commonly used performance indicator (Menz and Barnbeck, 2017; Li and Richard Ye, 1999). For 32 observations I was unable to obtain the ROA, so these were excluded from further analysis.

When using different measures, particularly as part of a cross-sectional research design and using only one participant in one company, there is a risk of common measurement biases (Podsakoff et al., 2003). There are several ways of dealing with this issue, the first of which is to combine primary resources and supplement them with data from secondary databases (Rindfleisch et al., 2008; Podsakoff et al., 2003). The results of the confirmatory factor analysis (CFA) in Chapter 3 showed that I limited the effect of common-method variance bias by merging my primary dataset with secondary data. The second way of avoiding measurement biases is to design a research model that exhibits some level of complexity instead of simple linear relationships between the predictors and outcome variables (Chang et al., 2010). Resultantly, due to the level of complexity in my model, I am able to lessen the effect of common-method bias. Additionally, I followed Podsakoff et al.'s (2003) guidelines for questionnaire design by measuring the constructs for the independent and dependent variables at different sections of the questionnaire.

I examined non-response bias by comparing the means of the questions from those participants that responded to those that did not respond at all (Whitehead et al., 1993) using the secondary data I had available, thus comparing the sample with the wider population from which the sample was drawn. I computed the sample and population means for the number of subsidiaries, the companies in the corporate group at the last reported year, the mean numbers of employees for the past six years available and the ROA for the past six years available. I then performed a two-sample t-test with unequal variances to compare the sample with the population mean and to determine if they were significantly different. The size of my population is n = 1,059 for the UK as the secondary data could not be found for 58 companies on FAME; and n = 1,007 for Germany as I could not find financial information for 104 firms. Not all firms in both my sample and the population had all financial data available and so those with missing data were excluded from the analysis. For the UK sample, the means for the four variables were not significantly different from each other except for one: the number of subsidiaries [t = 1.4122, p = .0799], the number of companies in the firm's corporate group [t = -1.2673, p = .1026], the number of employees [t = 1.0771, p = .1416], the difference of the mean of the ROA between the sample and the population [t = 3.0947, p = .0010]. The sample has a mean ROA of 5.924006% and the population one of 2.381521%, meaning that the firms which responded were on average performing better. However, as this is only one of our four variables that I used to compare the sample with the non-responding population in the British sample, there is not a great indication for non-response bias.

For the German sample, the mean of the sample and the population was significantly different for the number of subsidiaries [t=1.3295, p=.0937]. However the means were not significantly different for the number firms in the corporate group [t=1.0900, p=.1395], nor the number of employees [t=.8674, p=.1940], nor the ROA [t=.4600, p=.3234]. Hence in the German sample there is no great indication of a non-response bias as only one of the four variables were significantly different.

4.4. Analysis of Empirical Results

4.4.1. Preliminary Tests

Before the main analysis I tested the reliability and validity of my measures through CFA and Cronbach's alpha (see Chapter 3). Even though one multi-item control variable (political behavior) was found not to be reliable, a single item measure of this construct was used; the other independent, control and dependent variables provided reliable measures.

To ensure the assumptions of parametric statistical analysis such as normality of distribution were kept, normality testing was conducted for all variables and was found to be within acceptable boundaries. To do this I considered some key descriptive statistics (mean, median, skewness and kurtosis) and plotted the distribution of the values for the variables in a histogram, boxplot, Q–Q plot and P–P plot. Additionally, I computed the skewness and kurtosis tests for normality, the Shapiro–Wilk W test for normal data and the Shapiro–Francis W test for normal data. It was noted, though, that for some of the continuous measures (ROA, mean of previous six years, firm age, percentage or turnover spent on research and development, and the number of employees for the previous six years) the normality of the data distribution could be enhanced by computing the natural logarithm. For this I considered the distribution using k-density plots prior to and after the log transformation.

For certain variables, such as firm age, R&D spending and the mean number of employees in the previous six years, there was missing data as the actual observation for some firms is 0. Therefore, I performed a linear interpolation for these variables to compensate for the missing data (Kohn and Ansley, 1986). Similarly, I performed a linear interpolation for the 26 missing values (11% of total sample n) of the employee numbers as these were not reported for all firms in the databases. The measures for dynamism were averaged into a composite variable following the CFA. While I had originally intended to control for industry category, the small sample size mandated a reduction of the categories, hence I classed the first six primary industry categories of the UK SIC and German Industry Categorization System into one ("All Manufacturing") and the following 15 into another

("All Service"). In cases where the respondents indicated that they belonged to none of the 21 industry categories, I assigned those into a third category ("Other").

4.4.2. Descriptive Statistics

By using descriptive statistics I am also able to provide an overview which of the four types of digital communication technologies are currently used by British and German firms at what stage of the SMP. The following two tables (Tables 4-1 and 4-2) provide an overview of how many companies (displayed as percentage of the complete sample) are using a specific type of technology at each stage of the SMP as per my two-by-two classification (Figure 3-3). Additionally, I also display the number of different technology types firms use at each stage of the SMP. To distinguish between users and non-users of a technology at a given stage of the SMP, I classed all firms that indicate that they "never" or "rarely" use a specific type as a non-user, and those firms that stated "occasionally", "usually", "often", "most of the time" or "always" as user.

Table 4-1 Technology use by stage[1]

	Corresponding			**Broadcasting**			**Aggregating**			**Collaborating**		
	UK	Germany	Total	UK	Germany	Total	UK	Germany	Total	UK	Germany	Total
Mission Statement Formulation	87%	89%	88%	41%	55%	46%	44%	62%	49%	68%	78%	71%
External Scanning	90%	89%	90%	54%	46%	51%	58%	58%	58%	61%	66%	62%
Internal Scanning	93%	84%	90%	39%	34%	38%	53%	59%	55%	72%	68%	71%
Generation of Strategic Alternatives	90%	89%	90%	36%	38%	36%	47%	61%	51%	67%	72%	69%
Strategy Implementation	93%	89%	92%	49%	46%	48%	49%	58%	52%	69%	72%	70%
Strategy Control and Evaluation	90%	86%	88%	39%	38%	39%	50%	63%	54%	66%	74%	69%
Mean	90%	88%	90%	43%	43%	43%	50%	60%	53%	67%	72%	69%

[1] Figures indicate the percentage share of the sample dataset that either “occasionally”, “usually”, “often”, “most of the time” or “always” use the technology for a specific stage of the SMP

Table 4-2 Number of different types of technology used by stage[1]

	No technology			One type of technology			Two types of technology			Three types of technology					
	UK	Germany	Total	UK	Germany	Total	UK	Germany	Total	UK	Germany	Total	UK	Germany	Total
Mission Statement Formulation	7%	5%	6%	23%	8%	18%	18%	22%	19%	28%	26%	27%	25%	38%	29%
External Scanning	4%	8%	5%	20%	13%	18%	18%	21%	19%	22%	28%	24%	35%	30%	33%
Internal Scanning	3%	11%	5%	20%	16%	18%	21%	20%	21%	28%	25%	27%	28%	29%	28%
Generation of Strategic Alternatives	6%	8%	7%	21%	12%	18%	23%	25%	24%	25%	22%	24%	24%	33%	27%
Strategy Implementation	4%	5%	4%	17%	16%	17%	26%	22%	25%	23%	21%	22%	31%	36%	32%
Strategy Control and Evaluation	5%	8%	6%	22%	16%	20%	21%	14%	19%	26%	32%	28%	26%	30%	27%
Mean	5%	7%	6%	21%	13%	18%	21%	21%	21%	25%	26%	25%	28%	33%	29%

[1] Figures indicate the percentage share of the sample dataset that either “occasionally”, “usually”, “often”, “most of the time” or “always” use the technology for a specific stage of the SMP

The most widely used type of technology across both countries and the SMP are corresponding technologies for which a mean of 90% of the participants indicated that corresponding technologies are used for the different stages of the SMP. Corresponding technologies are signified by the individual control and low synchronicity, which means they provide a high degree of editability but also restriction in terms of whom is given access to the transmitted media or content. Corresponding technologies incorporate emails, which are a widely used communication technology. As such, the high usage across the SMP of corresponding technologies is not a surprising result and potentially reflects the highly dispersed use of emails in today's business.

The second most frequently used type of technology is collaborating technologies which includes technologies such as multi-user document editing and video calling. With a mean of 69% of companies in my sample using collaborating technologies across the SMP, it becomes clear that collaborating technologies are widely used among businesses. As collaborating technologies are newer than some corresponding technologies, it appears as if collaborating technologies rather supplement the use of corresponding technologies as opposed to replacing them.

Aggregating technologies are used by a mean of 53% across the SMP while broadcasting technologies are only used by a mean of 43% across the SMP. This demonstrates that collaborating technologies appear to play a much more important role in strategizing than these two types.

A mere 6% of companies in my sample indicated that they do not use any type of technologies across the SMP as opposed to 94% that use at least one technology. 76% of all companies in my sample use two or more types which provides some evidence for the fact that it is not uncommon for businesses to use different technologies for their strategizing. As such it can be noted that the SMP as a business process has also been digitalized.

There are also some noteworthy differences between the type of technologies that are used for specific stages in the UK as opposed to Germany. It appears that more German companies in my sample use shared-control technologies (Aggregating technologies mean: 60%; Collaborating technologies mean: 72%) than British companies (Aggregating technologies mean: 50%; Collaborating technologies mean: 67%). The following table (Table 4-3) displays the results of a two-sample t-test with unequal variances in order to determine whether this difference is statistically significant.

Table 4-3 T-Test difference in technology use British *versus* German companies

	Corresponding Technologies			Broadcasting Technologies			Aggregating Technologies			Collaborating Technologies		
	Δ	t	**p**	Δ	t	**p**	Δ	t	**p**	Δ	t	**p**
Mission Statement Formulation	-.024	-0.534	**0.594**	-.142	-2.046	**0.043**	-.183	-2.677	**0.008**	-.095	-1.577	**0.117**
External Scanning	.007	0.167	**0.867**	.0794	1.140	**0.256**	.004	0.056	**0.955**	.067	-0.756	**0.451**
Internal Scanning	.090	1.945	**0.054**	.0505	0.756	**0.451**	-.058	-0.846	**0.399**	.040	0.620	**0.537**
Generation of Strategic Alternatives	.007	0.167	**0.867**	-.026	-0.381	**0.704**	-.139	-2.023	**0.045**	-.055	-0.866	**0.388**
Strategy Implementation	.032	0.773	**0.441**	.030	0.434	**0.665**	-.088	-1.273	**0.205**	-.037	-0.578	**-0.579**
Strategy Control and Evaluation	.040	0.857	**0.393**	.011	0.163	**0.871**	-.129	-1.886	**0.061**	-.074	1.180	**0.240**

Given the results in table 4-3, I could determine a significant difference in technology use per stage between British and German firms for corresponding technology use for internal scanning at the $p < 0.1$ level, with more British than German firms using corresponding technologies. However, significantly more German firms use broadcasting technologies for mission statement formulation than British firms ($p < 0.05$). For aggregating technology use in two stages (mission statement formulation and generation and evaluation of strategic alternatives) I could detect a statistically significant difference ($p < 0.05$) between British and

German firms, with significantly more German firms using aggregating technologies than British firms. More German firms also appear to use aggregating technologies for the control and evaluation stage of the strategy than British firms ($p < 0.1$). Apart from these three stages, no other statistically significant difference between the two countries in my sample could be determined.

4.4.3. Hypothesis Testing

Tables 4-4 and 4-5 contain the descriptive statistics and correlations for the main variables used in the subsequent regression models for the sample dataset. Because technology adoption is endogenous (Zhu et al., 2006b; Rogers, 2003), I used an instrument variable (IV) regression to test my hypotheses. IV regression allows the identification of a causal relationship (Angrist and Imbens, 1995), while at the same time accounting for the individual choices made by the participants that can lead to a specific observation, such as the degree of political behavior in the strategy process, the use of analytical methods or the balance of personal interests versus organizational interests (Angrist and Imbens, 1995). As a result, an ordinary least squares (OLS) regression could have led to biased results (Semadeni et al., 2014). This also aligns with the technology adoption literature which has previously pointed out how certain external factors determine the degree of adoption of a focal technology (Zhu et al., 2003; Zhu et al., 2006b; Zhu et al., 2006a). Therefore, the technology use variables were set as instrumented variables in their models to test the hypotheses. IV regression is also becoming a frequently chosen method in strategy-related research (Stadler et al., 2018; Bednar, 2012; Quigley and Hambrick, 2012), in particular a two-stage Heckman regression which is appropriate to use in instances in which endogeneity arises as result of sample-selection biases (Certo et al., 2016). I followed the guidance for IV regressions outlined in Bascle (2008) for my analysis, using the `ivreg2` command in Stata

16. For the regression, the continuous variables were converted using the natural logarithm ($\ln x$) and linearly interpolated to minimize missing data.

Table 4-4 Descriptive Statistics Sample

	Variable	Mean	SE[a]	SD[a]
1	Qualitative performance indicators	6.047	.082767	1.27954
2	Quantitative performance indicators	4.932	.114392	1.76846
3	ROA of past six years[bc]	6.514	.7372	10.6059
4	Firm age in years[bc]	45.029	3.1541	38.7583
5	% of total revenue spent on R&D[b]	6.014	.6033	9.3273
6	Mean no. of employees of past six years[bc]	3160.1	1082.9	15915.9
7	Dynamism	2.663	.0847	1.3088
8	Munificence	2.820	.068717	1.06234
9	% of total sales made in foreign countries[bc]	43.477	2.1770	33.6965
10	No. of countries firm is operating in[b]	13.895	1.70903	26.4210
11	Strategy team size[bc]	184.251	167.318	2586.67
12	Aggregating technology use in mission statement formulation	1.808	.1063	1.6439
13	Aggregating technology use in external scanning	2.026	.1018	1.5743
14	Aggregating technology use in internal scanning	2.050	.1162	1.7957
15	Corresponding technology use in generating and evaluating strategic options	3.904	.1045	1.6150
16	Broadcasting technology use in strategy implementation	1.891	.1145	1.7695
17	Collaborating technology use in strategy control and evaluation	2.820	.1222	1.8890

[a] SE (Standard Error); SD (Standard Deviation)
N= 239, unconverted scales used for descriptive statistics
[b]The log was used to compute the correlation factor, but unconverted scales are used for the descriptive statistics
[c]Linear interpolation was performed on this variable after the natural logarithm was performed

Table 4-5 Correlation Matrix

	1 Qual Perf	2 Quant Perf	3[bc] ROA	4[bc] Firm Age	5[b] R&D Spen	6[bc] No Empl	7 Dynm	8 Muni	9[bc] For Sales	10[b] No of coun	11[bc] Str Team	12 Ag Miss	13 Ag Extl	14 Ag Intl	15 Corr Eval	16 Bro Impl	17 Coll Con
1	1																
2	0.6200**	1															
3[bc]	0.3029**	0.1320*	1														
4[bc]	-0.1081	-0.0853	-0.1239	1													
5[b]	0.0059	0.0835	0.1072	0.0961	1												
6[bc]	0.1254	0.0957	0.0179	0.2931**	-0.1322	1											
7	0.0062	0.0940	0.0748	-0.0465	0.2403**	0.0992	1										
8	0.2376*	0.2291**	0.0565	-0.1086	0.2053**	0.0972	0.1566*	1									
9[bc]	0.0407	0.0751	-0.0018	0.0437	0.1763*	0.2045**	-0.0123	0.2860**	1								
10[b]	0.1999**	0.1576*	0.0770	0.1165	0.1646*	0.4607**	0.1477*	0.3342**	0.4565**	1							
11[bc]	0.0412	0.0882	0.0177	0.1410*	0.1871**	0.2946**	0.2500**	0.1679**	0.0839	0.2926**	1						
12	0.0934	0.1302*	0.0595	0.1075	0.1728*	0.1512*	0.2659**	0.1838**	0.0379	0.2695**	0.1788**	1					
13	0.0482	0.1282*	0.0200	-0.0087	0.1347	0.1064	0.2957**	0.2322**	0.1638*	0.2858**	0.1928**	0.5312**	1				
14	0.0815	0.0790	0.0582	0.0321	0.1726*	0.1973**	0.3171**	0.2500**	0.1121	0.3018**	0.2789**	0.5912**	0.5406**	1			
15	0.0878	0.1786**	0.0094	0.0275	0.1081	0.1478*	0.1668**	0.1621*	0.0137	0.0921	0.1290*	0.1623*	0.1332*	0.1524*	1		
16	0.1463*	0.1118	0.0497	0.054	0.0586	0.3270**	0.2714**	0.2809**	0.1862**	0.3517**	0.2680**	0.3828**	0.4158**	0.4632**	0.1757**	1	
17	0.1809**	0.2030**	0.0977	-0.0456	0.2254**	0.0984	0.2716**	0.3335**	0.1713**	0.2900**	0.2131**	0.5016**	0.4946**	0.5031**	0.0852	0.3536**	1

N= 239, missing data excluded listwise, * Significant at .05 level, ** Significant at .001 level.
[b] The log was used to compute the correlation factor, but unconverted scales are used for the descriptive statistics
[c] Linear interpolation was performed on this variable after the natural logarithm was performed.

The following tables (4-6; 4-7; 4-8; 4-9) present the results of my hypotheses' tests. First, I tested the baseline control model using the 11 control variables outlined in Table 4-6. For this I used an OLS regression as there is no endogenous technology use variable in this model. The results for this are in table 4-6, Model 1. For Models 2 to 7, I used IV regression which contains the endogenous variables measuring the use of the hypothesized technology for the specific stage of the SMP. The first stage regression model contained the same 11 control variables as the second stage plus three additional instrument variables, namely the degree of rationality and the extent of political behavior and the intention by top management to include other individuals in the SMP. Only the second stage regression models are reported along with the relevant test statistics, as outlined by Bascle (2008). Each model presents the effect on the quantitative and qualitative performance indicators.

The quantitative performance control model is significant (F(12, 196) = 3.49; p = 0.0001) with an R^2 of 0.176, which indicates a good fit of the model. Quantitative firm performance is significantly predicted by the ROA mean of the previous six years (b = .5441; t = 4.02; p = 0.000); the degree of munificence in the firm's external environment (b = .3862; t = 3.30; p = 0.002), and the number of countries the firm operates in (b = .1905; t = 1.82; p = 0.071). The subsequent test for heteroscedasticity, the Breusch–Pagan / Cook–Weisberg test, indicated that in the quantitative model ($\chi^2(1) = 0.00$; prob > χ^2 = 0.994) the null hypothesis that the variance is constant cannot be rejected. Similarly, checking the variance inflation factors (VIFs) showed that none of them surpassed a value of 10, with the highest value being 2.10 for firm age (Hair et al., 2010) indicating that multicollinearity is not an issue. I also ran the regression with robust variance estimators, to increase the robustness of the model to misspecifications. The regression coefficients and level of significance did not vary drastically and therefore the regression results without robust variance estimators are reported for the quantitative model.

The qualitative performance control model is significant (F(12, 196) = 1.64; p = 0.0833) with an R^2 of 0.0912, which indicates a good fit of the model. Qualitative firm performance is significantly predicted by the ROA mean of the previous six years (b = .1742; t = 1.71; p = 0.090) and the degree of munificence in the firm's external environment (b = .2759; t = 3.01; p = 0.003). The subsequent test for heteroscedasticity, the Breusch–Pagan / Cook–Weisberg test indicated that in the qualitative model ($\chi^2(1) = 0.76$; prob > $\chi^2 = 0.383$) the null hypothesis that the variance is constant cannot be rejected. Similarly, checking the VIFs showed that none of them surpassed a value of ten with the highest value being 2.10 for firm age (Hair et al., 2010) indicating that multicollinearity is not an issue. I also ran the regression with robust variance estimators, to increase the robustness of the model to misspecifications. The regression coefficients and level of significance did not vary drastically and therefore the regression results without robust variance estimators are reported for the qualitative model.

Next it was necessary to establish whether endogeneity is an issue for my regression models with firm performance, that is qualitative and quantitative firm performance indicators, as a dependent variable. It could be argued that technology use is not a random choice as it is likely to be a result of earlier managerial decisions (Shaver, 1998; Hamilton and Nickerson, 2003). Endogeneity occurs when the estimated value of the regression's error term can be predicted by any of the regressors, which indicates that there is an omitted variable bias violating the OLS assumption of exogeneity (Hausman, 1978). As discussed in section 4.2 above, the use of digital communication technologies in the SMP is likely to be motivated by the degree of rationality, the lack of political behavior, and the intention of top management to involve other people. I therefore theorize that these three factors act as instruments for technology use.

Most cases of endogeneity use a Heckman IV regression. However, with this approach the technology use variables would be converted into a binary observation which in turn would reduce the measurability of technology use into a simple “use” versus “do not use”. Through a categorical variable, I was able to measure a greater degree of frequency of use and thus a linear two stage least square (TSLS) approach was used; the results are reported for each model in Table 4–6. However, the F-statistic for the first stage did not meet the threshold value for a TSLS regression with three instruments of 9.08 (Stock and Yogo, 2005). Following the recommended procedure outlined in Bascle (2008), I used a limited information estimation (LIML) instead, while also reporting the coefficient estimates of the TSLS (see Table 4–6). Additionally, robustness against heteroscedasticity was implemented.

