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The Reconfiguration of the Pharmaceutical Business Model

Navn:	Ingrid Saupstad, André Tvilde Trankalis

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André Tvilde Trankalis
Ingrid Saupstad

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André Tvilde Trankalis Ingrid Saupstad

Abstract

Technological innovations are transforming business models across multiple industries, and are radically changing the way firms create and appropriate value. The pharmaceutical industry has been dominated by large companies with a structure aimed at producing blockbuster drugs. However, the industry is under growing pressure from both internal and external factors and the costs are increasing regardless of the value delivered. The returns obtained from the traditional model are diminishing which is forcing fundamental changes for many companies operating in the industry.

The purpose of this thesis is to analyze how the pharmaceutical industry is responding to these pressures through a comparison of the old blockbuster business model and the current model. Based on Drucker's (1954) five business model elements, the pharmaceutical business model is described and explored. For the purpose of gaining a deeper understanding of the theory of a business model, we followed the reasoning of Fjeldstad and Snow (2018) and added the concept of value configuration to the concept of business model. Following a descriptive and exploratory methodology allowed us to compare the characteristic similarities and differences of the five business model elements in the traditional and current model. We conducted in-depth interviews with employees of the management of a large pharmaceutical company, as well as stakeholders in the pharmaceutical industry in Oslo. We believe this thesis contributes with novel insight on how the pharmaceutical business model is evolving.

Working through theories on different concepts of business models and analyzing the empirical material, we arrived at a conclusive discovery: Roche is shifting its focus from delivering a product to delivering health outcomes. This transformation of perspective is providing novel ways to create and appropriate value. We point out that the industry is restructuring to support and facilitate for this process of reconfiguration. Our thesis contributes to explore and detect that the pharmaceutical business model is moving away from the traditional blockbuster model. Thus, we observe a shift from a value chain configuration towards a value shop.

1. Introduction

In this section, we will present the background information on our research topic, specify and define our research question and explain the structure of the thesis.

1.1 Background

Businesses have constantly been evolving, but digitalization is today fundamentally challenging and accelerating the pace they evolve. New technologies and innovations are transforming the way businesses are conducted, and these imperative changes impose new business environments to operate in. Digitalization and technological development provide opportunities to create value in a variety of areas, ranging from products and services, to processes and systems. It is completely altering how a company performs business (Zott & Amit, 2017).

Following the era of digitalization, new opportunities to connect businesses and customers are enabling a blurring of their traditional boundaries (Ritzer & Jurgenson, 2010). Digitalization is also changing roles and relationships between actors, and specifically turn around the power in favor of the consumer (Hagberg et al., 2016). Decreasing information asymmetry and increasing market transparency enable consumers to exert more influence on products and services delivered (Rezabakhsh et al., 2006). The demand-side has empowered its influence on the supply-side, thus changing the power balance between a business and its customers (Doherty & Ellis-Chadwick, 2010). This is changing the expectations of how companies deliver value for its customers and force them to re-evaluate how they conduct business.

Digitalization is shortening the life cycle of products and services. This creates a constant evolving business environment and challenges companies' ability to create sustainable competitive advantage (Kuula & Haapapasalo, 2017). It challenges a company's ability to create value for customers and the ability to appropriate value while doing so. To overcome these obstacles, established firms are forced to convert their business model (Sosna et al., 2010).

A business model presents "the assumptions about what a company gets paid for" (Drucker, 1994), thus connecting the business environment, mission, and core

competencies (Kuula & Haapapasalo, 2017). A business model perspective requires a holistic view and a need to look beyond products and processes, in the quest for innovating a new paradigm for business (Amit & Zott, 2012). The business model has always been a core element of economic activities, however the concept has not gained prominence as a research field until the last decades (Teece, 2010). As a consequence, there is a lack of consensus in the definition of a business model, as well as its key components. For the purpose of this thesis, Drucker's five business model elements are used as theoretical framework: *1) customer, 2) value proposition, 3) product/service offering, 4) value creation mechanism* and *5) value appropriation mechanism*.

The pharmaceutical industry is characterized by being highly innovative and considered by many to be the most important industry in the world. In 2016 the industry's worldwide revenue was EUR 952 billion (Statista, 2018). The ten largest pharmaceutical companies by revenue constitute around half of the global market, from now on referred to as "Big Pharma". The business model of Big Pharma is characterized by a structure where the financial gain originates from developing extraordinary profitable drugs, i.e. blockbuster drugs. Developing a blockbuster drug involves both high costs and high risk of failure. Nonetheless, a single blockbuster can compensate for all investments made. This constitutes high barriers for entry and the industry has for decades been dominated by Big Pharma (Ubel, 2016).