Table 4-6 Regression Results Models 1 & 2

	Model 1		Model 2			
	OLS	OLS	TSLS	TSLS	LIML	LIML
Variable	Quan	Qual	Quan	Qual	Quan	Qual
Constant	3.724***	5.076***	3.85***	5.28***	3.85***	5.29***
	(0.921)	(0.650)	(0.95)	(0.78)	(0.94)	(0.85)
ROA	0.54***	0.17*	0.50***	0.12	0.50***	0.12
	(0.14)	(0.10)	(0.14)	(0.12)	(0.14)	(0.11)
Firm age	-0.10	-0.060	-0.14	-0.11	-0.14	-0.11
	(0.17)	(0.13)	(0.17)	(0.14)	(0.19)	(0.15)
R&D spending	-0.062	0.048	-0.10	-0.0010	-0.11	-0.0073
	(0.10)	(0.078)	(0.11)	(0.089)	(0.11)	(0.092)
No. of employees	0.022	0.042	0.0021	0.018	0.00041	0.015
	(0.085)	(0.064)	(0.088)	(0.072)	(0.079)	(0.073)
Dynamism	-0.080	0.0092	-0.19	-0.12	-0.20	-0.14
	(0.095)	(0.072)	(0.12)	(0.10)	(0.13)	(0.10)
Munificence	0.39***	0.28***	0.33**	0.21*	0.33**	0.20*
	(0.12)	(0.092)	(0.13)	(0.11)	(0.13)	(0.11)
% of sales made in foreign	-0.14	-0.094	-0.074	-0.017	-0.068	-0.0075
countries	(0.12)	(0.093)	(0.13)	(0.11)	(0.13)	(0.11)
No. of countries firm	0.19*	0.048	0.096	-0.066	0.087	-0.081
operates in	(0.10)	(0.079)	(0.13)	(0.10)	(0.13)	(0.12)
Size of strategy team	-0.049	-0.023	-0.058	-0.033	-0.059	-0.034
	(0.11)	(0.080)	(0.11)	(0.089)	(0.11)	(0.084)
Germany[b]	-0.076	0.042	-0.25	-0.17	-0.27	-0.20
	(0.33)	(0.25)	(0.37)	(0.30)	(0.39)	(0.33)
All service industries[c]	-0.092	-0.13	-0.17	-0.22	-0.18	-0.24
	(0.30)	(0.23)	(0.32)	(0.26)	(0.34)	(0.26)
Other industries[c]	-0.34	-0.30	-0.32	-0.28	-0.32	-0.28
	(0.42)	(0.32)	(0.43)	(0.36)	(0.36)	(0.35)
Aggregating tech use			0.44	0.52**	0.47	0.59**
Mission statement (H1)			(0.31)	(0.26)	(0.34)	(0.28)
Heteroscedasticity-robust SE	No	No	No	No	Yes	Yes
Autocorrelation-robust SE	No	No	No	No	Yes	Yes
First stage F statistics			3.86**	3.86**	4.46**	4.46**
Sargan statistic			1.163	1.649		
Hansen J statistic					1.123	1.563
F value	3.49***	1.64*	3.01***	1.45	4.37**	1.64*
R^2	0.176	0.091	0.08	-0.19	0.057	-0.2876

N=209, robust standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1
[b]The base country is the UK
[c]The base industry is “All Manufacturing”

With my first hypothesis (H1) I suggested that the use of aggregating technologies for mission statement formulation is significantly associated with higher business performance. The first stage regression (not shown) with aggregating technology use in the mission statement as dependent variable is significant at the 0.001 level ($F(3, 193) = 4.46$; $p = 0.0047$), demonstrating that the instrumented variable is predicted by the instruments with the instruments being weak. The Hansen J statistics are not significant, indicating that the exogeneity assumption is not violated. I tested the validity of my instruments through the C statistics. Each of these, for both the quantitative regression (rationality: C = 0.242, p = 0.6226; political behavior: C = 1.325, p = 0.2497; participation intention: C = 0.554; p = 0.4565) and the qualitative regression (rationality: C = 0.228, p = 0.6332; political behavior: C = 0.827, p = 0.3633; participation intention: C = 0.622; p = 0.4303) returned insignificant, thus confirming that the instruments are valid (Stadler et al., 2018; Baum et al., 2003). The results of the second stage test of hypothesis H1 are included in Model 2, Table 4-6. Both LIML regression models Quan (F (13, 195) = 4.37; *p* = 0.0000) and Qual (F (13, 195) = 1.64; *p* = 0.0771) are significant. However, the use of aggregating technologies does not significantly predict quantitative performance (b = .4736; z = 1.39; p = 0.164), but positively predicts qualitative firm performance (b = .6241194; z = 2.00; p = 0.045). Therefore, H1 is partially supported.

Table 4-7 Regression Results Models 3 & 4

	Model 3				**Model 4**			
	TSLS	TSLS	LIML	LIML	TSLS	TSLS	LIML	LIML
Variable	Quan	Qual	Quan	Qual	Quan	Qual	Quan	Qual
Constant	3.661***	5.059***	3.653***	5.045***	3.98***	5.45***	4.00***	5.50***
	(0.948)	(0.738)	(0.952)	(0.702)	(0.93)	(0.74)	(0.96)	(0.77)
ROA	0.566***	0.200*	0.567***	0.202**	0.54***	0.17	0.54***	0.17
	(0.138)	(0.108)	(0.126)	(0.101)	(0.13)	(0.11)	(0.13)	(0.10)
Firm age	-0.118	-0.080	-0.119	-0.082	-0.12	-0.082	-0.12	-0.087
	(0.171)	(0.133)	(0.182)	(0.131)	(0.17)	(0.13)	(0.18)	(0.13)
R&D spending	-0.072	0.036	-0.072	0.035	-0.089	0.013	-0.092	0.0054
	(0.105)	(0.0815)	(0.109)	(0.081)	(0.10)	(0.083)	(0.11)	(0.085)
No. of employees	0.033	0.056	0.034	0.057	-0.0021	0.012	-0.0047	0.0051
	(0.087)	(0.068)	(0.085)	(0.0701)	(0.087)	(0.069)	(0.080)	(0.074)
Dynamism	-0.179	-0.108	-0.185	-0.117	-0.15	-0.082	-0.16	-0.10
	(0.119)	(0.093)	(0.121)	(0.088)	(0.12)	(0.092)	(0.12)	(0.093)
Munificence	0.326**	0.204**	0.322**	0.198*	0.34***	0.22**	0.33***	0.20**
	(0.131)	(0.102)	(0.129)	(0.101)	(0.13)	(0.10)	(0.13)	(0.10)
% of sales made in foreign countries	-0.169	-0.131	-0.170	-0.134	-0.13	-0.084	-0.13	-0.082
	(0.127)	(0.099)	(0.108)	(0.083)	(0.12)	(0.097)	(0.11)	(0.086)
No. of countries firm operates in	0.117	-0.038	0.113	-0.046	0.14	-0.0089	0.14	-0.022
	(0.118)	(0.092)	(0.115)	(0.097)	(0.11)	(0.089)	(0.11)	(0.098)
Size of strategy team	-0.058	-0.0332	-0.0587	-0.0341	-0.096	-0.081	-0.10	-0.095
	(0.108)	(0.084)	(0.096)	(0.069)	(0.11)	(0.091)	(0.11)	(0.087)
Germany[b]	0.006	0.138	0.011	0.146	-0.0097	0.12	-0.0027	0.14
	(0.344)	(0.268)	(0.340)	(0.249)	(0.34)	(0.27)	(0.33)	(0.25)
All service industries[c]	0.006	-0.011	0.011	-0.001	-0.022	-0.039	-0.014	-0.018
	(0.316)	(0.246)	(0.370)	(0.261)	(0.31)	(0.24)	(0.35)	(0.27)
Other industries[c]	-0.480	-0.466	-0.488	-0.480	-0.34	-0.31	-0.34	-0.31
	(0.443)	(0.345)	(0.336)	(0.336)	(0.42)	(0.33)	(0.34)	(0.34)
Aggregating tech use External scanning (H2)	0.365	0.431**	0.386	0.467**				
	(0.258)	(0.201)	(0.253)	(0.187)				
Aggregating tech use Internal scanning (H3)					0.25	0.31*	0.27	0.38*
					(0.23)	(0.18)	(0.25)	(0.20)
Heteroscedasticity-robust SE	No	No	Yes	Yes	No	No	Yes	Yes
Autocorrelation-robust SE	No	No	Yes	Yes	No	No	Yes	Yes
First stage F statistics	6.73***	6.73***	7.47***	7.47***	6.20***	6.20***	6.29***	6.29***
Sargan statistic	1.123	1.876			2.185	3.804		
Hansen J statistic			1.062	1.667			2.088	3.048
F value	3.06***	1.61*	4.46***	2.18**	3.17***	1.50	4.65***	2.03**
R^2	0.0929	-0.066	0.083	-0.102	0.1445	-0.0505	0.1348	-0.1305

N=209, robust standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1
[b]The base country is the UK
[c]The base industry is “All Manufacturing”

With my second hypothesis (H2) I suggested that the use of aggregating technologies for external scanning is significantly associated with higher business performance. The first stage regression (not shown) with aggregating technology use in external scanning as dependent variable is significant at the 0.001 level (F(3, 193) = 7.47; *p* = 0.0001), demonstrating that the instrumented variable is predicted by the instruments with the instruments being weak. The Hansen J statistics are not significant, indicating that the exogeneity assumption is not violated. Each of the C statistics for both the quantitative regression (rationality: C = 0.118, p = 0.7310; political behavior: C = 0.921, p = 0.3373; participation intention: C = 0.329., p = 0.5664) and the qualitative regression (rationality: C = 0.034, p = 0.8532; political behavior: C = 1.608, p = 0.2048; participation intention: C = 0.238., p = 0.6253), returned insignificant confirming that the instruments are valid (Baum et al., 2003). The results of the second stage tests of hypothesis H2 are included in Model 3, Table 4-7. Both LIML regression models Quan (F (13, 195) = 4.46; p = 0.0000) and Qual (F (13, 195) = 2.18; p = 0.0116) are significant. However, as an instrumented variable, the use of aggregating technologies does not significantly predict quantitative performance (b = .3857; z = 1.53; p = 0.127), but positively predicts qualitative firm performance (b = .4673; z = 2.50; p = 0.012). Therefore, H2 is partially supported.

With my third hypothesis (H3), I suggested that the use of aggregating technologies for internal scanning is significantly associated with higher business performance. The first stage regression (not shown) with aggregating technology use in internal scanning as dependent variable is significant at the 0.001 level (F(13, 195) = 6.29; p = 0.0004), demonstrating that the instrumented variable is predicted by the instruments with the instruments being weak. The Hansen J statistics are not significant, indicating that the exogeneity assumption is not violated. Each of the C statistics for both the quantitative regression (rationality: C = 0.945, p = 0.3310; political behavior: C = 1.750, p = 0.1859; participation intention: C = 0.511, p = 0.4746) and the qualitative regression (rationality: C = 0.978, p = 0.3227; political behavior: C = 2.717, p = 0.0993.; participation intention: C = 0.479, p = 0.4888) returned either insignificant or very close to the 10% significance cut-off, confirming that the instruments are valid (Baum et al., 2003). The results of the second stage test of hypothesis H3 are included in Model 4, Table 4-7. Both LIML regression models Quan (F (13, 195) = 4.65; p = 0.0000) and Qual (F (13, 195) = 2.03; p = 0.0200) are significant. As an instrumented variable, the use of aggregating technologies does not significantly predict quantitative performance (b = .2714; z = 1.11; p = 0.269), but positively predicts qualitative firm performance (b = .3785; z = 1.89; p = 0.059). Therefore, H3 is partially supported.

Table 4-8 Regression Results Models 3 & 4

	Model 5				Model 6			
	TSLS	TSLS	LIML	LIML	TSLS	TSLS	LIML	LIML
Variable	Quan	Qual	Quan	Qual	Quan	Qual	Quan	Qual
Constant	2.43	3.78***	2.20	3.20*	4.79***	6.38***	4.88***	6.63***
	(1.48)	(1.23)	(1.53)	(1.79)	(1.20)	(1.00)	(1.31)	(1.16)
ROA	0.49***	0.11	0.48***	0.089	0.55***	0.18	0.55***	0.18
	(0.16)	(0.13)	(0.18)	(0.16)	(0.13)	(0.11)	(0.13)	(0.11)
Firm age	-0.10	-0.063	-0.10	-0.065	-0.23	-0.21	-0.25	-0.25
	(0.19)	(0.16)	(0.21)	(0.20)	(0.20)	(0.16)	(0.22)	(0.18)
R&D spending	-0.18	-0.073	-0.20	-0.12	-0.048	0.064	-0.046	0.067
	(0.15)	(0.12)	(0.15)	(0.17)	(0.10)	(0.086)	(0.11)	(0.089)
No. of employees	-0.14	-0.13	-0.17	-0.20	-0.058	-0.051	-0.065	-0.071
	(0.16)	(0.13)	(0.16)	(0.19)	(0.10)	(0.087)	(0.10)	(0.096)
Dynamism	-0.11	-0.021	-0.11	-0.033	-0.17	-0.10	-0.18	-0.12
	(0.11)	(0.091)	(0.12)	(0.12)	(0.12)	(0.099)	(0.13)	(0.11)
Munificence	0.25	0.13	0.22	0.069	0.30**	0.18	0.30**	0.16
	(0.17)	(0.14)	(0.18)	(0.20)	(0.14)	(0.11)	(0.14)	(0.12)
% of sales made in foreign	-0.071	-0.024	-0.060	0.0038	-0.17	-0.14	-0.18*	-0.15
countries	(0.15)	(0.12)	(0.13)	(0.15)	(0.13)	(0.10)	(0.11)	(0.096)
No. of countries firm	0.27**	0.13	0.29**	0.17	0.13	-0.028	0.12	-0.044
operates in	(0.13)	(0.11)	(0.13)	(0.15)	(0.12)	(0.097)	(0.11)	(0.11)
Size of strategy team	-0.056	-0.029	-0.057	-0.032	-0.10	-0.087	-0.11	-0.10
	(0.12)	(0.100)	(0.16)	(0.15)	(0.11)	(0.095)	(0.12)	(0.098)
Germany [b]	0.027	0.15	0.044	0.19	0.23	0.40	0.26	0.47
	(0.38)	(0.32)	(0.38)	(0.38)	(0.41)	(0.34)	(0.43)	(0.38)
All service industries [c]	-0.13	-0.16	-0.13	-0.18	-0.21	-0.27	-0.22	-0.30
	(0.34)	(0.28)	(0.42)	(0.36)	(0.32)	(0.26)	(0.34)	(0.26)
Other industries [c]	-0.63	-0.61	-0.68	-0.73	-0.22	-0.17	-0.21	-0.14
	(0.53)	(0.44)	(0.45)	(0.47)	(0.43)	(0.36)	(0.36)	(0.37)
Corresponding tech use	0.68	0.72*	0.80	1.01				
for generation and evaluation	(0.52)	(0.43)	(0.59)	(0.71)				
of options (H4)								
Broadcasting tech use for					0.37	0.43*	0.41	0.53*
strategy implementation (H5)					(0.29)	(0.24)	(0.31)	(0.28)
Heteroscedasticity-robust SE	No	No	Yes	Yes	No	No	Yes	Yes
Autocorrelation-robust SE	No	No	Yes	Yes	No	No	Yes	Yes
First-Stage F Statistics	1.60	1.60	1.99	1.99	4.42***	4.42***	5.55**	5.55**
Sargan Statistic	0.831	1.908			1.571	2.582		
Hansen J Statistic			0.762	1.044			1.428	1.965
F value	2.49**	1.12	2.49**	0.84	3.16***	1.40	4.75***	1.68*
R^2	-0.1160	-0.4868	-0.2362		0.1304	-0.1779	0.1151	-0.3120

N=209, robust standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1
[b]The base country is the UK
[c]The base industry is "All Manufacturing"

With my fourth hypothesis (H4) I suggested that the use of corresponding technologies for the generation and evaluation of strategic options is significantly associated with higher business performance. The first stage regression (not shown) with corresponding technology use for generating and evaluating different strategic options as dependent variable is insignificant ($F(3, 195) = 1.99$; $p = 0.1166$), demonstrating that the instrumented variable is not predicted by the instruments. The results of the second stage test of hypothesis H4 are included in Model 5, Table 4-8. Subsequently, the LIML regression model for Quan ($F(13, 195) = 2.49$, $p = 0.0037$) is significant, while the LIML regression model for Qual ($F(13, 195) = 0.84$, $p = 0.6135$) is insignificant. As expected, as an instrumented variable, the use of collaborating technologies does not significantly predict quantitative performance ($b = .7964$; $z = 1.36$; $p = 0.173$), also given the fact that the instrumented variable itself is not significant. Therefore, H4 is not supported.

With my fifth hypothesis (H5), I suggested that the use of broadcasting technologies for the implementation of the strategy is significantly associated with higher business performance. The first stage regression (not shown) with broadcasting technology use for strategy implementation as dependent variable is significant at the 0.05 level ($F(13, 195) = 5.55$; $p = 0.0011$), demonstrating that the instrumented variable is predicted by the instruments with the instruments being weak. The Hansen J statistics are not significant, indicating that the exogeneity assumption is not violated. Each of the C statistics for both the quantitative regression (rationality: $C = 0.244$, $p = 0.6213$; political behavior: $C = 1.404$, $p = 0.2360$; participation intention: $C = 0.132$, $p = 0.7165$) and the qualitative regression (rationality: $C = 0.058$, $p = 0.8100$; political behavior: $C = 1.956$, $p = 0.1619$; participation intention: $C = 0.005$, $p = 0.9440$) returned insignificant, confirming that the instruments are valid (Baum et al., 2003). The results of the second stage test of hypothesis H5 are included in Model 6, Table 4-8. Both LIML regression models Quan ($F(13, 195) = 4.75$, $p = 0.0000$) and Qual ($F(13, 195) = 1.68$, $p = 0.0680$) are significant. As an instrumented variable, the use of broadcasting technologies does not significantly predict quantitative performance ($b = .4060$; $z = 1.30$ $p = 0.193$), but positively predicts qualitative firm performance ($b = .5269$; $z = 1.91$; $p = 0.057$). Therefore, H5 is partially supported.

Table 4-9 Regression Results Model 7

	Model 7			
	TSLS	TSLS	LIML	LIML
Variable	Quan	Qual	Quan	Qual
Constant	3.66***	5.04***	3.66***	5.02***
	(0.90)	(0.70)	(0.86)	(0.68)
ROA	0.52***	0.15	0.52***	0.15
	(0.13)	(0.10)	(0.13)	(0.11)
Firm age	-0.075	-0.025	-0.073	-0.021
	(0.16)	(0.13)	(0.16)	(0.11)
R&D spending	-0.097	0.0018	-0.098	-0.0039
	(0.10)	(0.080)	(0.11)	(0.078)
No. of employees	0.023	0.043	0.023	0.044
	(0.082)	(0.063)	(0.073)	(0.064)
Dynamism	-0.13	-0.051	-0.13	-0.059
	(0.10)	(0.078)	(0.10)	(0.074)
Munificence	0.32**	0.19*	0.32**	0.18*
	(0.13)	(0.10)	(0.13)	(0.10)
% of sales made in foreign	-0.17	-0.14	-0.17	-0.14*
countries	(0.12)	(0.094)	(0.11)	(0.086)
No. of countries firm	0.16	0.014	0.16*	0.0097
operates in	(0.10)	(0.080)	(0.097)	(0.089)
Size of strategy team	-0.067	-0.046	-0.068	-0.048
	(0.10)	(0.080)	(0.097)	(0.067)
Germany [b]	-0.083	0.032	-0.083	0.031
	(0.32)	(0.25)	(0.31)	(0.23)
All service industries [c]	-0.049	-0.070	-0.047	-0.063
	(0.29)	(0.23)	(0.32)	(0.23)
Other industries [c]	-0.49	-0.49	-0.49	-0.52
	(0.43)	(0.33)	(0.35)	(0.33)
Collaborating tech use for	0.21	0.28*	0.22	0.31*
Control and evaluation (H6)	(0.19)	(0.15)	(0.20)	(0.16)
Heteroscedasticity-robust SE	No	No	Yes	Yes
Autocorrelation-robust SE	No	No	Yes	Yes
First stage F statistics	7.84***	7.84***	9.06***	9.06***
Sargan statistic	2.280	3.923		
Hansen J statistic			2.463	1.044
F value	3.32***	1.70*	4.90***	2.26**
R^2	0.1843	0.0611	0.1827	0.0374

N=209, robust standard errors are in parentheses; *** p<0.01, ** p<0.05, * p<0.1
[b]The base country is the UK
[c] The base industry is “All Manufacturing”

With my sixth hypothesis (H6) I suggested that the use of collaborating technologies for the control and evaluation of the strategy is significantly associated with higher business performance. The first stage regression (not shown) with collaborating technology use for the control and evaluation of the strategy as dependent variable is significant at the 0.001 level ($F(13, 195) = 9.06$; $p = 0.0000$) demonstrating that the instrumented variable is predicted by the instruments with the instruments being weak. The Hansen J statistics are not significant indicating that the exogeneity assumption is not violated. Each of the C statistics for both the quantitative regression (rationality: C = 1.341, p = 0.2468; political behavior: C = 1.228, p = 0.2678; participation intention: C = 1.840, p = 0.1750) and the qualitative regression (rationality: C = 1.862, p = 0.1724; political behavior: C = 1.694, p = 0.1931; participation intention: C = 2.676, p = 0.1019), returned insignificant confirming that the instruments are valid (Baum et al., 2003). The results of the second stage test of hypothesis H6 are included in Model 7, Table 4-9. Both LIML regression models Quan (F (13, 195) = 4.90, p = 0.0000) and Qual (F (13, 195) = 2.26, p = 0.0087) are significant. As an instrumented variable, the use of broadcasting technologies does not significantly predict quantitative performance (b = .2210; z = 1.08; p = 0.280) but positively predicts qualitative firm performance (b = . 3109; z = 1.94; p = 0.052). Therefore, H6 is partially supported.

4.5. Discussion

The purpose of my study is to determine whether the use of digital communication and social technologies in the SMP has a significant effect on firm performance. With the increasing use of digital technologies by businesses in general and the constant emergence of new technological opportunities and threats (Demirkan et al., 2020), it is important to establish what kinds of technologies firms are using for their strategy development and whether or not this is an effort and investment worth making. Developing a novel theoretical framework based on the open strategy literature, I hypothesized that using different types of digital communication technologies, according to a typology I developed, in the various stages of the SMP can impact business performance by allowing businesses to eclectically utilize these four different types as it is more relevant for some stages of the SMP to engage in open strategizing (e.g. environmental scanning) than it is for others (e.g. generating strategic alternatives). Based on data gathered from 239 different firms, I tested these hypotheses. The results of the study revealed a positive relation between the use of the hypothesized technology and qualitative performance in five of the six stages of the SMP (mission statement formulation, external and internal scanning, strategy implementation, and strategy control and evaluation). However, the results for the regression looking at quantitative performance as the dependent variable did not show any significant effects. This does not mean that technology use does not have an effect on quantitative firm performance, but such an effect could be subject to time lags (Boyd, 1991; McGahan, 1999). As this study was based on cross-sectional data, the impact of technology use on future performance was not assessed. The findings of my analysis suggest, however, that using the different types of technology can have an effect on firm performance as the qualitative subjective assessment of performance —an assessment that leads to actual performance (Hult et al., 2008; see Brouthers et al., 2000) — was positive and significant in most cases.

Consequently, there are several implications of this study for the further theoretical development of the field. By detecting a significant association between technology use for the SMP and firm performance, I highlight a potential means by which firms can improve the effectiveness of their strategy process, responding to calls in the literature to consider alternative theoretical understandings and approaches to strategic planning (Wolf and Floyd, 2017). In particular, I have been able to test some of the implications raised in open strategy theory (Seidl et al., 2019). The results of the analysis demonstrate that using technologies can facilitate involving a greater number of individuals in the strategy process and can help businesses generate strategies that lead to better performance. In particular, the stages in which the input of multiple people throughout the firm can be beneficial, such as external and internal scanning, are likely to benefit from the use of aggregating technologies. As suggested by open strategy research (Seidl et al., 2019), the use of these technologies allows a greater opening up of the strategy context which can be enhancing for firms: my research demonstrates the performance-enhancing effect across a number of companies. Therefore, this study contributes to our current understanding of how digital communication technologies can be used to facilitate the running of more open strategy processes, given that current work in the open strategy literature typically relies on case study methodologies to explore this relationship.

I have also been able to demonstrate that taking a simple "digitalization" approach to the SMP *per se* or using a uniform approach to technology for all firm activities is not what leads to an improvement in efficiency and output. My theory and results indicate that the type of technologies that are used play a very important part in it. The varying affordances of interactivity and synchronicity that the various technologies on the market offer determine their suitability and, consequently, their effectiveness for the relevant stage. With my results, I not only highlight that digital communication technologies are used for the SMP, but also that the specific choice of a type of technology plays a crucial role. For example, my findings demonstrate that for those stages of the SMP for which previous scholarly work recommends a greater involvement of different individuals (e.g. mission statement formulation), shared-control technologies such as aggregating technologies can allow businesses to implement those recommendations and thus increase the effectiveness of this stage of the SMP. This in turn is positively reflected in the qualitative business performance. The implication for further scholarly activity in the field of technology use for strategy or IB-related phenomena is that an affordance-based stance to technology use represents a valuable research agenda. Focusing on specific platforms and brands runs more of a risk of the results rapidly becoming obsolete once those platforms and brands fall out of fashion or are superseded.

For management and strategy practitioners, I have been able to determine that using digital communication technologies in the SMP can enhance the effectiveness of this process. This process optimization takes place through the added benefit of involving more individuals in the process (Whittington et al., 2011), but also by increasing the degree of rationality and reducing the impact of political behavior in the process (Dean and Sharfman, 1993). In recent months, many businesses in the UK and Germany have been forced to adopt more digital technology as the COVID19 pandemic has required many companies to shift to remote working practices. My research shows that using digital communication technologies, instead of the classic face-to-face meeting, to engage in the activities related to the SMP, does not have to place businesses at a disadvantage. On the contrary, implementing and adopting specific technologies at various stages of the SMP, can enhance the SMP. In this regard, managers can see the current circumstances of the pandemic as an opportunity to open up their strategy process and improve strategy development and implementation.

My results indicate that the only stage for which the regression model did not work was for the generation and evaluation of different strategic alternatives stage. For this stage, I hypothesized that the use of corresponding technologies would lead to improved business performance — that is, those technologies which are low in synchronicity and interactivity such as email. There could be two reasons as to why this hypothesis was not supported. Firstly, several of the digital communication technologies that fall into the corresponding technology type, such as email or instant messaging, are very highly dispersed (Bughin et al., 2017) and thus may not represent a source of competitiveness and performance advantage over a firm’s competitors (Barney, 1991). Secondly, the potential advantages of maintaining a closed strategic alternatives generation and evaluation stage could be outdone by the advantages an opening up of this stage could bring. For instance, the more open types of digital communication, the aggregating and collaborating technologies, could enhance this stage of the strategy process by involving a greater number of opinions in a review of the proposed alternative strategies. Exploring this possibility would be a fruitful avenue of further research that could enhance our understanding of open strategizing practices further.

It may be the case that other technologies, which afford a higher degree of interactivity, would be more beneficial in this stage of the SMP. It could be argued that, despite the difficulties of this stage of the SMP such as the occurrence of cognitive biases (Das and Teng, 1999), using aggregating or collaborating technologies could increase its effectiveness. For instance, aggregating technologies would allow those involved in generating different options to collect ideas from a larger audience about the various strategic actions the company could take — for example, developing a new product. Additionally, collaborating technologies could be used to obtain insights and feedback in real time, or at least in a timely manner, for instance, by facilitating focus groups of employees, suppliers or customers. Hence there exists an opportunity for firms to use aggregating or collaborating technologies to generate strategy options and evaluate these, as the use of corresponding technologies for this stage may not lead to any significant improvement in performance. This may thus also represent a fruitful area of research: scholars may want to investigate how precisely it is that the interactivity of digital communication and social technologies promotes the development, evaluation and choice of strategy alternatives.

In sum, with this study I have made five main contributions. Firstly, I developed and tested a new theory that can draw out how digitalization of the SMP within businesses can facilitate the implementation of numerous improvements to strategy development, as established by previous scholarly studies. For instance, Dean and Sharfman (1993) suggest that a greater degree of rationality in the strategy process increases its effectiveness. Another suggestion is that involving more people at certain stages or activities of the SMP, such as drawing up the mission statement, can improve its effectiveness (Williams Jr et al., 2014). However, there was previously no theoretical link that could explain how digital communication technologies might help bring about such improvements. This study has found supporting evidence for the notion that digital communication technology use can allow businesses to include a greater number of individuals in the SMP and so increase rationality in decision making (Verreynne, 2006; Tyran et al., 1992). Thus by using a technology which can facilitate the inclusion of a greater number of individuals, managers can achieve the suggested benefits of taking a more rational approach to strategizing. This in turn then increases the overall effectiveness of the SMP. Consequently, the theory that I have developed can help scholars to explore and understand the impact of a digitalized SMP on firm performance.

Secondly, I have contributed to the ongoing debate about whether following an SMP within a business has a performance-enhancing effect. While some studies maintain that there is a positive link between strategic planning and business performance (Armstrong, 1982; Boyd, 1991), others maintain that the results are mixed overall, with no clear link yet established (Miller and Cardinal, 1994; Powell, 1992). The research I have presented here points toward a positive relationship between strategic planning plus its associated activities and firm performance, provided that specific digital communication technologies are used for the strategy-related activities. Based on my results, I have been able to establish that using different types of technology with varying degrees of interactivity and synchronicity can enhance a firm's performance, if they are used at the appropriate stage of the SMP. In particular, I have examined the strategic planning performance relationship in conjunction with digital communication and social technology use and could thus obtain a more finegrained understanding of this ongoing dispute in the literature. This revised understanding of the strategic planning performance relationship means that the different results between studies could derive from the fact that some firms may be using different technologies to enhance the effectiveness of their SMP while others are not. This observation could also be explained from a resource-based view, as technology use may currently allow firms to perform more competitively than others because they are able to engage in open and digital strategy practices. Such open practices allow firms, for instance, to generate more innovate ideas (Hautz et al., 2017; Stadler et al., 2020) or increase the effectiveness of their strategy implementation (Alexander, 1985).

Thirdly, the extant literature generally only considers what the impact of digitalization on firm performance is (c.f. Li and Richard Ye, 1999), or focuses on specific areas such as marketing (c.f. Cooke and Buckley, 2008). Therefore, with this study I have contributed to the digitalization literature, by highlighting that (i) the benefit of digitalization can be considered more precisely by using a typology or classification of technologies; and (ii) considering other business processes, such as the SMP, to deepen our understanding of the growing digitalization of business processes is an area worthy of further empirical work. However, it should be noted that I have only found a significant association between digitalization and the firm’s qualitative performance. Nevertheless, this provides further insight into the general usefulness of top management engaging in strategy-related activities, such as formulating the mission statement, or internal and external scanning.

Fourthly, I considered the use of different technology types for the purpose of strategic planning in a cross-cultural context. Previous work which explored the different practices, has so far not considered the impact of national culture or legislation on how digital communication technologies are used for strategizing. I could determine that in my sample more German firms were using aggregating technologies. In three of the six stages of the SMP, this difference in aggregating technology use between British and German firms is even statistically significant. This demonstrates that there could differences between countries in terms of how inclusive they are with their strategic planning. As for my sample, it could be argued that German firms pursue a more inclusive approach to their SMP, as aggregating technologies are one of the two types in my classification that afford shared control. Interestingly, some of the previous case (Matzler et al., 2014; e.g. Hutter et al., 2017) studies on aggregating technology use in the SMP were conducted in German companies. Therefore I contribute to our current knowledge by extending the findings of previous research and demonstrate, that aggregating technology use for strategizing purposes is current practice in German businesses.

Finally, I have made a contribution to the open strategy literature, which represents a growing field within the wider strategic management literature. The open strategy literature suggests that companies which open up their SMP and thus allow a greater number of individuals to participate, can enhance the SMP in multiple ways (Seidl et al., 2019; Hautz et al., 2017). The improvements take place due to a greater sharing of information among more individuals (Tannenbaum and Massarik, 1950), as well as increased creativity and innovation in the development of new insights and information, to name a few reasons (Adobor, 2019; Hautz, 2017; Hutter et al., 2017). I am able to explain with my theory how this greater participation and thus a more open SMP can be achieved through the use of more interactive digital communication technologies, such as aggregating and collaborating technologies. In addition, I have also found supporting evidence for the fact that using such technologies enhances the effectiveness of the process and therefore contributes positively to firm performance. As the results do not indicate that this opening up of the SMP should take place across the whole process, I have contributed to the open strategy literature by demonstrating that the SMP as a whole does not need to be opened up. This will help discerning future scholars to not only consider an open strategizing process in its entirety but instead focus on specific stages. This also helps strategy practitioners to think of opening up the strategy process as a partial and not whole opening of the SMP. My results suggest that an opening up of the first three stages of the SMP (mission statement formulation, internal scanning, and external scanning), supported by the use of aggregating technologies, can enhance the effectiveness of the SMP. Therefore, I have expanded our understanding of open strategy practices, by postulating that the strategy process may be optimized by opening specific stages of the process by means of aggregating and collaborating technologies, while keeping others, such as strategy implementation, more closed through the use of corresponding or broadcasting technologies.

4.5.1. Areas for Further Research

I have highlighted relevant findings for future scholarly activity throughout my discussion. More generally, as this study represents a first attempt to examine the relationship between technology tools in the SMP through a quantitative study, further quantitative studies are needed in order to further elaborate this connection, potentially longitudinal studies, based on the framework I have developed. In particular, one further area which I would like to outline is that the context in which businesses operate has been drastically affected by the ongoing COVID-19 pandemic. In that respect, it would be a beneficial approach to follow up on the results of my study to determine whether the pandemic and the shift to more remote working-practices has accelerated the use and maybe even determined what types of digital communication technology are adopted. Additionally, a further exploration could be of the precise ways in which the four types that I have identified are used within businesses. For instance, what specific platforms of aggregating technologies do businesses use for mission statement formulation, and internal and external scanning? What are the benefits of using, for example, a forum-based platform over a wiki?

4.5.2. Limitations and Conclusion

As with any study, there are some limitations. Firstly, the results of this study may be limited in their generalizability as I collected data from two European countries only. While I attempted to choose two countries that differ culturally and institutionally as well as in their wider industrial organization, the results of this study may not be generalizable to other markets such as the US or Asia. The effect of digital communication use may vary significantly between countries and industries, and different effects may be detected elsewhere. This could be caused, for instance, by a different regulatory environment, as both the UK and Germany were subject to the General Data Protection Regulation (GDPR) at the time of data collection. Since I only considered manufacturing firms in both countries, the results may not be generalizable to more service-oriented industry sectors. Future research may wish to explore other industries or political boundaries in order to assess the validity of these findings in a different entity.

Second, although in both the UK and Germany I had substantial lists of firms to contact, the limited usable sample size may affect the overall generalizability of this study. My data collection in the UK was fairly successful but was affected by the growing uncertainty around Brexit in 2019 and early 2020 and some businesses expressed their inability to participate due to an increased workload. Similarly, my German data collection came abruptly to an end when the German government responded to the COVID-19 pandemic and introduced initial restrictions such as school closures and encouraging companies to allow workers to work from home. Future research in the field of digitalization could consider the pandemic and the rapid adoption of remote working practices as a natural experiment and follow up on my results to see if the degree of digitalization of the SMP has accelerated and what impact, if any, this has had on the SMP and a firm's performance.

Another limitation of my study is the fact that I used self-reported performance indicators and thus collected both the independent and dependent variable from the same participant. Consequently, there could persist an issue with common-method bias (CMB). I took steps to minimize this possibility including adding secondary data for companies in cases where it was possible. While objective performance indicators may have been preferable, it was not possible to get the most up-to-date objective indicators from firms, especially given the difference in accounting standards between Germany and the UK. I did obtain secondary data on performance from FAME and Amadeus databases, but it was not possible to obtain these for every company as they either did not report those figures or the questionnaire link was anonymous. In addition, the objective performance data I could get was at best contemporaneous with the data collection effort and so the time lag between the use of digital technologies and the results of the new strategy could not be taken into account. Future research might want to sample more strategically and only target companies from which current performance data can be obtained.

Additionally, questions around the degree of dynamism and munificence were also reported directly from the participants themselves and were not measured through any objective industry-specific measures. Hence it may be the case that these self-reported measures exhibit some form of bias from the participants. Future studies may wish to obtain more objective industry measures for dynamism and munificence.

Fifth, although I developed and tested my summary of the four types of digital technology, it could still be that managers misinterpreted or wrongly assessed the use of these technologies in their strategy process. Further research might need to triangulate the results, comparing actual use with reported use in a sample of firms to verify classification. It is also possible that since the extent to which the companies were using these digital communication technologies is self-reported, managers could either over- or under-estimate the extent to which the technology was being used. The process of developing reliable instruments for measuring the use of the four types of digital communication technologies is also still at its infancy, given the novelty of the classification I developed for this study. Future studies may wish to explore opportunities where they can implement monitoring systems to more objectively track the use of these different types of digital communication and social technologies.

In conclusion, with the growing complexity in the external environment, businesses need to follow some system in order to manage this increasing uncertainty. Additionally, with the growing degree of technology use and digitalization of business processes, it is important to understand whether the use of digital communication and social technologies has an impact on business performance, thus establishing whether this is a development which is adding to the future success of businesses or undermining their performance. Based on previous theoretical and empirical work in the fields of strategy and digitalization, I developed new theory to explain how using digital communication and social technologies can improve the SMP within companies and thus positively enhance business performance. To test this, I developed a two-by-two typology of digital communication and social technology types and hypothesized how each type could be relevant for a different stage of the SMP. I found that using digital communication technologies in the SMP can help businesses to achieve several process-enhancing recommendations previously established in the strategy literature. Additionally, following a SMP with its set number of stages in combination with the use of specific types of digital communication technologies allows businesses to perform better qualitatively. Thus, my study makes an important contribution to knowledge and understanding of this particular area.

Chapter 5 – The Adoption of Collaborating Technologies in the Strategic Management Process in British and German Firms

5.1. Introduction

The strategic management process (SMP) is a formal process through which businesses are able to manage the balance between external and internal factors (Mintzberg, 2007) and set up a designated plan to achieve their business objectives (Glueck, 1976). While there is some ambiguity (Hutzschenreuter and Kleindienst, 2006; Wolf and Floyd, 2017), research tends to suggest that using a formal SMP leads to better firm performance (Andrews et al., 2009; Armstrong, 1982; Pearce et al., 1987). Over the past decade, the SMP has increasingly becoming digitalized (Aten and Thomas, 2016; Plotnikova et al., 2020; Weiser et al., 2020) and several studies have explored exactly how this digitalization takes place and how firms engage in "digital strategizing" (c.f. Heracleous et al., 2018; Plotnikova et al., 2020). Moreover, in Chapter 4 of this thesis, I established that using certain types of digital communication and social technologies in the various stages of the SMP is associated with better business performance. Incorporating the argument of opening up the SMP to include a greater number of stakeholders (Whittington et al., 2011), I found that collaborating technologies are among different types of digital communication and social technologies that can significantly enhance certain stages of the SMP. With their real-time operation and sharing of control among a larger group of individuals, collaborating technologies provide a number of affordances that allow firms to enhance their SMP. For instance, businesses can improve the reach and scope of their external and internal scanning processes by involving a greater number of employees from throughout the firm (Yasai-Ardekani and Nystrom, 1996).

However, there are still unanswered questions as to why some firms are digitalizing their SMP with collaborating technologies while others are not. There is, of course, the obvious argument that top management and strategy makers are hoping such technologies will boost the effectiveness of their SMP and thus increase their business performance. Nevertheless, when it comes to technology adoption, extant work points toward a multitude of different antecedents that go beyond simple gain-seeking motives. The diffusion of innovations (DOI) theory proposes that innovations become dispersed through a process of communication "through certain channels over time among the members of a social system" (Rogers, 2003). This theory identifies several reasons that explain variation in the adoption of innovations such as the differences in relative advantage, compatibility, complexity, trialability and observability. In addition to this, DeSanctis and Poole's (1994, p.122) adaptive structuration theory (AST) refers to the differences in a business's structure and human interactions to explain variations in how advanced technologies are used. Together, these two theories suggest that a business's intention to adopt a certain technology does not just depend on the perception of benefits, but also to some extent on how the business is set up and how individuals interact. This is particularly relevant when considering technology adoption within the SMP, as strategic management encompasses the whole organization, spanning the entire structure and involving a great amount of human interaction (Olson et al., 2005).

In this chapter I develop a theoretical framework with which I can explain the adoption of collaborating technologies within the SMP. Building on DOI (Rogers, 2003) and AST (DeSanctis and Poole, 1994) and the technology–organization–environment model (TOE) (Tornatzky and Fleischer, 1990), I explore four distinct sets of factors — technological, organizational, environmental, and top management support— that influence why some firms adopt collaborating technologies in their SMP and others do not. Specifically, I theorize that the degree to which top management supports the implementation or integration of collaborating technologies into their existing SMP will determine adoption. I suggest that adoption is more likely to take place if the collaborating technology is compatible with the firm's existing technology, its software and hardware, if support to use and implement this new technology is available, and if top management perceives the use of the technology to be beneficial to the SMP.

Moreover, organizational factors such as the size of the firm and its international scope will determine adoption behavior because they serve as proxies for the complexity of the business and this new technology can help firms manage this complexity more effectively. As collaborating technologies afford the inclusion of multiple individuals, I theorize that firms with increased complexity, whether through a high number of individuals working for the firm or a wide international scope, are more likely to adopt collaborating technologies in the SMP. I theorize that the degree to which collaborating technologies are compatible with the firm's existing SMP also contributes to the adoption; I propose that the more the affordances of collaborating technologies (high interactivity and synchronicity) fit the characteristics of the firm's SMP, the higher the association with an adoption of collaborating technologies. Furthermore, I also argue that the firm's strategic decision speed has a positive association with collaborating technology adoption, as collaborating technologies can help firms to achieve a higher speed with which they make strategic decisions relative to their competitors. Finally, as collaborating technologies afford the inclusion of more individuals in SMP related activities, I also argue that the magnitude of top management's intention to involve other individuals in the SMP can also drive the adoption of these technologies.

Apart from the technological and organizational factors, there are also structural and environmental factors such as the level of dynamism and prevalence of network effects that can influence adoption of collaborating technologies. I theorize that the more dynamic and munificent the firm's environment, the stronger the support of the firm's top management will be for the adoption of collaborating technologies in the SMP. This occurs because collaborating technologies allow a wide participation to capture more knowledge and real time interaction to speed up decision making, thus resulting in a more effective management of the changes in the external environment. Network effects also influence adoption behavior because, as perceived by top management, the greater the network effects, the more value the use of collaborating technologies will bring to the SMP.

Using a large-scale quantitative survey, I collected data about the main antecedents of collaborating technology adoption in British and German businesses. With this data I then created a structural equation model (SEM) to determine the antecedents and mediators of collaborating technology adoption in the SMP of firms.

With this study, I am adding to our current understanding of the SMP as I am expanding our insights into the practices of digital strategizing and increasing our knowledge about what motivates businesses to use digital communication and social technologies in their SMP. Current work in this field places the focus on the uncovering of various phenomena of digital strategizing, for instance, on the functionality of technologies (Hutter et al., 2017) or how different user groups interact with a technology used for strategy purposes (Plotnikova et al., 2020). However, this work does not explain precisely why some firms adopt technologies for strategizing and others do not. In this chapter I develop and test a theoretical framework to try and explain precisely what factors lead some businesses to adopt digital communication and social technologies for the purposes of strategizing, to understand why some firms adopt such technologies and others not. Building on existing adoption theories (DOI and AST), I theorize that three sets of factors (technological, organizational, environmental (Tornatzky and Fleischer, 1990) influence the adoption process. In this way I add to the small but growing literature that explores the digitalization of the SMP.