Declining R&D productivity, continued patent expiration, increased customer influence, governmental pressures and technological development, are creating a growing pressure on the Big Pharma's traditional blockbuster model. In the traditional model, value was measured by volume and profitability. However, following an empowered influence by the customer, value is today defined around the customer and the outcome delivered (Porter, 2010). The value generated from the traditional model is diminishing, and disabling its ability to maintain successful growth. These circumstances are forcing Big Pharma to re-evaluate their business model.

1.2 Research Question and Aim

In our initial phase of writing this thesis we discovered a lot of research texts about the declining profitability of the blockbuster model, however, it was little to detect on how the changing dynamics are affecting the value mechanisms, and how Big Pharma is responding when this occurs.

Several studies have been published on how pharmaceutical companies are adapting to the research paradigm of open innovation. We recognize the impact it has had on the pharmaceutical industry, however, we neither believe that it is addressing the core challenges of the blockbuster model, nor that it will provide a solution to the issue.

We therefore saw it as relevant to examine what alterations pharmaceutical companies are pursuing in the quest for identifying and pointing out a sustainable business model. Hence, the aim of our thesis is to clarify how the pharmaceutical industry is responding to the diminishing value obtained from the traditional business model. This led us to the following research question:

"How does the pharmaceutical industry respond to the diminishing return obtained from the blockbuster model, and how can a new model mitigate it?

We believe understanding this can bring clarity to an ambiguous industry and enable managers to comprehend the essential changes occurring in the pharmaceutical industry.

To be able to answer our research question, we needed to obtain a deeper understanding of the pharmaceutical business model. We were obliged to thoroughly examine the blockbuster business model as well as the current model employed by a large pharmaceutical company. The objective of our thesis is not to generalize on behalf of the global industry, but to reveal aspects of the current business model of a central player in Oslo.

1.3 Thesis Structure

The thesis is divided into five sections. Firstly, a literature review is provided, including theory regarding business model, value configuration and business model innovation. Secondly, a review of the pharmaceutical industry is presented. Next, the methodology for our thesis is addressed. Subsequently, the empirical data are presented and reviewed which create the foundation for our analysis. Then, we conduct an in-depth analysis of the blockbuster business model and the business model of current operations. We compare the two, and add value configurations as a contingency variable in order to increase our understanding of the pharmaceutical business model. Lastly, a summary and a conclusion are presented.

2. Literature Review

2.1 Business Model History

The theory of "business model" has its origins in Peter Drucker's (1954) answer to "what is a business?" He asserted that to know what a business is we must start with its *purpose*; the purpose of a business is *to create a customer*. He further explained that what the customer thinks he is buying, what he considers "value", is decisive – it determines what a business is, what it produces, and whether it will prosper. For it is the customer by his willingness to pay for a good or for a service, who converts economic resources into wealth, things into goods (Drucker, 1954). Through his early work on defining a business, Drucker can be regarded as the precursor of the business model concept that were further developed by numerous of scholars after him.

Business models have always been a core element of economic activities, however, the concept has not gained prominence as a research field until the last few decades (Teece, 2010). In the late 1990s, when the growth of the Internet and e-commerce emerged, the concept became an established expression. The Internet and e-commerce led to an increased customer power as the customer were provided with easy access to a vast amount of data. Further, the Internet represented a new distribution channel and challenged the traditional way of

viewing a business; it required new ways to *deliver* value to the customer, as well as *capturing* value (Teece, 2010).

2.2 Business Model Theory

Despite of its foundations, progress in the business model theory has been hindered by the lack of consensus in the definition of a business model, as well as its key components (Zott et al., 2011). Anderson et al. (2007) state that "The frequent use of the concept in combination with the many practical and theoretical definitions of the concept makes it difficult to create one coherent view of what it means, what is included in the concept and, what the purpose is of applying it". Zott et al. (2011) claim that the literature has been developed predominantly in silos, which is why the literature has resulted in diversified definitions rather than one. Another possible explanation to the fluctuation on the subject might be that the business model is a broad concept in which it incorporates a great amount of theories through a wide range of academic disciplines.

Various opinions flourish in the academic literature, on which criteria define a business model. In the following we have listed articles which have received attention for their definitions. We believe these articles underscore our point, that there exists no consensus when it comes to defining the concept.

Table 2.1. Selected Definitions of the Business Model

Author(s)	Business Model Definition
Amit & Zott (2001)	"A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities"
Magretta (2002)	Business models are "stories that explain how enterprises work."
Chesbrough & Rosenbloom (2002)	A Business model is "the heuristic logic that connects technical potential with the realization of economic value."
Casadesus-Masanell & Ricart (2010)	Business model refers to the logic of the firm, the way it operates and how it creates value.
Johnson et al. (2008)	Business models "consist of four interlocking elements, that, taken together, create and deliver value. These are customer value proposition, profit formula, key resources, and key processes."