I am also contributing to the technology adoption literature by developing a theory that describes technology adoption at the firm level and for one specific business process. Previous work in this field has typically considered the diffusion of a novel technology across an entire organization (e.g. Cepa, 2021) or the adoption of a novel technology from a consumer perspective (e.g. Johnson et al., 2021). With this research, I am broadening our understanding of technology adoption in two ways. Firstly, I consider technology adoption in the context of the SMP and in doing so consider specific factors in my collaborating technology adoption model such as strategic decision speed (Kownatzki et al., 2013) and the impact of dynamism and munificence in the firm's external environment. Secondly, much of the technology adoption literature investigates technology adoption for general functions and purposes within a business (Gangwar et al., 2014). However, I theorize that there are certain factors influencing adoption of collaborating technologies for the SMP specifically — for example, strategic decision speed and SMP process compatibility. In these ways, I am able to make a meaningful contribution to the technology adoption literature by taking a view of micro-foundations (Barney and Felin, 2013; Felin and Foss, 2012) to this phenomenon.

5.2. Background

As an administrative, and thus more social construct, the SMP is often denoted as consisting of six distinctive stages: (i) mission statement formulation; (ii) external environmental analysis; (iii) internal environmental analysis; (iv) generating and evaluating strategic alternatives; (v) strategy implementation; and (vi) strategy control and evaluation (Tyran et al., 1992; Pettigrew, 1977; David, 2011; Kaplan and Norton, 2008b; Platts and

Gregory, 1990). Studies indicate that use of technology in the SMP might help boost creativity, uncover novel insights and information, as well as improve employees' level of commitment to and acceptance of the strategy (Adobor, 2019; Hautz et al., 2017; Hautz, 2017; Hutter et al., 2017). However, these previous studies do not help us understand what specific types of technologies firms should be using in the SMP, as they often focus on one specific technology, such as online communities (Plotnikova et al., 2020), that is used across the whole SMP (Hutter et al., 2017), or talk about technology use in open strategy development only theoretically (Adobor, 2019; Hautz, 2017; Hautz et al., 2017). Furthermore, these studies do not address the issue of why some firms adopt technologies in the SMP while others do not.

Out of the four types of digital communication technologies (corresponding, broadcasting, aggregating and collaborating) that I specified in Chapter 4, collaborating technologies represent a broad category that would allow businesses to achieve the advantages I outlined above. Through their synchronous and shared-control affordance, collaborating technologies provide a high degree of interactive working between multiple individuals in real time. Through these mechanisms, collaborating technologies such as multi-user document editing and collaborating platforms (e.g. Microsoft Teams or the Google Workspace) allow companies to open up their strategy process to include a large number of individuals both inside and outside the organization. As suggested by the open strategy literature, including more people in the strategy process and thus opening up the process can help firms to perform better — for instance, by enabling open user generation of new products and services (Appleyard and Chesbrough, 2017); increasing employee commitment to and involvement in the achievement of wider organizational goals (Tavakoli et al., 2017); or identifying and solving problems throughout the company (Stieger et al., 2012).

Despite these potential advantages, it remains unclear what factors lead to the adoption of collaborating technologies in the SMP. Several studies already exist that describe in great detail how firms are using various types of technologies, including some which could be classified as collaborating technologies (Plotnikova et al., 2020; Weiser et al., 2020; Stieger et al., 2012). But the focus of these qualitative studies is the question "How do businesses utilize collaborating technologies for strategizing?" rather than "Why have these businesses adopted digital communication technologies?" In addition, the majority of technology adoption studies — notably, Zhu et al. (2006b), and Oliveira and Martins (2010) — were published before these collaborating technologies became available or commonly used in day-to-day business (Bughin et al., 2017; Darbyshire, 2020). None of the published technology adoption studies look at the SMP and why or how firms select technologies to improve this process. Consequently, building on past technology adoption research, I have developed my own theory to explain the adoption process of collaborating technologies in the SMP.

5.3. Theory and Hypothesis Development

Understanding and explaining technology adoption by businesses remains an important topic as failed adoptions can result in a loss of valuable resources such as time and money for businesses (Furneaux and Wade, 2011). Technology adoption has been described as taking place in certain stages (Zhu et al., 2006b), such as initiation, adoption and routinization. However, more recent research regards adoption as a one-step process, considering and measuring only the adoption (Priyadarshinee et al., 2017; Yu et al., 2017), which is the stance I also take in this study. While some studies have already explored why specific digital technologies are adopted by some firms and not by others (Zhu et al., 2003; c.f. Molinillo and Japutra, 2017), one question that remains unanswered in the literature is why some firms adopt technologies in their SMP while others do not (Hazlehurst and Brouthers, 2018). I therefore develop a new theoretical angle based on existing theory, as I consider the adoption of a technology not for a business as a whole, but only for one specific process within a company.

Technology adoption scholars have brought forward a number of different theories and models that have been used in various contexts to understand the process of technology adoption (Gurjar, 2018; Koul and Eydgahi, 2017). The main models are the technology acceptance model (TAM) (Davis, 1989), the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) and the TOE model (Tornatzky and Fleischer, 1990). However, the TAM and UTAUT only explain technology adoption at the individual level (Gonzalez et al., 2012), whereas the TOE model can be used to identify and explain why entire firms are adopting a specific technology (Oliveira and Martins, 2011). Since the SMP is a firm level activity, the implications of which are typically relevant for some parts of the firm, if not the entire firm in which it takes place (Alexander, 1985; Barringer and Bluedorn, 1999), it is necessary to apply a theory that considers the adoption of technologies at the firm level as opposed to the individual level. Another benefit of the TOE model is that it can be applied to the adoption of a variety of different IT-based technologies. The TOE model’s strengths are that its theoretical underpinning is sound and it is continuously confirmed by empirical studies; the various factors it contains, however, vary from study to study (Oliveira and Martins, 2011). Using the TOE framework for this study therefore allows me to formulate a solid theoretical basis to explain the adoption of collaborating technologies in the SMP.

The assumption of the TOE model is that adoption of a specific technology by a firm takes place if there is a match between factors inside the firm with those outside the company (Aboelmaged, 2014). The model considers three contexts or groups of factors (Tornatzky and Fleischer, 1990). The first group is the technological context, incorporating all factors in the firm's technological environment. Previous studies have identified three components in this context: technology integration, technology readiness and perceived benefit in the technological context. The second group is the organizational context which contains all factors associated with the organizational setting of the firm. Previous work has already extensively investigated the role of firm size in this context (Zhu and Kraemer, 2005; Low et al., 2011). However, the results of this have been mixed, finding that firm size sometimes drives (Aboelmaged, 2014) and sometimes inhibits (Oliveira and Martins, 2010) technology adoption. Another frequently used factor in the organizational context is the scope of the firm (Oliveira and Martins, 2011), which provides a proxy for the complexity that the firm is facing, for instance, through its international operations (Zhu and Kraemer, 2005). Previous studies have concluded that a greater amount of complexity can also act as a barrier to adoption (Gutierrez et al., 2015; Zhu et al., 2006b). The third and final group is the environmental context which is concerned with the factors that exist outside the firm in the external environment. Factors in this context are related to other businesses such as competitors but also industry-specific characteristics such as the degree of competition. As such, frequently considered factors are the competitive (c.f. Kim et al., 2018) and regulatory pressure (c.f. Kuan and Chau, 2001).

I use the TOE model in the context of the SMP. Through the TOE framework, DOI can be transformed into a theoretical model, that can describe the adoption of different technologies (Zhu et al., 2003). Nevertheless, there are certain shortcomings with this theoretical approach, such as the lack of clarity of the constructs specified in the TOE model (Gutierrez et al., 2015). Hence I expand on the existing model to explain more specific constructs for the SMP, drawing on AST to capture the structural element within the organization, such as the SMP (DeSanctis and Poole, 1994). Firstly, I control for all the factors identified in previous research. Secondly, based on a review of the SMP and open strategy literature, I have identified several potential new factors which could play a role in predicting collaborating technology adoption for the SMP. These factors are: SMP process compatibility; decision speed and participation intention in the organizational context; and network effects in the environmental context.

Furthermore, given the unique position of the SMP as one of the central functions in many businesses (Menz and Barnbeck, 2017), a direct link between the organizational and environmental TOE factors and the adoption of collaborating technologies seems unlikely, as it would imply that the top management team does not have any role to play in technology adoption for SMP. Given the importance of strategic planning and the fact that in many organizations this still, at least to some extent, follows the traditional hierarchical top-down approach (Baptista et al., 2017), I include the mediating role of top management in my theoretical framework. Introducing DOI and the TOE model into the context of the strategy literature allows me to develop a framework that can explain why some firms adopt collaborating technologies in their SMP and others do not.

5.3.1. Technological Context

The technological context describes any technology-relevant factors which act either inside or outside the firm (Tornatzky and Fleischer, 1990). This context includes all factors that can predict firm technology adoption with a focus on the existing technological environment available to support a firm in order to enable a potential adoption. Previous scholarship has already highlighted the relevance of this context for the adoption of other technologies. Within the technological context there are several factors that can help explain why some firms adopt certain technologies while others do not. There are three commonly used constructs in this context and I will incorporate these into my model to explain collaborating technology adoption in the SMP as control variables. First, there is the level of *technology readiness* a firm has (Venkatesh and Bala, 2012), which is defined as (i) the physical technology infrastructure; and (ii) the human resources in the IT department that maintain and manage the system, the IT support (Oliveira and Martins, 2010). The second construct is the level of *integration of technology* (Chen et al., 2015; Low et al., 2011). The level of integration of technology describes the extent to which a technology can be incorporated within the existing IT and databases and other technological processes that exist within the firm (Zhu et al., 2006b). The third construct is the perceived benefit (Chen et al., 2015; Oliveira and Martins, 2010; Iacovou et al., 1995; Gangwar et al., 2015). The perceived benefit can be understood as the extent to which a potential use of a novel technology can act as a benefit for the business (Gutierrez et al., 2015). As in previous research, I expect these same factors to impact the adoption of collaborating technologies in the SMP.

5.3.2. Organizational Context

The organizational context of the TOE model contains quantifiable institutional, administrative and managerial factors that could potentially play an antecedent role in technology adoption (Soares-Aguiar and Palma-dos-Reis, 2008). As opposed to the technological context, these factors are less focused on technology-centered aspects but more focused on other characteristics of the company in question. Previous studies have highlighted the importance of the organizational context through some core factors that could significantly be associated with technology adoption such as firm size and scope, even demonstrating that these factors might play a greater role than the technological ones (Yang et al., 2015) and also having a direct effect on technology adoption (Venkatesh and Bala, 2012).

I suggest that three other organizational context variables are important drivers of collaborating technology adoption in the SMP: process compatibility, decision speed, and participation intention. *Process compatibility* is the degree to which using collaborating technologies would fit with the existing social structure and activities of the SMP (Zhu et al., 2006a). It is important because there needs to be a degree of compatibility between a new technology and the existing value and belief systems of the firm so that the firm can integrate the new technology with the current SMP and derive value from it (Rogers, 2003; Venkatesh and Bala, 2012). I define *decision speed* as the time between a firm making a first mention of a particular course of action until that particular course is committed to action (Kownatzki et al., 2013). Decision speed is important because companies that are faster in their strategic decision making than their competitors may gain first mover advantages (Forbes, 2005). *Participation intention* is the extent to which top management wants to involve other internal and external stakeholders of the business for some or all stages of the SMP (Tannenbaum and Massarik, 1950; Baptista et al., 2017; Mitchell, 1973). Participation intention is important because receiving input and information from multiple stakeholders helps improve the outcome of the SMP (Hautz et al., 2017; Dobusch et al., 2017). I theorize that all these organizational context factors influence the adoption of collaborative technologies through the mediating influence of TMT support for several reasons.

TMT support is essential for adopting technology (Chen et al., 2015): without TMT support no adoption will take place (Gunasekaran et al., 2017; Low et al., 2011). Any technology which cannot be fully integrated into the firm's SMP is unlikely to be of value to top management and subsequently they will be less likely to support the use of that specific technology. To be integrated, a new technology needs to be compatible with either the existing value and belief system, an already established innovation or idea, or with the need for innovation (Rogers, 2003). The main point of compatibility for technology integration comes from the idea that for individuals there needs to be some idea of similarity with a novel innovation as this makes it easier for them to adopt it (Rogers, 2003). A high degree of compatibility with their SMP would allow a company to integrate collaborating technologies more easily with their strategizing. Integrating the use of a technology within the SMP of the firm helps to increase the value the firm can derive from technologies (Zhu and Kraemer, 2005). Therefore I hypothesize:

> H1: The degree of process compatibility is positively associated with the degree of top management support for collaborating technology adoption.

Decision speed also plays an important role when the TMT is trying to determine if it will support the adoption of new technology. A number of studies have found an empirical link between decision speed and business performance (Baum & Wally, 2003; Eisenhardt, 1989). One of the main reasons why firms undertake an SMP is to ensure their competitiveness compared to their main rivals (Chandler, 1962 (1975 printing)). The SMP is often used as a tool of top management to position the firm in the market in such a way that the company is able to capture growing returns from their customers, whether that be other businesses or consumers (Shrader et al., 1984). In industries where competition is fierce, it is also not only a matter of what firms do but also when they do it. A faster decision speed enables firms to achieve a "first mover advantage" which can place them in a position in which they are ahead of their main competitors with a certain strategic move (Li and Richard Ye, 1999). This could be, for instance, entering a new national market or releasing a new product. Consequently, I argue that technology which allows the firm to make faster decisions is also more likely to be supported by TMT. Eisenhardt (1989b) notes that in fast strategic decision-making companies, executives prefer using various communication tools such as email or other forms of instant messaging, and using real-time information. Collaborating technologies provide similar benefits to those observed by Eisenhardt (1989b). Consequently, I hypothesize:

> H2: The relative speed of strategic decision making is positively associated with the degree of top management support for collaborating technology adoption.

The degree to which senior management intends to involve other individuals in the SMP may also be associated with the degree to which the TMT will support the use of collaborating technologies. Increasing participation represents an important construct in the open strategy literature (Ketokivi and Castañer, 2004; Wooldridge et al., 2008). One of the central arguments of the open strategy literature is that involving more individuals in the SMP can help to improve the efficiency of the process by driving employee commitment to the company and the strategy (Hautz et al., 2017). In addition, involving other individuals in the SMP can increase the amount of information available to top management and thus enhance the effectiveness of their SMP (Whittington et al., 2011; Baptista et al., 2017). I theorize that collaborating technologies are a useful tool with which top management can involve more individuals in the SMP, since such technologies facilitate a high degree of interaction and function in real time. Consequently, I argue that in firms indicating the intention to allow greater participation in the SMP, top management is more supportive of using collaborating technologies, as collaborating technologies allow top management to effectively include a greater number of individuals. Therefore, I hypothesize:

H3: The degree of participation intention in the SMP is positively associated with the degree of top management support for collaborating technology adoption.

5.3.3. Environmental Context

Besides the technological context which considers the factors related to technology and the organizational context that considers measurable constructs about the company or business, the environmental context includes all factors relating to the sphere in which the company operates — that is, the industrial sector, the competitors alongside the company, as well as the regulatory institutions (Soares-Aguiar and Palma-dos-Reis, 2008). Environmental factors that exist externally to the firm can have a significant impact on the decisions and behaviors inside it (Luthans and Stewart, 1977). Previous studies have highlighted that factors in the environmental context tend to be the most significant ones (Gutierrez et al., 2015). C*ompetitive pressure* is one such factor (Zhu et al., 2003; Zhu et al., 2006b), which can be defined as the intensity of competition within the company's industry. Competitive pressure is often captured as the level of environmental dynamism and munificence. Environmental dynamism indicates the degree of change and variation that exists within an industry (Chen et al., 2015). Munificence denotes the capacity for further growth and opportunity an industry possesses (Baum and Wally, 2003). These two factors can provide a good indication of the competitive environment from a strategic management perspective

(Wolf and Floyd, 2017). Competitive pressure has been found to influence technology adoption because it drives firms to seek a constant competitive advantage over their rivals by adopting new innovations or technologies (Aboelmaged, 2014).

I suggest that one other environmental context variable is an important driver of the adoption of collaborative technology in the SMP: network effects. Network effects are defined as the value generated from the number of users of a technology; the greater the number of users of a technology or innovation, the more value a user can derive from that technology or innovation (McIntyre and Subramaniam, 2009). Network effects can thus influence the degree of adoption of a technology, as users may not chose to adopt a technology if it has only a small number of other users (McIntyre and Subramaniam, 2009; Kim et al., 2018). Collaborating technologies by their very nature require multiple users to have access to the technology so they can work together and collaboration can thus take place. As network effects mean that a technology only delivers value if there are multiple users, collaborating technologies can also only deliver meaningful value if they have more than one user, since when there is only one user collaboration could not take place. This is similar to the other types of digital communication technologies: equally, corresponding technologies (e.g. email and text messaging) would have no value if no other users existed (McIntyre and Subramaniam, 2009). I theorize that network effects influence the adoption of collaborative technologies through the mediating influence of TMT support for one central reason.

As network effects denote that the larger the installed base — that is, the number of users that a technology has — the greater the benefit that can be derived from it, the perceived magnitude of these network effects can signal to top management how valuable a technology will be. For example, collaborating technologies, as the name suggests, are primarily facilitators of collaboration between two or more individuals. However, within different industries and firm networks, the number of firms/people having access to specific collaborative technologies may vary due to the nature of the industry or the size of the firm (Kuan and Chau, 2001). For instance, in the UK, Microsoft Sharepoint has a market share of 34.09% in January 2020, while Slack, and IBM notes are below 5% (Liu, 2021). Hence, if the number of users of such technology is limited, and the dispersion of use remains low, top management may not support the adoption of that particular collaborating technology as the cost/benefit ratio for such technologies may be unfavorable. Consequently, I argue that the greater the network effects top management perceives for collaborating technologies in their immediate network of competitors, buyers, suppliers and other support roles, the more top management will support the adoption of that collaborating technology (Strader et al., 2007). This also links back to the main argument from open strategy theory that increased participation of individuals throughout the SMP can enhance its effectiveness (Appleyard and Chesbrough, 2017). This would thus provide some incentive for top management to support the use of collaborating technologies with higher network effects. However, this greater participation needs to be facilitated by some form of technology that is used or at least available to those individuals and organizations top management wishes to involve in the SMP. This availability is captured by network effects, as network effects take into account the installed base, that is the number of users or the degree of diffusion of these technologies. Therefore, I hypothesize:

> H4: The degree of network effects of collaborating technologies is positively associated with the degree of top management support for collaborating technology adoption.

5.3.4. Mediating Variable

I theorize that top management support plays a mediating role in the technology adoption process. *Top management support* is defined as the level of support the TMT gives to the use of collaborating technologies specifically for the SMP. Chen et al. (2015) suggest and find that adding a behavioral component to the framework by including "top management support," which is located outside the other three TOE contexts, as a mediating variable for both the organizational and environmental context can increase the explanatory power of the TOE framework. They theorize that this occurs because including top management support adds a behavioral component to capture how key decision makers in a company are required to interpret the internal (organizational) and external (environmental) factors and convert them into concrete actions (Chen et al., 2015). Further, it captures the mediating effect of human agency stemming from the top management as they make an active decision about supporting a novel technology (Chen et al., 2015). Building on these insights, I theorize that top management support plays a similar mediating role in the adoption of collaborative technologies in the SMP for several reasons.

First, the involvement of top management within any business typically spans departmental and divisional boundaries within the firm. Consequently, top management's beliefs about the value of a specific technology can play a vital mediating role in its adoption across the organization (Liang et al., 2007). Since this boundary-spanning role also allows top management to steer the company toward competitive advantage, it similarly directs the way in which the company can achieve that — for instance, by promoting the use of specific innovations or technologies within the company (Gunasekaran et al., 2017). Additionally, like strategy, the adoption of collaborating technology affects various parts across the business, hence it is vital that top management, with their boundary-spanning sphere of influence, supports an adoption of collaborating technology as otherwise the use of collaborating technology for the SMP may not take place. This relationship is similar to other technology adoptions which were found to be mediated by top management support such as cloud computing (Low et al., 2011).

Second, no technology or innovation would be adopted if there were no supporters or advocates for doing so. Firms, therefore, need some proponents or “champions” that can function as an enabler and promoter of adopting a novel technology (Rogers, 2003). In the DOI theory Rogers (2003) describes these as being either a person in a “powerful” position within the company or somebody in a coordination role. These two attributes could be ascribed to top management, who are often located at the top end of the hierarchy and also perform a coordination function within businesses. Thus, according to DOI theory, top management can act as the champion when it comes to adopting collaborating technologies within the firm. However, as the TOE model literature stipulates, when it comes to technology adoption there are certain antecedents which predict technology adoption. Combining these with the DOI, it can be argued that top management must possess some form of mediating role in this process, due to the “champion” position they can play in the adoption process. Therefore, in my model I maintain that the constructs I have added to the organizational and environmental contexts are mediated by the level of top management support for using collaborating technologies in the SMP.

Third, driving the adoption of collaborating technology allows top management to address growing calls for greater participation and a loosening of corporate hierarchies within the SMP. While in the traditional sense the SMP is seen as something performed by the top executive level (Gegenhuber and Dobusch, 2017), several corporate scandals and cases of mismanagement have led to a reconceptualization of how businesses should formulate their strategy (Adobor, 2019; Hautz, 2017). Therefore top management support for collaborating technology adoption leads to a greater adoption because doing so allows them to implement open-strategy practices (Seidl and Whittington, 2014). Open strategy can be defined as the practice to involve a greater number of individuals from throughout the company to involve them in the formulation of the business strategy (Whittington et al., 2011; Hautz et al., 2017). It is important because, as scholars have already noted, there is an increasing shift of managerial practice away from a traditional, strictly hierarchical model to accommodate more and more participation of more employees in the SMP (Hautz, 2017). Therefore, I theorize that greater support from top management for collaborating technologies leads also to increased adoption, as collaborating technologies allow firms to involve more individuals in the SMP and thus enable a greater number of individuals to participate in the SMP.

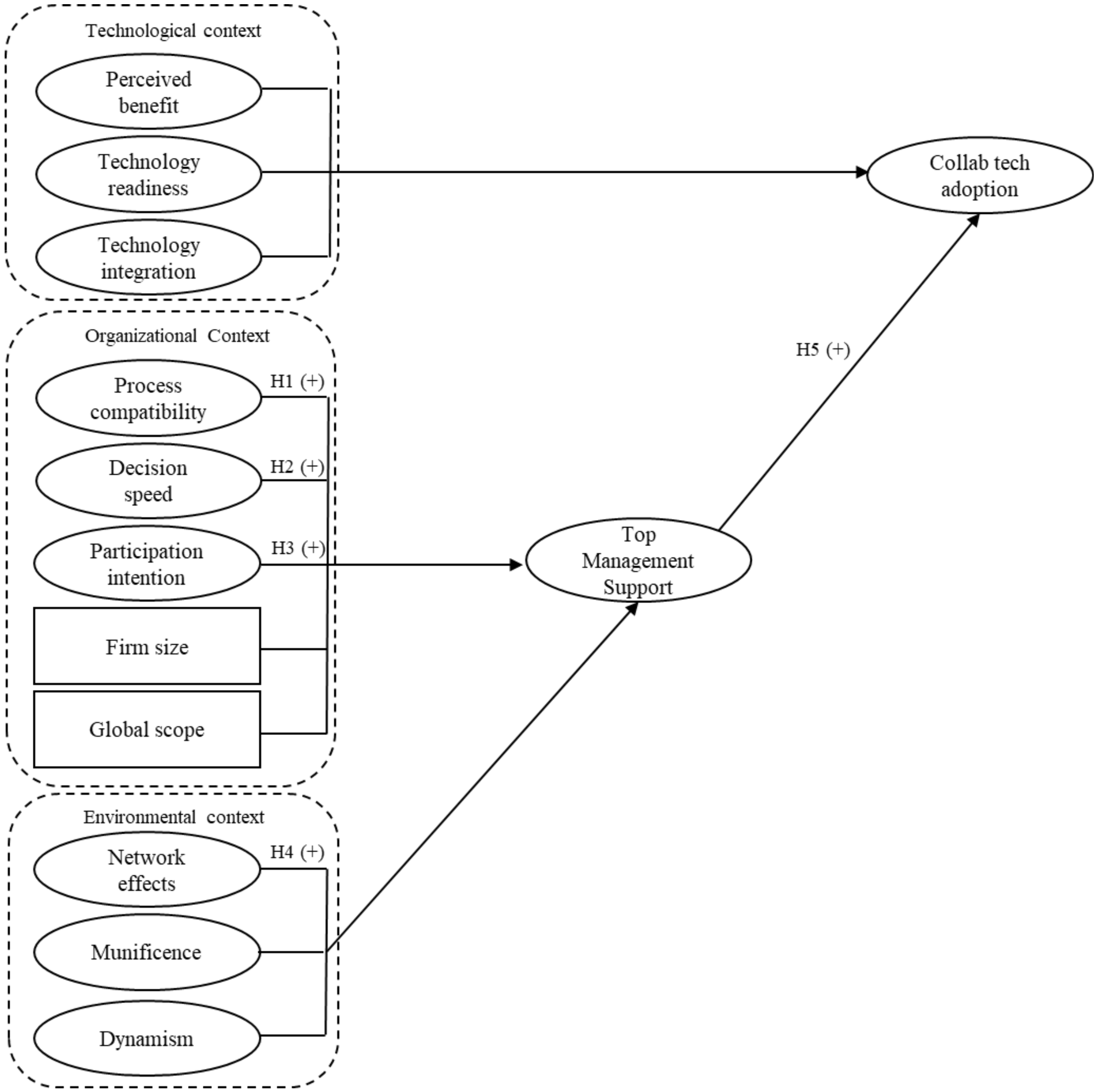
Fourth, top management support is often important in providing the necessary resources to accommodate the adoption of a new technology (Low et al., 2011). In particular, given the role of top management to oversee the allocation and distribution of financial and other resources across the business such as allocating support staff (Tornatzky and Fleischer, 1990), I argue that top management support has a direct influence on the adoption of new technology as the amount of support top management gives to adopting collaborating technologies in the SMP could manifest in the amount of funding and resources they provide to support such an adoption. For instance, in companies in which top management does not support using collaborating technologies in the SMP, it seems unlikely that the top management will provide money or allocate other resources that are required to roll out collaborating technologies in the SMP.

Fifth, as the SMP represents a vital instrument through which managers are able to compete and ensure the company’s longevity and success, managers are continuously looking to find ways in which to increase its effectiveness (Andersen, 2004). In particular, given the challenges associated with the increasing complexity businesses have to deal with, current SMP practices may not allow businesses to continuously compete successfully (Whittington et al., 2006). Whether that is through activities such as environmental scanning (Culnan, 1983) or common tools such as a "SWOT" analysis (Jarzabkowski and Kaplan, 2015), managers attempt to find ways in which they can improve the efficiency of their SMP. One such way is to adopt collaborating technologies, as they offer several benefits to businesses in general, for example improving efficiency, access to information, support with decision making or general management of the resources and capabilities in organizations (Westerman and Bonnet, 2015; Orji, 2019). This pursuit of efficiency is also described by AST as DeSanctis and Poole (1994) argue that more advanced technologies allow individuals within the firm to form new forms of connection between each other. Hence I argue that the support of top management for the use of collaborating technologies drives their adoption as the support serves as a signal and willingness of top management to what extent they want to drive greater participation across the SMP. Taking this into the context of the SMP, it could mean that strategy makers would be able to connect with other individuals and roles in the company, for instance, more customer-facing roles, for the purposes of strategy development. Therefore, I hypothesize:

> H5: The degree of top management support for collaborating technology adoption is positively associated with the degree of collaborating technology adoption for the SMP.

The following graph (Figure 5-1) represents the theoretical model I propose to explain collaborating technology adoption in the SMP and that I will now proceed to test using SEM.

Figure 5-1 Theoretical Model for Collaborating Technology Adoption in the SMP



For the sake of simplicity, the two control variables *country* and *industry* are not included in this figure.

5.4. Methodology

5.4.1. Sample

In order to test my hypotheses I conducted an online survey among British and German manufacturing businesses. The UK and Germany represent suitable locations to test my ideas in a comparative manner as they are representative of other continental European countries (Berg et al., 2018). Additionally, Germany and the UK also have different levels of digitalization, with the UK being slightly less advanced than Germany according to the Euler Hermes Enabling Digitalization Index 2019 (Dib, 2019). This may mean that the two countries also exhibit some differences in terms of collaborating technology adoption.

The data from the British sample was obtained through a survey of 1,280 companies located throughout the UK. I purchased a list of manufacturing companies from a private provider. I then conducted the data collection online in January 2020. After a total of three rounds of reminder emails I received a total of 163 usable responses which corresponds to a response rate of 11.4%. The data for the German sample was obtained through a survey of 1,187 active manufacturing firms according to the German industry classification. This list was obtained from the Amadeus Database. The data was collected online in March 2020 but only resulted in 76 responses (response rate of 9.8%) due to the accelerating impact and restrictions of the COVID-19 pandemic. In total I obtained a sample of 239 completed questionnaires.

5.4.2. Measures

Collaborating technology adoption For this study the dependent variable is *collaborating technology adoption* in the SMP which was measured by self-devised instruments. For these I followed the guidance from Gerbing and Anderson (1988). Respondents were asked how frequently they used collaborating technologies for each of the six stages or activities of a typical SMP on a seven-point scale ranging from “never” to “always”: (i) mission statement formulation; (ii) external environmental scanning; (iii) internal environmental scanning; (iv) generating and evaluating different strategic alternatives; (v) strategy implementation; and (vi) strategy control and evaluation.

Organizational Context In the organizational context I included three independent variables. To measure these independent variables I adopted existing questions from the technology adoption and strategic management literature. For *process compatibility* I used Venkatesh and Bala’s (2012) scale and adapted the wording slightly to make the questions relevant for the context of this study. For *decision speed,* I developed by own scale based on the empirical results of Eisenhardt (1989b). To measure *participation intention* I adopted the previously used scales by Dyson and Foster (1982). All three scales were measured on a seven-point scale ranging from “strongly disagree” to “strongly agree”.

Environmental Context In the environmental context I included one independent variable: network effects. To measure this variable I used Strader et al.’s (2007) scale of perceived network effects measured on a seven-point scale. The questions for this variable were measured on a seven-point scale ranging from “strongly disagree” to “strongly agree”.

Mediating Variable To measure *top management support* I adopted the scales used by Chen et al. (2015) using a seven-point Likert scale ranging from “not at all” to “it is among the highest priorities”.

Control Variables I controlled for a number of variables that past research had indicated can predict technology adoption (Zhu et al., 2006a; Zhu et al., 2003; Zhu et al., 2006b; Zhu and Kraemer, 2005; Hsu et al., 2006; Low et al., 2011). In the technology context I controlled for *perceived benefit*, *technology integration* and *technology readiness*. These were measured as follows. I measured perceived benefit by adapting the scales used by

Venkatesh and Bala (2012) measured on a seven-point scale. To measure technology integration I adapted two items on a seven point scale previously used by Zhu et al. (2006b). To measure technology readiness I adapted the questions from Venkatesh and Bala (2012) to match the focal technology to collaborating technologies. All three controls were captured using multiple seven-point scales ranging from "strongly disagree" to "strongly agree". In the organizational context I controlled for *firm size*, measured as the current number of employees worldwide. Additionally, I controlled for the *firm's global scope*, which I measured as the percentage of total revenue made in foreign countries and the number of countries in which the firm had a physical presence, as previous adoption studies found that larger and more global firms are more likely to adopt specific technologies (Hsu et al., 2006). In the environmental context I controlled for environmental *dynamism* and *munificence*. The scales for dynamism and munificence were both adopted from Baum and Wally (2003) and were measured on a seven-point scale. Additionally, to control for the country- and industry-specific effect I included a dummy variable for the *country* and the *industry*, differentiating between all those firms that self-reported themselves to be a primarily a manufacturing firm and those that did not in order to capture any industry-specific influences on technology adoption (Oliveira and Martins, 2010).

5.4.3. Common-method Variance and Non-Response Bias

When using different measures, particularly as part of a cross-sectional design and using only one participant in one company, there is a risk of common measurement biases (Podsakoff et al., 2003; Rindfleisch et al., 2008). Consequently, I put several measures in place in order to limit the impact of this and to enhance the validity of my data. Firstly, I used a research model that exhibits some level of complexity instead of simple linear relationships between the predictors and outcome variables. This can help to mitigate the impact of common-method variance (CMV) (Chang et al., 2010). Secondly, I followed Podsakoff et al.'s (2003) guidelines in questionnaire design by measuring the constructs for the independent and dependent variables at different sections of the questionnaire. Thirdly, I specifically and exclusively addressed and sent my questionnaire to the private email addresses of top managers who are best suited to provide accurate assessments of the measures I used (Craighead et al., 2011). Additionally, I also used Harman's single factor test to have a statistical assessment of CMV. The single factor model (χ^2 [902] = 3976.44, $p < 0.001$ [CFI = 0.489, TLI = 0.464, RMSEA = 0.119, SRMR = 0.103]) fits the data poorly and thus provides further evidence that CMV bias is not an issue. Additionally, the exploratory factor analysis (Table 5-1) revealed that there are multiple factors which also points toward CMV not being an issue.

I also examined non-response bias by comparing the means of the questions from those participants that responded to those that did not respond at all (Whitehead et al., 1993) using the data I had available from the survey lists I bought. I compared the sample and population means for the number of subsidiaries, the companies in the corporate group at the last reported year, the mean number of employees for the past six years available and the ROA for the past six years available. I then performed a two-sample t-test with unequal variances to compare the sample with the population mean. The results of these tests are in Chapter 4, section 4.3.3. For my UK sample I only found some small indication with one of four variables for a non-response bias. Likewise, in my German sample I only found one of the four variables may exhibit some minimal evidence for a non-response bias. These results allow me to conclude that non-response bias is not affecting my sample.

5.4.4. Preliminary Analysis of Empirical Results

To analyze my data and test my hypotheses I used SEM with Mplus 7 (Muthén and Muthén, 1998-2017). Using SEM enables me to test the various parts and elements of my model at the same time while also considering more complex relationships between the independent variables and the dependent variable (Shook et al., 2004). As it is common in management studies (Zhang and Bartol, 2010; Powell and Greenhaus, 2010; Simsek, 2007), I also follow the two-step approach outlined by Anderson and Gerbing (1988) — that is, to first test the model through a restricted model and then compute the main measurement model through a series of nested models to identify the best fitting model (confirmatory factor analysis, CFA).

Consequently, as a first step I performed an exploratory factor analysis to assess if my factors loaded into the intended constructs with an 11-factor model (χ^2 [517] = 732.912, $p < 0.001$) (Table 5-1) which exceeded the commonly accepted cutoff of the fit indices of 0.9 for the CFI and TLI([CFI = 0.964, TLI = 0.934]), and is below the commonly accepted thresholds for the RMSEA and SRMR of 0.08 [RMSEA = 0.042 , SRMR = 0.025], (Hu and Bentler, 1999; Marsh et al., 2004). Moreover, the difference of fit of a ten-factor as opposed to an 11-factor model is significant ($\Delta\chi^2$ = 103.9 [34], $p < 0.001$). For the individual factor loadings I followed the guidance by Yong and Pearce (2013) who argue that for setting the cutoff values the sample size needs to be considered. Additionally, I considered the level of significance as advocated by Shook et al. (2004) and set the cutoff for meaningful factor loadings at 0.5 (Sharma et al., 2005). As shown in Table 5-1, there are a few measures that fall below the 0.5 cutoff and were subsequently excluded. As such I was unable to reliably measure the technology integration control variable and excluded it. Additionally, dynamism appears to load onto two factors and hence I tested the first order and second order models specifically with the two factors for dynamism: the second order model fits significantly better ($\Delta\chi^2$ = 19.125 [8], $p < 0.01$) and therefore I proceeded with the second order model.

I then followed Simsek (2007) and Chen et al. (2015) and assessed the convergent and discriminant validity of my constructs as part of a CFA with the latent variables identified in the previous step. For convergent validity, the average variance extracted (AVE) needs to be above 0.5, the factor loadings must not be smaller than 0.5 and the composite reliability not smaller than 0.7 (Cheung and Wang, 2017). To compute my models and the reliability score, I removed the constraint of the first measure as it is set as the default in Mplus, in order to set the constraint as the variance of the latent factor. The aim of this was to see if the intercorrelations between my variables that were measuring one item were not too high (Kline, 2016). I then computed the reliability score and AVE to assess this. To compute these I followed the following formulas (Fornell and Larcker, 1981): The reliability (ρ) of factor η is equal to the sum of the estimates of the factors (λ_{yi}) squared divided by the squared sum of the estimates of the factors (λ_{yi}) added to the sum of the error variances (ε_i) for each of my indicators:

$$\rho_\eta = \frac{\left(\sum_{i=1}^{p} \lambda_{yi}\right)^2}{\left(\sum_{i=1}^{p} \lambda_{yi}\right)^2 + \sum_{i=1}^{p} Var(\varepsilon_i)}$$

As the reliability (ρ) of factor η does not consider the variance of the construct, I also consider the AVE calculated with the following formula as outlined by Fornell and Larcker (1981): The AVE (ρ_{vc}) of factor η equals the sum of the squared estimates of the factors (λ_{yi}^2) divided by the sum of the squared estimates the factors (λ_{yi}^2) added to the sum of the error variances (ε_i) for each of the indicators:

$$\rho_{vc(\eta)} = \frac{\sum_{i=1}^{p} \lambda_{yi}^2}{\sum_{i=1}^{p} \lambda_{yi}^2 + \sum_{i=1}^{p} Var(\varepsilon_i)}$$

The results of the reliability and the AVE alongside the summary descriptive statistics are reported in Table 5-2. Based on the specified cutoff criteria (Cheung and Wang, 2017; Hair et al., 2010), two of my control variables (dynamism 2 and munificence) did not meet the criteria and were therefore excluded from the subsequent analysis.

Table 5-1 Factor Analysis

Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
	Collaboration Tech Adoption	Technology Readiness	Network Effects	Perceived Benefits	Decision Speed	Process Compatibility	Participation Intention	Top Management Support	Dynamism 1	Dynamism 2	Munifcence
CLMS	**0.741***	0.042	-0.073	-0.029	-0.024	0.012	0.046	0.096	0.006	-0.07	0.009
CLES	**0.731***	0.016	-0.003	-0.048	-0.068	0.036	-0.067	0.066	0.062	-0.042	-0.021
CLIS	**0.763***	0.037	0.183*	0.022	-0.001	0.004	-0.022	-0.027	0.052	-0.037	-0.052
CLSA	**0.762***	0.007	0.001	0.092*	-0.03	0.017	0.076	0.039	0.03	-0.014	0.026
CLSI	**0.891***	0.012	0.108*	-0.01	0.036	-0.008	-0.022	-0.054	-0.065	0.071	0.047
CLSE	**0.866***	-0.032	0.017	0.006	0.062	-0.013	0.053	0.052	-0.056	0.062	0.04
NE1	0.134	-0.038	0.407*	0.153*	-0.015	0.087	-0.016	-0.006	0.143	0.114	0.230*
NE2	0.165*	0.206*	**0.616***	-0.003	0.024	0.024	0.017	0.03	0.012	-0.046	0.084
NE3	-0.001	0.045	**0.835***	0.04	0.009	0.004	0.016	0.078	-0.017	0.038	0.012
TERED1	0.052	**0.821***	0.041	0.022	0.016	0.06	-0.011	0.001	-0.029	-0.019	-0.006
TERED2	-0.003	**0.973***	-0.014	0.015	-0.012	-0.022	-0.027	-0.008	0.05	0.049	0.019
TERED3	0.01	**0.532***	0.269*	-0.015	-0.003	0.088	0.01	0.068	0.032	-0.103	-0.049
DESE1	0.02	0.051	0.044	0.086	**0.852***	0.014	0.007	0.009	0.052	-0.048	-0.03
DESE2R	-0.044	-0.039	-0.174*	-0.039	**0.643***	0.026	-0.02	0.019	-0.081	-0.031	0.041
DESE3	-0.001	-0.009	0.026	-0.018	**0.782***	0.055	-0.045	0.023	0.098	-0.023	-0.01
PROCO1	-0.022	0.08	0.097	0.342*	0	**0.624***	0.068	0.012	-0.028	0.017	0.032
PROCO2	0.019	0.062	-0.04	0.414*	0.028	**0.749***	0.062	-0.009	-0.008	0.023	0.041
PROCO3R	0.048	-0.066	0.13	-0.079	0.017	**0.536***	-0.055	0.159	0.025	-0.046	-0.093
PROCO4	0.049	0.158*	-0.01	0.400*	0.026	0.146	-0.086	0.089	-0.11	0.088	0.025
PERBE1	0.056	-0.008	0.087	**0.818***	-0.025	-0.022	-0.064	0.071	-0.005	-0.022	0.001
PERBE2	-0.066	0	0.015	**0.781***	-0.141*	0.017	-0.012	0.224*	0.078	-0.121	0.042
PERBE3R	-0.055	0.005	0.036	-0.025	-0.118	0.143	-0.142	0.131	0.075	-0.062	-0.004
PERBE4R	0.009	-0.088	-0.012	0.442*	-0.282*	0.094	-0.078	0.322*	0.02	-0.108	-0.038
PERBE5	0.116	-0.02	-0.085	**0.584***	0.134*	0.008	0.036	-0.041	0.048	0.022	-0.036
PERBE6	-0.005	0.002	0.147*	**0.722***	0.007	-0.02	0.068	-0.023	-0.076	0.057	-0.004
PERBE7	-0.043	0.05	0.005	**0.695***	0.091	-0.082	0.099	0.006	-0.009	-0.001	-0.029
INT1	-0.009	0.015	0.122	-0.091	0.008	0.017	**0.891***	0.04	0.018	-0.081	-0.067
INT2	0.128	-0.099	-0.001	0.072	-0.052	0.066	**0.558***	-0.058	0.038	-0.01	-0.004
INT3	0.002	-0.013	-0.055	0.049	-0.012	0.011	**0.803***	0.053	-0.008	0.067	0.074
TECHI1	0.012	0.209*	0.01	-0.014	0.096	0.078	0.009	0.296*	0.234*	0.008	0.061
TECHI2	0.071	0.09	-0.043	-0.062	0.016	-0.006	0.116	0.190*	0.215*	0.083	0.023
TMTSU1	0.087	0.137*	0.022	0.025	0.021	-0.002	0.172*	**0.714***	0.007	0.002	0.02
TMTSU2	-0.009	0.207*	0.065	0.046	-0.017	-0.013	0.025	**0.799***	-0.043	0.025	-0.009
TMTSU3	0.096	-0.022	0.043	0.084	0.034	0.079	0.032	**0.740***	0.018	0.055	0.009
DYNM1	0.063	0.016	0.054	0.088	-0.004	-0.05	0.116	-0.032	**0.724***	-0.008	-0.058
DYNM2	-0.052	-0.009	0.015	-0.02	0.001	0.04	-0.005	0.046	**0.697***	0.298*	0.05
DYNM3R	0.013	-0.031	0.039	-0.045	-0.086	0.009	-0.011	0.054	0.005	**0.531***	-0.023
DYNM4R	-0.009	-0.02	-0.011	-0.123	-0.023	-0.076	0.011	0.097	0.101	**0.512***	0.028
DYNM5	0.005	0.055	-0.019	-0.037	0.074	-0.045	-0.005	0.186*	0.391*	0.252*	0.244*
MUNI1	0.04	-0.042	-0.062	-0.039	0.089	-0.055	-0.032	0.107	-0.025	-0.586*	0.146
MUNI2	0.043	0.018	0.002	0.013	-0.034	0.028	-0.015	0.04	-0.14	0.013	**0.763***
MUNI3	0.007	0.079	0.012	-0.043	-0.114	0.035	0.038	-0.04	0.047	-0.355*	**0.541***
MUNI4	0.014	-0.05	0.041	0.099	0.12	-0.002	-0.032	-0.015	0.163	-0.167	**0.564***
MUNI5R	-0.082	-0.022	0.141	-0.04	0.059	-0.067	0.111	0.056	-0.17	-0.324*	0.226*

* Significant at the 0.05 level.

Table 5-2 Summary Statistics

Variable	No. of Items	Type	N	Mean[a]	SD[a]	Reliability	AVE[b]
Collaborating technology use	6	Dependent	239	2.70	1.61	0.937	0.714
Perceived benefit	5	Control	239	4.25	0.93	0.864	0.565
Technology readiness	3	Control	239	3.81	1.53	0.890	0.731
Process compatibility	3	Independent	239	3.63	1.33	0.836	0.637
Decision speed	3	Independent	239	3.34	1.10	0.826	0.628
Participation intention	3	Independent	239	3.31	1.35	0.836	0.639
Firm size[c]	1	Control	239	6.41	2.07	N/A[d]	N/A[d]
Scope	1	Control	239	43.47	33.60	N/A[d]	N/A[d]
Industry	1	Dummy	239	0.62	0.48	N/A[d]	N/A[d]
Country	1	Dummy	239	0.32	0.47	N/A[d]	N/A[d]
Network effects	2	Independent	239	3.25	1.74	0.883	0.639
Dynamism 1	2	Control	239	2.67	1.44	0.726	0.572
Dynamism 2	2	Control	239	2.64	1.02	0.542	0.375
Munificence	3	Control	239	2.72	0.95	0.689	0.431
Top management support	3	Mediator	239	2.94	1.68	0.934	0.826

[a] The mean and SD were computed using the arithmetic mean of the scores of all measures in the construct
[b] Average variance extracted
[c] The log was used for this statistic
[d] The corresponding construct is directly observable and not computed through a latent variable

I then proceeded to assess discriminant validity which denotes that the AVE of two constructs needs to be larger than the correlation squared between those two constructs. For this, and to assess multicollinearity, the interconstruct correlations are reported in Table 5-3 below.

Table 5-3 Interconstruct Correlation

	1 Col Use	2 Perc Ben	3 Tech Red	4 Proc Com	5 Dec Spee	6 Part Int	7 Netwo Eff	8 TMT Supp	9 Dyna 1	10 Glob Scop	11 Coun	12 Indus	13 Firm Size
1	1												
2	0.338	1											
3	0.488	0.292	1										
4	0.532	0.662	0.555	1									
5	0.162	0.131	0.275	0.239	1								
6	0.324	0.254	0.122	0.326	0.053	1							
7	0.66	0.496	0.633	0.631	0.287	0.281	1						
8	0.63	0.505	0.562	0.63	0.272	0.41	0.708	1					
9	0.271	0.201	0.238	0.162	0.133	0.262	0.289	0.275	1				
10	0.308	0.096	0.266	0.223	0.04	0.046	0.28	0.268	0.023	1			
11	0.031	-0.081	0.036	-0.026	-0.119	-0.01	-0.192	0.108	-0.161	0.056	1		
12	-0.01	0.007	-0.048	-0.023	-0.007	-0.173	-0.11	-0.11	-0.004	0.138	0.086	1	
13	0.256	0.219	0.207	0.202	0.063	-0.027	0.346	0.254	0.159	0.402	0.139	0.034	1

Assessing the squared values of the correlation, it became apparent that none of these are bigger than the AVE of the corresponding constructs. Hence my constructs exhibit both convergent and discriminant validity (Fornell and Larcker, 1981; Cheung and Wang, 2017). The fit indices of my final model using CFA and the latent variables in Table 5-2 are as follows: χ^2 [453] = 754.857, $p < 0.001$ [CFI = 0.942, TLI = 0.928, RMSEA = 0.053, SRMR = 0.055], which complies with all the criteria set out for the various fit indices.

5.5. Analysis of Model

In order to test my hypotheses and to be able to determine which of the theorized antecedent factors can predict collaborating technology adoption in the SMP, I continued with the two-step approach outlined by Anderson and Gerbing (1988) and tested a total of five structural equation models: (i) the saturated model (M_S); (ii) the null model in which all covariance parameters between the constructs are set to 0 (M_N); (iii) my hypothesized model (M_T); (iv) the constrained theoretical model in which at least one of the parameters estimated in the model is constrained, representing the best alternative to the theoretical model (M_C); and (v) in which the constrained parameters of M_T are estimated (M_U).

The saturated model is equal to the previously identified model as part of the CFA , the results of which were presented above (M_S). I then computed the second required model (M_N) setting all the covariances between my factors to 0 using the "η_1 WITH η_2 @0" subcommand within the "Model" main command in Mplus. I then proceeded to test my main hypothesized model M_T as described in the theory section of this chapter (Figure 5-1). I measured M_C by constraining the second factor loading to one of each latent construct and computed the indirect as well as direct effect on collaborating technology adoption before I unrestricted these for M_U in order to measure those paths that I previously restricted in M_C. The results for all five nested models are presented in the table below (Table 5-4).

Table 5-4 Nested SEM Models

Model Name	χ^2 **[df]**	***p***	**CFI**	**TLI**	**RMSEA**	**SRMR**
M_S	754.857 [453]	0.0000	0.942	0.928	0.053	0.055
M_U	785.512 [457]	0.0000	0.936	0.922	0.055	0.057
M_T	817.844 [464]	0.0000	0.931	0.918	0.056	0.062
M_C	879.008 [466]	0.0000	0.920	0.904	0.061	0.069
M_N	1374.387 [519]	0.0000	0.834	0.822	0.083	0.200

The results demonstrate the required sequence of $M_s > M_U > M_T > M_C > M_N$ (Anderson and Gerbing, 1988). I then performed a series of chi-square significance difference tests in order to assess my theorized model (M_T) as to determine if it possesses the best fit (Anderson and Gerbing, 1988). I thus followed the decision-tree outlined by (Anderson and Gerbing, 1988) to calculate the chi-square difference between the models. The results of this are reported in the table below (Table 5-5).

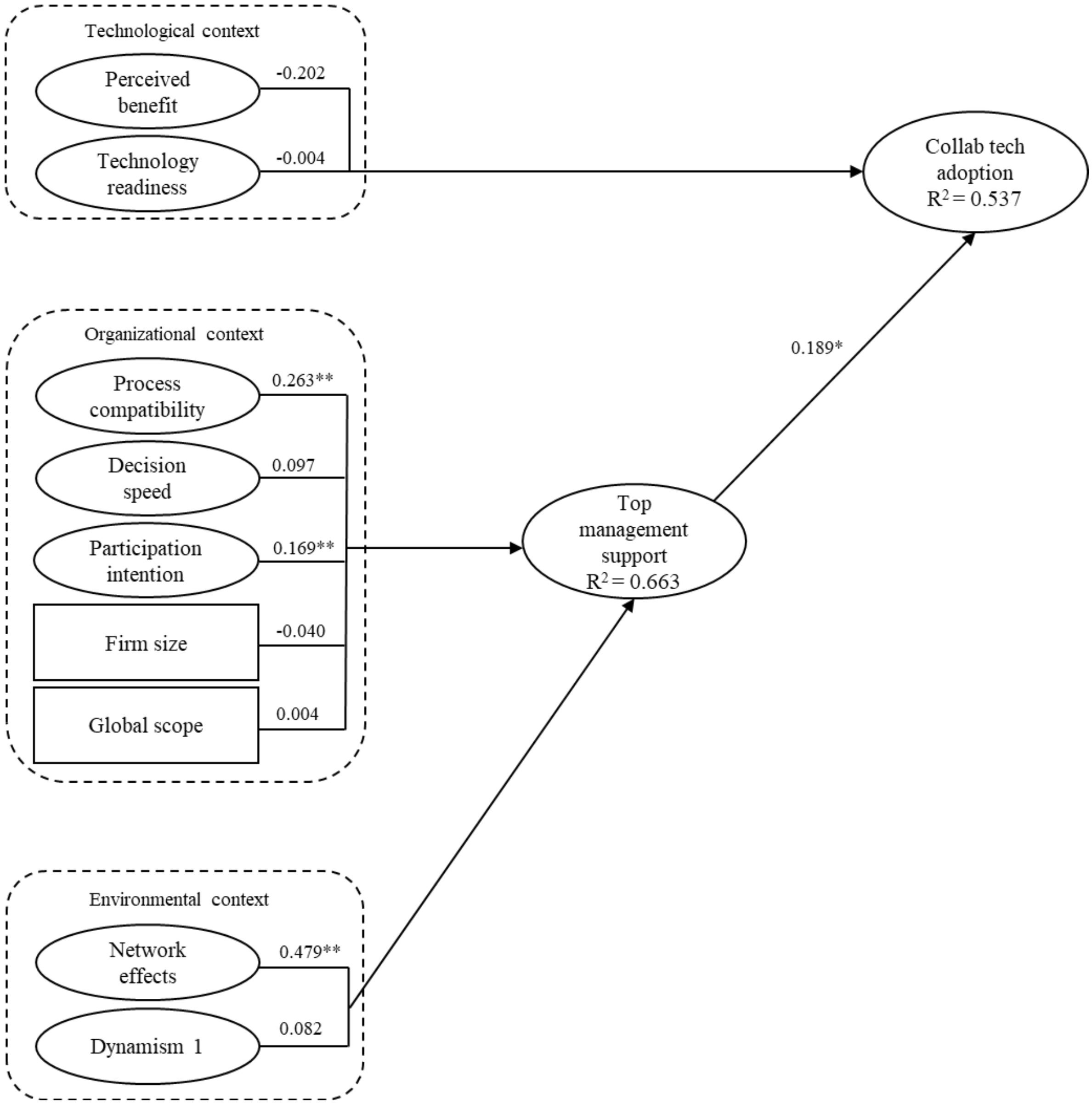
Table 5-5 Model Comparison

Complex Model	Simpler Model	$\Delta\chi^2$	[df]	*p*	Next step
M_T	M_S	62.987	[11]	0.0000	M_C - M_T
M_C	M_T	61.164	[2]	0.0000	M_T - M_U
M_T	M_U	32.332	[7]	0.0003	M_U - M_S
M_U	M_S	30.655	[4]	0.0000	Devise $M_{U'}$

As an alternative model, $M_{U'}$, Anderson and Gerbing (1988) suggest considering the parameters set out in M_T and removing the constraint. Consequently, I added a mediated path to both the control variables (country and industry). The resultant model $M_{U'}$ (χ^2 [455] = 758.911, $p < 0.001$ [CFI = 0.941, TLI = 0.928, RMSEA = 0.053, SRMR = 0.055]) possesses an insignificant difference with M_S ($\Delta\chi^2 = 4.054$ [2], $p > 0.05$) and a significant difference with M_T ($\Delta\chi^2 = 58.933$ [9], $p > 0.001$).

Based on the results of the chi-square difference tests, I accepted $M_{U'}$ which is the model with both the direct and indirect paths drawn in for the mediated variables as hypothesized, as well as the two control variables, country and industry. The resultant model and indirect path coefficients are reported below (Figure 5-2). However, in order to test my hypotheses, I determined the indirect, direct and total effect size and assessed the significance of these effects using bootstrapping since significance testing (Sobel test) has limitations assessing direct and indirect effects (MacKinnon, 2008). I used 10,000 bootstrapped samples and requested the bias-corrected version in line with Mackinnon et al. (2004). The results of this are reported in Table 5-6. The results indicate that apart from network effects, the 5% confidence intervals for the direct effects between process compatibility, and participation intention and collaborating technology adoption contain 0 and are thus insignificant. This means that these paths are fully mediated. The total effect [0.271; 0.687] and the direct effect [0.156; 0.632] between network effects and collaborating technology adoption are significant at the 5% confidence interval, while the indirect path via top management support is not [-0.006; 0.215] is insignificant. This means that while network effects have a significant positive association with top management support, the mediated association with collaborating technology adoption is not supported. One of the reasons for this result is the relatively high correlation between top management support and network effects ($r = 0.708$, $p < 0.001$), which would indicate that the effects of top management support and network effects cannot be clearly separated in regard to collaborating technology adoption.

Figure 5-2 SEM Model Results [ab]



[a] For the sake of simplicity only the indirect path coefficients were reported in this model. The coefficients are unstandardized.
[b] The coefficients of the two control variables and top management support were as follows: country b = 0.862, p = 0.000; industry b = -0.161, p = 0.293. The coefficients of the two control variables and collaborating technology adoption were as follows: country b = 0.294, p = 0.176; industry = 0.202, p = 0.216.
* Significant at the *p* > 0.05 level
** Significant at the *p* > 0.01 level

Table 5-6 Direct and Indirect Effects

	Direct			Indirect			Total		
From	**Lower 2.5%**	**Estimate**	**Upper 2.5%**	**Lower 2.5%**	**Estimate**	**Upper 2.5%**	**Lower 2.5%**	**Estimate**	**Upper 2.5%**
Process compatibility	-0.039	0.186	0.401	0.000	0.050	0.127	0.014	0.236	0.459
Decision speed	-0.201	-0.059	0.067	-0.003	0.018	0.084	-0.186	-0.041	0.091
Participation intention	-0.071	0.083	0.226	0.000	0.032	0.104	-0.030	0.115	0.247
Network effects	0.156	0.380	0.632	-0.006	0.091	0.215	0.271	0.471	0.687

5.6. Hypothesis Testing

With my first hypothesis (H1) I suggested that process compatibility is positively associated with top management support for collaborating technology adoption in the SMP. The path coefficient (b = 0.263) is significant at the 0.001 level ($p = 0.000$); therefore, H1 is supported. This implies that there is a statistically significant positive association between the compatibility of collaborating technologies with the firm's SMP and top management support for the use of collaborating technologies.

With my second hypothesis (H2) I suggested that the relative speed of strategic decision making is positively associated with the level of top management support for collaborating technologies adoption in the SMP. The path coefficient (b = 0.097) is insignificant ($p = 0.240$) and consequently H2 is unsupported.

With my third hypothesis (H3) I suggested that the degree of intention to involve more individuals in the SMP of the firm is positively associated with top management support for collaborating technology adoption in the SMP. The path coefficient (b = 0.169) is significant at the 0.001 level ($p = 0.001$) and therefore, H3 is supported. This implies that there is a statistically significant positive association between the extent to which top managers want to involve more individuals in the SMP and top management support for the use of collaborating technologies.

With my fourth hypothesis (H4) I suggested that the degree of network effects of collaborating technologies is positively associated with the degree of top management support for collaborating technology adoption. The path coefficient (b = 0.479) is significant at the 0.001 level (p = 0.001) and therefore, H4 is supported. This implies that there is a statistically significant positive association between the perceived network effects of collaborating technology use and top management support for the use of collaborating technologies.

With my fifth hypothesis (H5) I suggested that top management support for collaborating technology adoption is positively associated with their adoption. The path coefficient (b = 0.189) is significant at the 0.05 level (p = 0.008) and therefore, H5 is supported. This implies that there is a statistically significant positive association between the extent of top management support for using collaborating technologies and their adoption for use in the SMP.

5.7. Discussion

The purpose of my study was to identify the antecedent factors that could help to explain why some firms adopt collaborating technologies in the SMP and others do not. I wanted to contribute to our understanding of open strategizing practices by investigating the factors that causes firms to adopt a specific type of technology that could facilitate a greater involvement and, thus, opening up of the SMP. With their high synchronicity and shared-control affordances (Chapter 3), collaborating technologies can accommodate multiple individuals working simultaneously on files, programs or other software while also communicating and collaborating in real time. Using DOI, AST and the TOE framework, I developed new theory whose constructs can explain why collaborating technologies are adopted specifically for the purpose of using them in the SMP. I hypothesized that four constructs are positively associated with top management support to use the collaborating technologies and this support then in turn translates into a positive association between top management support and collaborating technology adoption. I tested these hypotheses using SEM with empirical data that I had collected from 239 different firms. The results of the study indicate support for four out of my five hypotheses and thus determine three latent variables positively associated with top management support for collaborating technology use: process compatibility, participation intention, and network effects. These three constructs have a significant positive association with top management support to use collaborating technologies, and top management support in turn possesses a significant positive association with collaborating technology adoption in the SMP.

The analysis of the direct and indirect effects (Table 5-6) allows for additional interpretations to be made of how precisely these associations may work as part of a causal framework. On the one hand, the indirect effect of process compatibility on collaborating technology use mediated by top management support is significant (b = 0.050 [0.000; 0.127]) while the direct effect is insignificant (b = 0.186 [-0.039; 0.401]). This is similar to participation intention and its effect on collaborating technology adoption with the indirect effect being significant (b = 0.032 [0.000; 0.104]), while the direct effect is insignificant (b = 0.083 [-0.071; 0.226]). This would suggest that these two paths are fully mediated and thus confirms the importance of human agency in making technology adoption decisions, as suggested by Chen et al. (2015). On the other hand, for network effects only the direct path (b = 0.380 [0.156; 0.632]) is significant while the indirect effect (b = 0.091 [-0.006; 0.215]) is insignificant. Thus in the case of network effects I was unable to detect a mediation, which contradicts the results of Chen et al. (2015) as their variable in the environmental context was partially mediating technology adoption.

As a result, there are several implications of this study for the ongoing theoretical understanding of this field. By identifying two constructs that possess an indirect effect with collaborating technology adoption, I have highlighted several previously unconsidered aspects of the open strategy literature. Firstly, I have demonstrated that top management plays an important role in the overall adoption of collaborating technologies for the SMP. This would mean that using technologies for the purpose of strategizing is a decision that is at least partially influenced by top management and their support for such technology. This implies that any technology use within the strategy therefore requires some sort of consent and support from top management and appears not to be something that lower managerial levels could force upon them as it is suggested by Guinan et al. (2014). The implication of this for the open strategy literature is that the initiators of any open strategy approaches remain at the top level of management, particularly if the effort of opening up requires using some form of collaborating technology.

Secondly, my results suggest that the compatibility of the SMP also plays a vital role in driving TMT support for the use of such technology. This confirms previous studies that also highlighted the importance of compatibility in technology adoption (Zhu et al., 2006a). The implication of this is that some firms' SMP lends itself more to the use of collaborating technologies than that of others. Considering process compatibility provides us with a better understanding as to why some firms engage in open and (or) digital strategizing practices and others do not. While my study does not reveal what precisely it is that creates this compatibility of collaborating technology use with the SMP, this link demonstrates that the established processes and social structures around the firm's SMP (e.g. the responsibilities or the manner in which it is done) can predict if a firm's TMT supports more open practices facilitated by collaborating technologies. Thus in some companies the firm's SMP itself can certainly act as a barrier to the adoption of these technologies.

Thirdly, I identified participation intention as another vital construct to potentially explain collaborating technology adoption. This provides some level of support to my conceptualization and classification of collaborating technologies, in as much as top management perceives collaborating technologies primarily as a tool to involve other people. As there is a statistical association between the intention to involve other individuals and top management support for the adoption of collaborating technologies, there is thus some evidence that suggests the use of a collaborating technology in the SMP depends on how willing top management is to involve other individuals in the SMP. This, too, helps open strategy scholars to understand how significant the influence of top management is in the implementation of such practices.

Fourthly, I did not identify a significant association between the relative decision speed and top management support for using collaborating technologies. This could imply that these technologies are not necessarily perceived by top management as a tool to speed up the SMP or to maintain its high speed. As decision speed is a relative construct, it could also be the case that the consideration of the competitor's speed may not be a point of consideration in technology adoption decisions for the SMP. Previous studies have already found that competitive pressures were insignificant in technology adoption (Aboelmaged, 2014), although other studies' results contradict this (Hsu et al., 2006). My findings could suggest that by involving more individuals the SMP might be slowed down or even protracted to some extent. However, it might be the case that this is a trade-off top management is willing to make for the sake of involving more individuals in the SMP.

Fifth, network effects were another significant factor, but unlike participation intention and process compatibility, I found network effects to directly drive collaborating technology adoption in the SMP. This highlights the importance of the wider user base of collaborating technologies both within and outside the company and also highlights the role of the external environment in technology adoption (Gutierrez et al., 2015). If collaborating technologies are perceived to be widely used within the firm's value network, the adoption of collaborating technologies in the SMP increases. This may indicate that the wider adoption of collaborating technologies throughout the firm itself as well as the firm's wider value network can also be associated with an adoption of collaborating technologies in the SMP, which supports the role of external pressure previously outlined in technology adoption (Iacovou et al., 1995). Consequently, the impact of network effects does not depend on the amount of support TMT gives to the use of collaborating technology. This to some extent then supports the narrative of lower managerial levels driving the transition of digital strategizing practices throughout the organization, as opposed to this being a process which entirely depends on the consent and support of top management. Nevertheless, the significant association of network effects with collaborating technology adoption suggests that the value derived from shared-control technologies such as collaborating technologies stems also from the number of existing users. This implies then that an adoption of collaborating technologies in the SMP does not take place if the technology in question has not reached wide-scale adoption (McIntyre and Subramaniam, 2009).

Sixth, neither of the two variables included in the technological context, technology readiness and perceived benefit, was found to be significantly associated with collaborating technologies. In this respect, my study contradicts earlier findings in the technology adoption literature (Zhu et al., 2003). There could be two main reasons for this: the first could simply be that collaborating technologies do not require the same amount of technological sophistication as semantic web technology (Kim et al., 2018) or artificial intelligence (Alsheibani et al., 2020). Most collaborating technologies such as Microsoft365 or Zoom are easy to use and set up and, therefore, do not necessarily require much input or support from IT experts. Alternatively, it could also be that most organizations are already using collaborating technologies elsewhere in their business and subsequently do not depend on IT support an adoption of collaborating technologies for use in the SMP. The lack of significant association could also imply that for technologies with a higher degree of user-friendliness, technological factors are less important than the organizational and environmental ones, due to the ease with which these technologies could be adopted.

In sum, with this study I make three main contributions. First, while there are several studies that have described how firms are using technologies to facilitate an open strategy process (Plotnikova et al., 2020; Heracleous et al., 2018) there has been a lack of understanding as to why some firms are adopting these technologies for strategizing in the first place. I contribute to this understanding with a model based on the TOE framework that can help to explain the technologies' adoption. My empirical study found support for the argument that a firm's organizational and environmental contexts play a vital role in the adoption of collaborating technologies in the SMP. Consequently, the theory I have developed can help scholars to better understand some of the preliminary factors (process compatibility, participation intention, and network effects) that drive and maybe reinforce technology adoption for strategy purposes. Additionally, the mediating effect of top management can also help scholars to re-conceptualize extant open strategy processes and dynamics that use technology, by placing greater emphasis on the crucial role top management support plays in that process.

Second, technological factors, at least in the case of adopting collaborating technologies for the SMP, were not found to be significantly associated with their adoption. This contradicts the findings of earlier technology adoption studies. Subsequently, when it comes to explaining the adoption of technologies for specific business processes as opposed to studying adoption for a firm or organization as a whole, certain contexts of the TOE framework appear to lose their relevance. Thus the implication for scholars is that the focus on technology adoptions should be centered around the factors in the organizational and environmental contexts and can move away from technological factors when it comes to digital strategizing factors.

Thirdly, this study is, to the knowledge of the author, one of the first to describe technology adoption specifically in the context of the SMP. As such, with this study I contribute to both fields by creating a link between technology adoption and strategic management. I established this link by combining some of the previously identified factors of the technology adoption literature with others adapted from the strategic management literature. Even though some of the previously identified factors did not display statistical significance, I was able to demonstrate that the TOE framework can be successfully adapted to describe technology adoption in the SMP. This provides support for scholars from other management-related disciplines as this demonstrates the suitability of the TOE to explain technology adoption for one specific type of technology or for a specific purpose.

5.7.1. Limitations and Conclusion

This study contains some limitations. As the data was collected with the same questionnaire as that discussed in Chapter 4, the detailed discussion of limitations there largely applies to this study as well. In this section I briefly summarize the main points and illustrate their applicability to this study. Firstly, the results of this study may have some limited generalizability due to the data being collected in two European countries. Unfortunately, due to the limited responses from the German sample, a meaningful comparison of the two countries was not possible using SEM, as the German group was too small. Future studies may therefore wish to explore the adoption of collaborating technologies in the context of other geographic or cultural boundaries with larger sample sizes in order to produce meaningful comparative results. Secondly, a limited sample size affects the statistical power, particularly for SEM with a large number of covariates and parameters. While the sample size of this study relative to the complexity of this model is relatively small (Kline, 2016), the size of my sample is still larger than that of Chen et al. (2015) whose sample was only 161 for an equally complex model. Thirdly, similar to my first empirical study (Chapter 4), I again used a self-reported use of collaborating technologies as the main dependent variable. However, I took several steps to minimize the possible impact of CMB. While objective measures about collaborating technology use would have been preferable, these would be extremely difficult to obtain from a sample size such as mine. The measures used in this study therefore represents the best ones available. However, future research may wish to sample the actual use of collaborating technologies of firms or develop a way in which this could be easily and objectively captured. This would then open up further valuable avenues of research into technology adoption. Fifth, although I used or adapted existing measures, some of these were not as reliable or some factors were not loading above the threshold I set. For instance, both measures of my technology integration constructs (Zhu et al., 2006b) loaded below 0.5 and therefore could not be used for the main analysis. Consequently, future research may wish to triangulate data from different sources in order to establish meaningful and reliable instruments.

In conclusion, with greater calls for more transparency, understanding of complexity, accountability and participation in civil society, businesses too may need to open up their core strategic decision making processes. The findings we have from the open strategy literature indicate that doing so can have many benefits. In the previous chapter I also demonstrated that using specific types of digital communication technologies to do so can even positively impact business performance. However, we did previously not understand why firms may or may not decide to adopt specific types of digital communication and social technologies for the purpose of strategizing. In this study, I have developed new theory based on DOI and AST to explain how the role of top management support can explain this adoption. Through an empirical study of British and German businesses investigating the use of collaborating technologies, which offer shared control and real-time functionality, I could find support for four of five of my hypotheses. I found that the degree of compatibility between a business's existing SMP and the use of collaborating technologies is positively associated with their adoption, fully mediated by the level of top management support. Similarly, the intention to involve other people is positively associated with collaborating technology adoption, fully mediated by the level of top management support. Network effects are also positively associated with collaborating technology adoption, but unlike the previous two variables, they are only partially mediated by top management support as they also possess a significant direct effect. Therefore, in order to be successful in the adoption of collaborating technologies for strategizing, businesses need to have an SMP that is compatible with using these technologies, be willing to include more individuals in the process and chose a software with a large installed-base, that is a large number of businesses already using it. In these respects, my study makes a vital contribution to our existing knowledge.

Chapter 6 – Review and Conclusion

6.1. Summary of PhD Thesis

With this thesis, I set out to make a valuable and novel contribution to advance our understanding of the usage of digital communication and social technologies by firms for the purpose of strategic management. As a growing proportion of business processes become digitalized (Dib, 2019; Tekic and Koroteev, 2019), I intended to find out whether the strategic management process (SMP) itself is also becoming more digital and, at the same time, more open. As with any novel development, this may be positive or negative and with my first study I wanted to establish whether using digital communication technologies in the SMP has a positive impact on business performance. Additionally, I wanted to find out why some firms use digital communication technologies for strategizing and other firms do not.

Taking the above as my general aims, my intention was to contribute to the growing field of digital and open strategizing with a novel theory that can explain how the use of specific types of digital communication technologies at certain stages of the SMP can boost firm performance. Additionally, I wanted to make a further meaningful contribution to the strategy and technology adoption literature by adapting an existing technology adoption framework in such a way that it could be used to explain technology adoption specifically in the context of the SMP. To address these aims and achieve the intended contributions, I conducted three different studies: (i) a systematic literature review of the strategy and IB literature to develop an overview of our current understanding of how technologies are used for strategizing and internationalizing; (ii) an empirical study into how digital communication and social technologies are currently used in the SMP and whether their use has a significant impact and whether this has a significant impact on firm performance; and

(iii) an empirical study of the antecedent factors of collaborating technology adoption for the SMP.

6.1.1. Systematic Literature Review

I conducted a systematic literature review for the purpose of scoping what it is we currently know about digital communication technology usage in the SMP. At the same time this also helped to highlight the existing gaps in our knowledge in this subject. I set up six search terms through which I could identify 13 distinct themes of articles published in the IB or strategy literatures. Those articles that related to business, management, strategy and internationalization were either specific to one technology (e.g. Pogrebnyakov, 2017) or focused on the development of a business strategy or internationalization process of technology companies (e.g. Brouthers et al., 2016). Consequently, I established that scientific studies exploring how newer information communication technology such as digital communication technologies are used for strategizing and internationalizing are not that common in the IB and strategy literature. In total, I reviewed 1,759 papers of which 73 were published in top IB and strategy journals.

To explain the lack of research in my particular area of interest, I discussed three main reasons. Firstly, there is no appropriate theory that can help scholars to explain the potential impact of these new technologies, including digital communication and social technologies. The existing theories scholars have previously made liberal use of, such as resource based view (RBV) and transaction cost analysis (TCA), reach their limits when it comes to explaining how businesses use technologies to formulate their strategy: these technologies add another layer of complexity which RBV and TCA are not set up for. Secondly, there is a lack of scientific data. While some popular press outlets or consultancy agencies seem to be successful in conducting regular surveys which capture how firms use specific types of technology, scholars have been less able to do so; to explore potential phenomena around technology use in strategy and IB, scholars require access to participants in order to collect this data. The third and final reason for the lack of research is the existing path dependency of research in strategy and IB. Whilst conducting the systematic literature review, I noticed that several research topics were the direct result of a previous call for research by another scholar. This of course leads to research topics developing along a certain avenue or narrative. While this is no condemnation of such efforts, which are also very valuable, this can lead to topics being a bit restricted, especially when it comes to the theoretical explanations that these articles rely on.

With the systematic literature review I established that our current knowledge in regard to digital strategizing and internationalizing practices is mostly limited to very specific technological platforms or managerial processes and operations in general. We do not yet have a very profound understanding of why and how some technologies are better suited for the SMP than others. I also contributed to our current understanding by providing three explanations as to why researchers have yet to explore these questions. However, these barriers need to be overcome as anecdotal evidence points towards a greater relevance of newer ICT in strategy and internationalization processes. Scholars need to keep up with the developments in the field in order to provide the required understanding for management practitioners as to whether or not these are developments that benefit businesses.

6.1.2. Use of Digital Communication Technology in the SMP

In order to address two of the limitations of our current understanding that I highlighted with my systematic review, I conducted an empirical study of the current usage of digital communication and social technologies in businesses' SMP. It is only recently that there has been some effort by scholars to explore the use of digital communication technologies for strategizing activities (e.g. Plotnikova et al., 2020). However, these are predominantly based on case-study methodologies and do thus not allow a meaningful cross-case comparison. This is the gap that I intended to fill with my first empirical study. Additionally, I wanted to explore whether this growing digitalization, undoubtedly accelerated by the COVID-19 pandemic from 2020 onwards, possesses a positive business performance-enhancing effect. By doing so, I could help inform managerial practice and enable manager practitioners to decide whether digital strategizing is a practice they wish to engage with. To determine whether the performance-enhancing effect exists, I collected quantitative survey data from 239 British and German manufacturing firms between January and March 2020. The questionnaire was sent to senior managers and executives in order to obtain meaningful data about technology usage in the SMP. I developed a two-by-two classification that categorizes existing digital communication technologies based on media synchronicity and interactivity theories so that I could ask the participants about the types of digital communication and social technologies they use in the SMP (corresponding, broadcasting, aggregating and collaborating technologies).

I hypothesized that using specific types of technology at different stages of the SMP could enhance performance in the SMP. I generated specific hypotheses for each of the six stages of the SMP (mission statement formulation, external scanning, internal scanning, generation and evaluation of strategic alternatives, strategy implementation, and strategic control and evaluation). I found a positive impact on qualitative firm performance by the use of aggregating technology in the mission statement, internal scanning and external scanning stages; of broadcasting technology in the strategy implementation stage; and of collaborating technology in the strategy evaluation and control stage; but no relationship for corresponding technology use in the generation and evaluation of strategic alternatives.

I have thus made several contributions. Firstly, I brought forward a reconceptualized understanding of the strategic planning–performance relationship. By bringing in and testing positions from the open strategy literature, I was able to empirically test these. With my results I demonstrated that using specific types of digital communication technologies in the SMP can allow firms to accommodate a greater number of participants and so open up their SMP. The results further highlight that for those stages or activities of the SMP, for which previous research has highlighted the benefits of a greater involvement of individuals — that is, the mission statement formulation, internal and external scanning, and strategy control and evaluation — the use of aggregating technology can positively enhance qualitative business performance. In contrast, the stage for which I theorized corresponding technology usage to be the most appropriate — generating and evaluating different strategic alternatives — did not exhibit any statistically significant association with enhanced firm performance. Possible explanations for this could be that corresponding technologies are not appropriate technologies for strategy-related activities or are too dispersed and widely used to represent an advantage.

Another important contribution I have made with this study is to demonstrate the value of developing a more detailed understanding of the digitalization of individual business processes by differentiating between different types of digital communication and social technologies. By differentiating between the different affordances of the four types of digital communication technologies I have demonstrated that firms are selectively using different types of technologies for the SMP, rather than uniformly relying on one type and using that throughout. This also contributes to our understanding as it highlights that no single technology is appropriate for the entirety of the SMP. By this I have highlighted that future strategy and IB research may wish to focus on the affordances of specific technologies and use these to identify commonalities and differences between the suitability of these technologies for a specific business function.

6.1.3. The Adoption of Collaborating Technologies in the SMP

With my second empirical chapter (Chapter 5), I intended to fill the gap in understanding as to why some firms adopt digital communication and social technologies in the SMP while others do not. While there are several fields in the wider management literature that have investigated their own adoption of technology, strategic management has not yet been fully explored in the same way. Therefore, with this study I aimed to fill this gap and make a contribution to our knowledge by building on the theory and previous empirical research of the existing technology adoption literature.

Using the technology–organization–environment (TOE) framework (Tornatzky and Fleischer, 1990) as a template, I identified a set of variables in each of the three contexts as well as a mediating variable in the literature. In the technological context I incorporated two previously identified constructs: perceived benefit and technology readiness. As these were previously found by several studies to significantly predict technology adoption I included them as control variables in my study. However, the results of my study showed that neither of these appear to play a role in collaborating technology adoption in the SMP as the effects I determined were statistically insignificant. In the organizational context I included two variables that again were previously included in other technology adoption studies: firm size and global scope. I developed new theory to explain why process compatibility, strategic decision speed and the participation intention of top management may be positively associated with the adoption of collaborating technologies in the SMP. While the two previously used variables were not significantly associated with technology adoption, I found a significant association for process compatibility and participation intention fully mediated by top management support for the use of collaborating technologies. I did not detect any significant association between the strategic decision speed and top management support. In the environmental context I included two further variables — environmental dynamism and munificence — as these are two frequently chosen controls in the strategy literature. I then developed a new theoretical explanation as to why the perceived network effects of collaborating technologies also act as a predictor for their adoption. While I did not identify a significant effect with my two control variables, I was able to identify a significant effect of network effects which was partially mediated by top management support.

With this study, then, I have made three main contributions. First, I have expanded our understanding when it comes to explaining differences among firms in regards to technology adoption for the SMP. In response to this gap, I have developed a TOE framework which scholars can use in order to explain technology adoption for the purpose of digital or open strategizing. I identified three novel factors in the TOE contexts — process compatibility, participation intention and network effects — that potentially play a vital role in the adoption process. Whilst my study was investigating the adoption of collaborating technologies in the SMP, there is potential for future scholarly work to test the adoption of the other three types of digital communication and social technologies within the SMP.

Secondly, I have demonstrated that the previously identified technological factors of the TOE do not appear to be of much relevance when it comes to the adoption of collaborating technologies. This may be due to the fact that collaborating technologies are relatively user-friendly as opposed to some of the more complex technologies that were the focus of earlier TOE studies. And finally, I have contributed to the technology adoption literature by studying the phenomenon of technology in a specific business process. By my having done so successfully, future scholars may explore technology adoption in other specific processes such as internationalization or supply procurement.

6.2. Contribution of Thesis

By conducting three separate studies under the topic of the adoption and use of digital communication and social technologies in the SMP of British and German businesses, I intended to make several novel contributions to the wider strategic management literature and advance our understanding of certain phenomena. Apart from the contributions made separately by each my three studies, the results and findings of the entire thesis taken together also make some important contributions.

First, in my second chapter I highlighted that we currently lack data about the use of digital communication technologies in the SMP. To address this gap I conducted a large-scale quantitative survey asking participating firms about their current use of such technologies. My thesis is among the first to do so, especially in the cross-cultural context. Even though the restrictions of the COVID pandemic impacted my data collection and the number of responses was not as high as intended, I was still able to produce a comprehensive and detailed dataset which provides us with some important and interesting insights into the use of digital communication technologies. Whilst I explored a set of specified hypotheses, the dataset itself could be used by other scholars to explore further relationships and theoretical constructs. Additionally, my dataset could be used as part of a longitudinal study seeking to explore the impact of the COVID-19 pandemic on the digitalization of businesses, as I collected my dataset just before the pandemic.

Second, I have demonstrated with my studies that the digitalization process of the SMP is more than just a managerial fad. This process may contain the potential to fundamentally change how businesses strategize, moving away from the traditional exclusive top management-only approach that was previously described, to become more participatory and open. Nonetheless, my results indicate that the role of top management remains important and with this study I thus hope to contribute to senior executives' and top management's understanding of digital strategizing by aiding them to recognize the potential benefits of such an approach. By identifying the specific stages of the SMP in which certain types of digital communication technologies enhance a firm's performance, I have contributed a useful roadmap for managers to choose the most appropriate type of technology for the activities in which they attempt to take a more open approach to strategizing. As I ran the regression models individually, even opening up just one stage or activity can have a performance-enhancing effect. Therefore, managers may wish to trial their initial attempts and open up their SMP one stage or activity at a time.

Finally, I have also made a vital contribution to managerial practice by highlighting the role of top management when it comes to the adopting and establishing of digital strategizing practice. This is of relevance for strategy scholars as well as managerial consultants, as it means that efforts should be centered around top management and their intention to involve other individuals. In this I align my contribution with that of other studies such as Hart (1992) and Hautz (2017), who both highlight the role of top management to generate value from the input of other employees before they may lose interest to participate in the SMP. In this regard I have shed some light on the question of who instigates this opening up process: namely, top management, as the results from both my fourth and fifth chapters highlight how vital top management support was in both studies, but particularly in regard to the actual adoption of digital communication technologies in the SMP. Consequently, the shift from a more closed to a more open strategizing process is likely to depend on the level of support that top management gives to such a transition. While this may sound discouraging and less "revolutionary" than such a shift occurring from the bottom up, it also provides encouragement as my results indicate that such a shift to open strategizing has not only social benefits but indeed also business performance benefits.

6.3. Limitations of Thesis and Areas for Further Research

As with any research, the efforts I have undertaken for my thesis are not free from limitations. While in Chapters 4 and 5 I listed the limitations of the corresponding study, in this section I briefly outline the overall limitations of this PhD thesis. To identify these I followed the guidance of Brutus et al. (2013).

Certainly, the chosen research design for the primary studies of this thesis limits the internal validity of my study. There are many well-documented caveats associated with asking respondents to self-report the use of a technology within an organization. There are certainly several influences that I could not control as part of this study, such as the individual attitude the participant has toward digital communication technologies. This could, for example, influence their perception of how often these technologies are used, possibly "too much" or "too little". This could also apply to the level of support they find top management gives to the use of such technologies in general, as the perception of this could vary according to who is asked from top management. To address this internal validity issue, future scholars may wish to develop more reliable measures of support and actual technology usage — for example, through the use of more objective data.

Another limitation is the external validity of this study. As I primarily focused on newer digital communication technologies and developed a two-by-two matrix based on the degree of interactivity and synchronicity various technologies afford, the boundaries of my definitions may exclude other existing or emerging technologies. The focus of my study is therefore exclusive to those technologies that can be incorporated into the two-by-two categorization. Consequently, this may exclude any technologies that fall in-between the two dimensions or are not captured by the dimensions at all. Additionally, any technologies which do not directly facilitate human interaction or communication, but yet may play a role in a company's SMP such as Enterprise Resource Planning software, are not considered in my thesis studies. As such the external validity of my thesis and its generalizability may be limited. Since I conducted my survey in two European countries, the findings may also be less generalizable to other geographic markets such as the Asian or American ones. In particular, the focus of my sampling was on companies with 100 or more employees. The findings of my study may thus also not be generalizable to businesses with fewer than 100 employees, or start-ups. To address these limitations, future scholarly work may wish to explore this topic using a different kind of classification of technologies, or maybe focus on those technologies which fall outside my two-by-two classification. Additionally, it would constitute a fruitful area of research to explore digital strategizing practices with start-ups or specifically focusing on small and medium-sized enterprises, as previous research has highlighted that smaller companies go about their strategizing in a less formalized fashion.

Another limitation of my study is the ways in which I measured both firm performance and technology usage in the SMP. First, firm performance was measured using two constructs relating to quantitative and qualitative performance. These were self-reported and also limited to the specific constructs to which they are related (e.g. market share, or market access). The use of technology in the SMP could of course have more complex implications for firm performance, affecting the share price or cash flow, for example. These are some aspects that I did not capture with the constructs used in this study. Future research may wish to assess the impact of digital communication and social technology use on other firm performance indicators. Additionally, I only measured the use of the four types of digital communication and social technologies specifically in the stages of activities that I conceptualized for my thesis (Chapter 3). Subsequently, the measures I used for this do not necessarily allow for any conclusions to be derived about how these technologies are used outside the SMP, which may also have an impact on firm performance. Other researchers may wish to explore other areas of businesses in which the four types of digital communication and social technologies are used, and how their use impacts firm performance.

Finally, the statistical tests used to determine both the effect of digital communication and social technology use in the SMP and the adoption of collaborating technologies in the SMP are subject to statistical measurement errors. This means that the values ascribed to the variables I used in this study may be very different from their actual value in the population. In particular, given the small sample size of my study, my results may suffer from a limited generalizability about the associations between the various constructs in the wider population. This may be partly due to the chosen methodology, as researchers in general exhibit difficulties recruiting participants for surveys. Therefore, future researchers wishing to explore this matter may need to obtain wider-scale data on technology usage in the SMP.

6.4. Conclusion

In this PhD thesis, I have made an original attempt to advance existing knowledge of strategic management. In the first chapter, I argued that while the exploration of the digital revolution has advanced in other areas of business research, the field was lacking a systematic exploration of how increased digitalization of businesses has impacted strategic management. In undertaking this research, I sought to address that gap and enable the strategic management literature to maintain its relevance during this third industrial revolution. As management scholars, it is vital that we understand these ongoing developments because they inform managerial education and future practice. With this research, I was able to suggest that using digital communication technologies not only translates a previously manually conducted SMP into the digital sphere, but indeed represents a potential avenue for businesses to enhance the effectiveness of the SMP, and thus ultimately, business performance. However, to do so, it would not be advisable for a firm to simply adopt any digital communication technology. What I have demonstrated with my research is that those technologies which facilitate a wider inclusion of different stakeholders in the SMP, such as aggregating and collaborating technologies, tend to possess a more significant performance-enhancing effect than those that do not allow for wider inclusion, such as corresponding technologies. In particular, what this demonstrates is whether or not corresponding technologies have lost their relevance in the modern business of today. I have also been able to identify the relevant antecedent factors that can help scholars and management practitioners alike achieve the successful adoption of collaborating technologies.

The findings of this thesis mark merely the beginning of a wider transformation and discussion about the future of strategic planning in businesses. The idea of open strategizing has been around for some time now, yet managers have appeared hitherto to lack the practical means to embrace it without going down the long-winded and time-consuming route of physical meetings. With the emergence of Web 2.0 and other Internet-based technologies we now have for the first time technologies available that allow top management to pursue wider participation in a practical, time-efficient way. However, the question remains open as to whether the various stakeholders of a business *wish* to become involved in the strategizing efforts. This is one vital question that still needs to be explored in the future by researchers.

Whilst I draw out potential ways in which a more participatory and open SMP could be handled through the use of aggregating or collaborating technologies, my results also revealed that corresponding technologies remain the most widely used type at all stages of the SMP. Some of the technologies that fall into this category, such as email, have been in use by most businesses since the mid-1990s. However, my research highlights that for most stages of the SMP corresponding technologies do not represent the ideal choice as their affordances are limited and do not match the needs of the individual stages. For instance, for external scanning I suggested that aggregating technologies are better suited as they allow the development of a broader insight through the aggregation of different perspectives from a greater number of individuals. As previous research suggested, bringing in a more diverse set of insights and interpretations can help firms to make this process more efficient. However, doing so via emails, for example, is in many ways impractical and inefficient as information can get lost in long chains or individuals may get excluded as corresponding technologies are more selective. With this thesis, I therefore would like to help current managerial practice to move on from the more established corresponding technologies and encourage practitioners to explore other types for strategic planning, such as aggregating or collaborating technologies.

These various newer aggregating and collaborating technologies signify themselves through their increased user-friendliness. In the fifth chapter, I identified a set of factors that could potentially contribute to the adoption of collaborating technologies. Among those, the technological factors were insignificant, which could potentially point towards the ease with which top management can implement collaborating technologies. With the availability of subscription models, for many firms the adoption of collaborating technologies does not represent a significant investment. Therefore, this route of involving more individuals in the

SMP is an option that is available to various businesses and can represent a fruitful avenue for companies to enhance their SMP.

In conclusion, the complexity which businesses will face in the future is unlikely to decrease. The COVID-19 pandemic has shown how easily one event can completely derail established practices. As with many things, to face these future and current challenges both society in general, as well as businesses in particular, require more collective efforts. With this thesis, I have shed some light on how using digital communications in strategic management can facilitate such collective action, and made novel as well as meaningful contributions to the strategic management literature and managerial practice.

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Appendix 1 – Search Terms Systematic Literature Review

1. ICT and Social Technologies (general)	2. ICT and Social Technologies (specific)	3. IB/Strategy (general)
"information technolog*" OR "communication technolog*" OR "social technolog*"	"social media" OR collaborative OR "decision technolog*" OR digital OR online OR electronic OR sharing OR resources OR exchange OR cloud OR survey OR edi OR email	strateg* OR internationli?ation OR expansion OR diversification OR dematerili?ation OR branding OR positioning
4. IB/Strategy Process (specific)	**5. Context**	**6. Internet**
"development" OR "external analysis" OR "internal analysis" OR "environmen* analysis" OR "long?term plan*" OR "generat*" OR ideas OR cho* OR strateg* OR implement* OR evaluat* OR goal?	E?business OR e?commerce OR m?business OR m?commerce OR i?business	Internet OR web OR internationali?ation OR multinational OR technology OR digital OR e?commerce OR e?business OR "internet?enabled" OR "Web 2.0" OR strategic OR strategy OR international OR business OR online

Appendix 2 – Questionnaire

How important are quantitative analytic techniques in making strategic decisions?

Not at all	☐	☐	☐	☐	☐	☐	☐	Very important

How would you describe the process that has the most influence on your firm's strategic decisions?

Mostly intuitive	☐	☐	☐	☐	☐	☐	☐	Mostly Analytical

In general, how effective is your firm at focusing its attention on crucial information and ignoring irrelevant information?

Not at all effective	☐	☐	☐	☐	☐	☐	☐	Very effective

When making decisions, are those involved in the strategy process primarily concerned with their own goals or with the goals of the firm?

Own Goals Completely	☐	☐	☐	☐	☐	☐	☐	Organisational Goals Completely

Your Company's Strategic Planning Process

	Not at all 1	2	3	4	5	6	Extensively/ Completely 7
How extensively does your firm look for information in making strategic decisions?	☐	☐	☐	☐	☐	☐	☐
How extensively does your group analyse relevant information before making a strategic decision?	☐	☐	☐	☐	☐	☐	☐
To what extent are people in your firm open with each other about their interests and preferences in the strategic decision?	☐	☐	☐	☐	☐	☐	☐
To what extent are strategic decisions affected by the use of power and influence among those involved in the strategy process?	☐	☐	☐	☐	☐	☐	☐
To what extent are strategic decisions in your firm affected by negotiation among those involved in the strategy process?	☐	☐	☐	☐	☐	☐	☐

To what degree do you want to involve your firm's stakeholders (e.g. employees, customers etc.) in the strategy process?

Not at all (top management team only)	☐	☐	☐	☐	☐	☐	☐	All identifiable stakeholders

To what degree do you want to communicate the various aspects of the strategic management process with your firm's stakeholders?

Not at all	☐	☐	☐	☐	☐	☐	☐	Free flow to and from all stakeholders

To what degree do you want to involve other stakeholders in the <u>strategic decision-making</u> process in your firm.

Not at all (top management team only)	☐	☐	☐	☐	☐	☐	☐	All identifiable stakeholders

The Strategy Makers

What is the approximate average age of those involved in making final strategic decisions? ____________

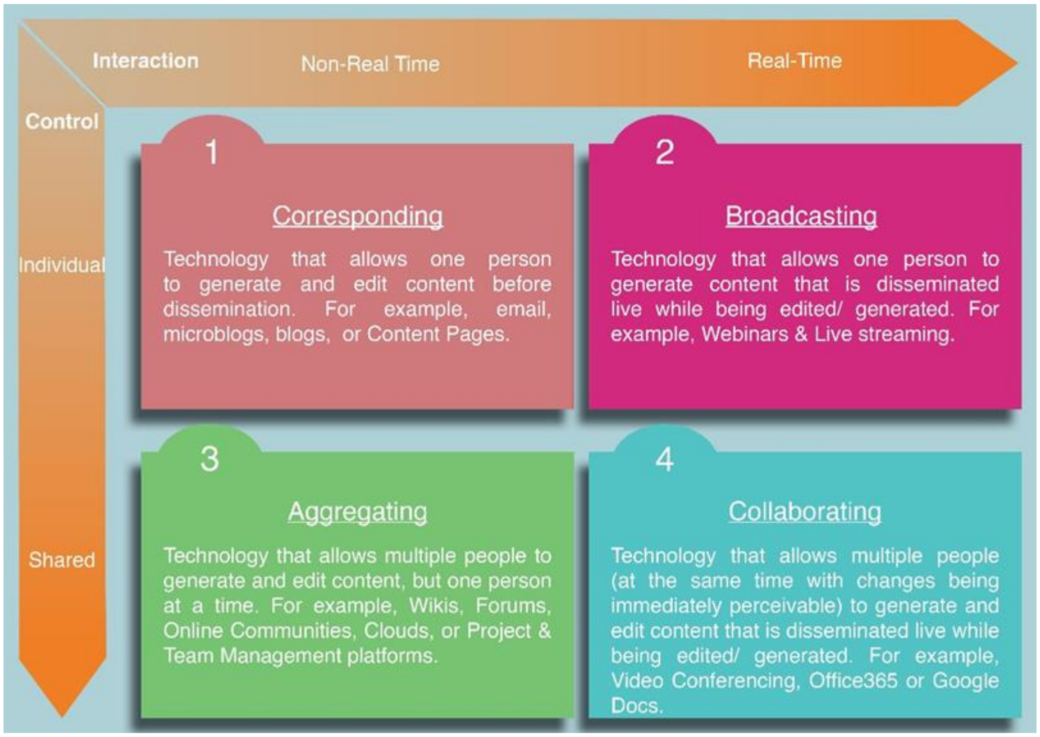
How many employees does your company have in corporate development and strategy functions (approximate)? __________________________

Do you currently employ or contract external individuals or firms to assist your firm with strategy formulation?

☐ Yes ☐ No ☐ Not currently but have done in the recent (2 years) past

Your use of Digital (Social) Communication Technologies

This section is concerned with the use of digital (social) communication technologies in your firm's strategy process. We differentiate between four types of digital communication technologies, as per the graphic below.



Please indicate, how often you use each type of digital communication technology for the different activities that are associated with strategy-making.

Mission Statement Formulation / Review (The mission statement is a written document that summarises your company's purpose and direction in the future.).	Never	Rarely	Occasionally	Usually	Often	Most of the time	Always
Corresponding Technologies (e.g. email; microblog; blog or Content Pages)	☐	☐	☐	☐	☐	☐	☐
Broadcasting Technologies (e.g. Webinar; Video Stream)	☐	☐	☐	☐	☐	☐	☐
Aggregating Technologies (e.g. Wikis; Forums; Online Communities; Clouds; Project and Team Management Platforms)	☐	☐	☐	☐	☐	☐	☐
Collaborating Technologies (e.g. Office 365; Google Docs; Video Conferencing)	☐	☐	☐	☐	☐	☐	☐

External Scanning (External scanning is a formal process to gather information about what is taking place in the context in which your firm operates (e.g. competitors, legal, technological, market, economy etc.).	Never	Rarely	Occasionally	Usually	Often	Most of the time	Always
Corresponding Technologies (e.g. email; microblog; blog or Content Pages)	☐	☐	☐	☐	☐	☐	☐
Broadcasting Technologies (e.g. Webinar; Video Stream)	☐	☐	☐	☐	☐	☐	☐
Aggregating Technologies (e.g. Wikis; Forums; Online Communities; Clouds; Project and Team Management Platforms)	☐	☐	☐	☐	☐	☐	☐
Collaborating Technologies (e.g. Office 365; Google Docs; Video Conferencing)	☐	☐	☐	☐	☐	☐	☐

Internal Scanning (Internal scanning is a formal process to gather information about what is taking place inside your company (e.g. performance indicators, strengths, weaknesses, employee's skills, status of projects etc.).	Never	Rarely	Occasionally	Usually	Often	Most of the time	Always
Corresponding Technologies (e.g. email; microblog; blog or Content Pages)	☐	☐	☐	☐	☐	☐	☐
Broadcasting Technologies (e.g. Webinar; Video Stream)	☐	☐	☐	☐	☐	☐	☐
Aggregating Technologies (e.g. Wikis; Forums; Online Communities; Clouds; Project and Team Management Platforms)	☐	☐	☐	☐	☐	☐	☐
Collaborating Technologies (e.g. Office 365; Google Docs; Video Conferencing)	☐	☐	☐	☐	☐	☐	☐

Generating potential strategic alternatives (Creating a set of alternative plans or options that could also be attained).	Never	Rarely	Occasionally	Usually	Often	Most of the time	Always
Corresponding Technologies (e.g. email; microblog; blog or Content Pages)	☐	☐	☐	☐	☐	☐	☐
Broadcasting Technologies (e.g. Webinar; Video Stream)	☐	☐	☐	☐	☐	☐	☐
Aggregating Technologies (e.g. Wikis; Forums; Online Communities; Clouds; Project and Team Management Platforms)	☐	☐	☐	☐	☐	☐	☐
Collaborating Technologies (e.g. Office 365; Google Docs; Video Conferencing)	☐	☐	☐	☐	☐	☐	☐

Evaluation of potential strategic alternatives and selecting one (or more) (Assessing the viability, profitability, feasibility or other set criteria of the available options).	Never	Rarely	Occasionally	Usually	Often	Most of the time	Always
Corresponding Technologies (e.g. email; microblog; blog or Content Pages)	☐	☐	☐	☐	☐	☐	☐
Broadcasting Technologies (e.g. Webinar; Video Stream)	☐	☐	☐	☐	☐	☐	☐
Aggregating Technologies (e.g. Wikis; Forums; Online Communities; Clouds; Project and Team Management Platforms)	☐	☐	☐	☐	☐	☐	☐
Collaborating Technologies (e.g. Office 365; Google Docs; Video Conferencing)	☐	☐	☐	☐	☐	☐	☐

Strategy Implementation (Executing and/ or launching the business strategy in part or as a whole).	Never	Rarely	Occasionally	Usually	Often	Most of the time	Always
Corresponding Technologies (e.g. email; microblog; blog or Content Pages)	☐	☐	☐	☐	☐	☐	☐
Broadcasting Technologies (e.g. Webinar; Video Stream)	☐	☐	☐	☐	☐	☐	☐
Aggregating Technologies (e.g. Wikis; Forums; Online Communities; Clouds; Project and Team Management Platforms)	☐	☐	☐	☐	☐	☐	☐
Collaborating Technologies (e.g. Office 365; Google Docs; Video Conferencing)	☐	☐	☐	☐	☐	☐	☐

Strategy Control/ Evaluation (Ensuring strategy is implemented as intended, measuring the performance of the selected strategy against a set of criteria).	Never	Rarely	Occasionally	Usually	Often	Most of the time	Always
Corresponding Technologies (e.g. email; microblog; blog or Content Pages)	☐	☐	☐	☐	☐	☐	☐
Broadcasting Technologies (e.g. Webinar; Video Stream)	☐	☐	☐	☐	☐	☐	☐
Aggregating Technologies (e.g. Wikis; Forums; Online Communities; Clouds; Project and Team Management Platforms)	☐	☐	☐	☐	☐	☐	☐
Collaborating Technologies (e.g. Office 365; Google Docs; Video Conferencing)	☐	☐	☐	☐	☐	☐	☐

In what year was your firm started (approximate)? ______________________________

How many locations (offices, stores, factories, etc.) does your company currently have worldwide? ____________

Your company's environment

This section asks you some questions about the industry structure in which your company currently operates.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
Our firm must frequently change its products/services and practices to keep up with competitors.	☐	☐	☐	☐	☐	☐	☐
Products/services quickly become obsolete in our industry.	☐	☐	☐	☐	☐	☐	☐
Actions of competitors are quite easy to predict.	☐	☐	☐	☐	☐	☐	☐
Consumer tastes are fairly easy to forecast in our industry.	☐	☐	☐	☐	☐	☐	☐
Technology changes very quickly in our industry.	☐	☐	☐	☐	☐	☐	☐
There are only few external threats to the survival and well-being of our firm.	☐	☐	☐	☐	☐	☐	☐
Our markets are rich in investment capital.	☐	☐	☐	☐	☐	☐	☐
Economic development programs offer sufficient support for our business community.	☐	☐	☐	☐	☐	☐	☐
Our markets are rich in profitable opportunities.	☐	☐	☐	☐	☐	☐	☐
Our firm operates in a threatening business environment.	☐	☐	☐	☐	☐	☐	☐

General Company Information

Compared to other firms in your industry and region, where do you see your company for:

	Lowest 20%	Below Average	Average	Above Average	Top 20%
Firm's total sales growth	☐	☐	☐	☐	☐
Firm's after-tax return on assets	☐	☐	☐	☐	☐
Overall firm performance/success	☐	☐	☐	☐	☐

How many employees does your firm have worldwide (approximate)? ____________________

What has your firm's annual sales (in million GBP £) for the last fiscal year? £____________________

What percentage of total sales are made in foreign countries (approximate)? __________%

What percentage of total sales are spent on R&D (approximate)? ____________%

Including the UK, in how many countries does your firm have a physical presence? _______

Please indicate which industry sector your company is in (largest share of total sales).

Primary:_____________________________Secondary:____________________________

Please indicate which of the following options best describes your company's ownership

☐ State/ Government Owned ☐ Public Limited ☐ Private Limited Company (Ltd)

☐ Partnership ☐ Subsidiary of a larger firm ☐ Other: ____________

Is your company a subsidiary of a holding or another larger corporation?

☐ Yes ☐ No

What is your age in years? __________

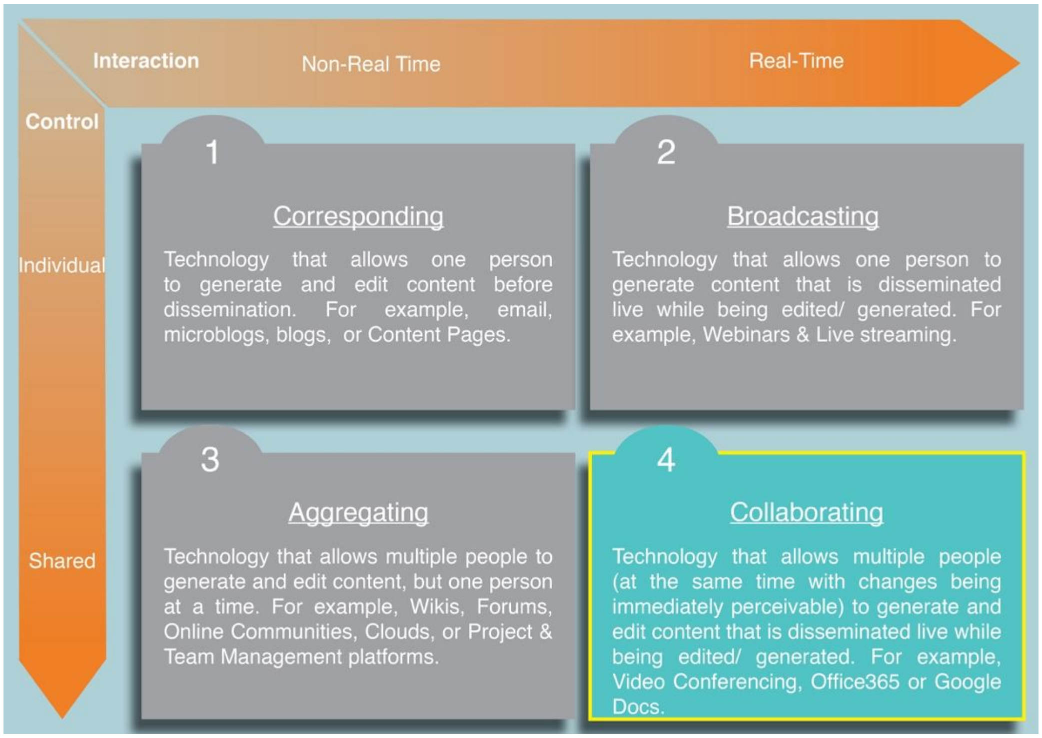
What is your gender?

☐ Female ☐ Male ☐ Prefer not to say

What is your position in your current company? ____

How many years have you been with your current firm? _____________________

Now we would like to explore the compatibility and level of support for using **Collaborating Technologies** in your firm's strategy process.



Please indicate to what extent you agree or disagree with the following questions.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
Many firms in our industry use Collaborating technologies in the strategy process.	☐	☐	☐	☐	☐	☐	☐
Assuming our firm has access to Collaborating technologies, we would use them in the strategy process.	☐	☐	☐	☐	☐	☐	☐
Given that we have access to Collaborating technologies, I predict that our firm would use it in the strategy process.	☐	☐	☐	☐	☐	☐	☐
If our firm has access to Collaborating technologies, I would want to use them as much as possible in the strategy process.	☐	☐	☐	☐	☐	☐	☐
Many employees in our company use Collaborating technologies.	☐	☐	☐	☐	☐	☐	☐
Many of my peers use Collaborating technologies.	☐	☐	☐	☐	☐	☐	☐
Our current ICT systems can support Collaborating technologies that we need for our strategy process.	☐	☐	☐	☐	☐	☐	☐

Please indicate to what degree:

	Not at all 0	1	2	3	4	5	A great deal 6
Our strategic management process is electronically integrated with our internal databases and information systems.	☐	☐	☐	☐	☐	☐	☐
Our company's databases and information systems are electronically integrated with those of our suppliers and business customers.	☐	☐	☐	☐	☐	☐	☐

Please indicate to what extent you agree or disagree with the following questions:

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
We have the ICT infrastructure that we need to implement Collaborating technologies.	☐	☐	☐	☐	☐	☐	☐
We have the in-house expertise to implement Collaborating technologies.	☐	☐	☐	☐	☐	☐	☐
I consider the speed at which we make strategic decisions to be faster than our competitors.	☐	☐	☐	☐	☐	☐	☐
Our competitors make strategic moves faster than we do.	☐	☐	☐	☐	☐	☐	☐
Our current strategy process allows us to react faster to things than the average in our industry.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies would be compatible with our current strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies would fit well with our existing strategy processes.	☐	☐	☐	☐	☐	☐	☐

These questions ask you about the general support of your company's top management team (TMT).

	Not at all 0	1	2	Somewhat 3	4	5	It is among the highest priorities 6
Does the TMT promote the use of Collaborating technologies in the strategy process?	☐	☐	☐	☐	☐	☐	☐
Does the TMT create support for Collaborating technologies initiatives within your organisation?	☐	☐	☐	☐	☐	☐	☐
Has the TMT promoted Collaborating technologies use as a strategic priority within your organisation?	☐	☐	☐	☐	☐	☐	☐

Please indicate to what extent you agree or disagree with the following questions.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
We would have to change our current strategy process to be able to use Collaborating technologies.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies would not interfere with our current exchange of files, data and information in our strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies can improve coordination with different individuals involved in the strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies can increase the efficiency of our strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies can increase the costs associated with our strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies cannot improve our strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies can reduce the number of errors and misunderstandings in our strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies can improve the sharing of information among those involved in our strategy process.	☐	☐	☐	☐	☐	☐	☐
Collaborating technologies can help us to increase the scope of strategy-relevant information that we gather.	☐	☐	☐	☐	☐	☐	☐
I expect us to use Collaborating technologies for the strategy process in the future.	☐	☐	☐	☐	☐	☐	☐

Business Performance and Industry

This section asks you about your firm's past performance.

Please indicate how satisfied you are with your firm's performance in the following areas:

	Very dissatisfied 1	2	3	4	5	6	7	8	9	Very Satisfied 10
Sales Level	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sales Growth	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Market Share	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Profitability	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reputation	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Market Access	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Marketing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Distribution of product or service to customers/ clients	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

End of questionnaire