Teece (2010)	"A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value"
Osterwalder and Pigneur (2010)	A business model describes the rationale of how an organization creates, delivers, and capture value."

The authors mentioned in the table, address different perspectives on the topic of business model, but they agree upon that every profitable enterprise is built on a functional business model. A business model describes how the pieces of a business fit together. Some scholars see these pieces as persons who are confronted with situations, like "who", "what", "when", "why", "where", "how" and "how much". The business model can be an abstraction, a conceptual tool and told as a story, but the core of any business model is the question of how to earn money. The business model represents a firm's underlying core logic and strategic choices for creating and capturing value within a value network.

Magretta (2002) follows Drucker's belief when defining "a good business model" as one that provides answer to the following questions: "Who is the customer? And what does the customer value?" and further "How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?" The reasoning behind these questions is that a business model concerns how an organization earns money by addressing these two fundamental issues; "how it identifies and creates value for customers" and "how it captures some of this value as its profit in the process" (Casadesus-Masanell & Enric, 2010).

Following a comprehensive analysis of the of the business model literature, we observe that even if it is seen as an architecture, a conceptual tool or model, a structural template, a method, or a framework (Zott et al., 2011), some concepts are constantly recurring. Namely, the discussion of how the firm creates a business by creating value for a customer and to gain profit from it while doing it.

With these elements recurring we only see it logical to cite the scholar who defined it in the first place. With Drucker's five elements, *1) customer 2) value proposition 3) product/service offering 4) value creation mechanism 5) value*

appropriation mechanism we believe one can tell the story of how a firm is able to create a product/service which has a value for the customer, and how it is able to appropriate value from it.

2.3 Business Model Elements

For the purpose of the following thesis, Drucker's five business model elements are used as theoretical framework. Following Fjeldstad and Snow's (2018) reasoning, based on Drucker (1954), we agree that the five elements of a business model allow researchers to describe and specify a business - how it creates and appropriates value. In order for us to use the business model concept in our analysis, the five elements are now presented and clarified.

2.3.1 Customer

An important element of the business model is knowing your customer. To understand more about this element, Drucker (1954) provides useful insight which we now will look deeper into.

"The customer is the foundation of a business and keeps it in existence "(Drucker, 1954). He further explained that "the first step towards finding out what our business is, is to raise the question: Who is the customer? What does the customer buy?" Having discovered who the customer is and what the customer buys, the business must answer the more difficult question "What does the customer consider value?" What the customer considers value is so complicated that it can only be answered by the customer himself. Management should not even try to guess at it – it should always go to the customer in a systematic quest for the answer. For it is the customer who determines what a business is (Drucker, 1954).

2.3.2 Value Proposition

Creating value for customers means finding a way to help customers to get an important job done. A "job" in this instance means a fundamental problem in a given situation that needs a solution. By understanding the job and all its dimensions, including the full process for how to get it done, the business can

design the offering (Johnson et al., 2008). This is what we refer to as the value proposition.

Johnson et al. (2008) further explain that the most important attribute of a customer value proposition is its precision: how perfectly it nails the customer job to be done - and nothing else. The value proposition explains a promise of value to be delivered regarding the outcome, which the customer can realize from utilizing the product or service. Thus, the value proposition answers the question "What will the customer buy?" (Drucker, 1954).

2.3.3 Product/Service Offering

While the value proposition describes the job to be done in order to solve an important problem or fulfil an important need for the target customer, this element describes the concrete offerings the customer receives. That is, the product/service offerings which satisfies the problem or fulfils the need. This is defined not only by what is sold, but also how it is sold (Johnson et al., 2008).

2.3.4 Value Creation Mechanism

The concept of value creation is arduous to comprehend, and there is a lack of consensus in the literature regarding what it entails (Lepak et al., 2007; Zott et al. 2011). The reasons for the lack of understanding is due to the multidisciplinary in the field regarding the question whom to create value for, i.e. if the goal is to create value for the individual consumer, organizations, or for a larger purpose such as for societies or nations. The question of what is valuable and to whom, is raising a more complex context for the value creation process. The mechanisms of value creation are often confused with the mechanisms of value appropriation (Lepak et al., 2007), since these elements often affect one another. However, Drucker explicitly separates them into two distinct processes, and we agree that it is crucial to recognize them as two separate elements. To understand the mechanism behind value creation, it is important to cope with some of these manifest contradictions.

Drucker and other scholars (Chesbrough & Rosenbloom, 2002; Mansfield & Fourie, 2004; Zott et al., 2011) believe the business model is customer centric. Value should be defined as what the customer finds valuable, and by organizing the resources and activities of the firm, value can be delivered to the customer (Drucker, 1954). In a simple form, value can be measured by what the customer is willing to exchange for what the business can provide (Zott & Amit, 2008). Hence, the value creation mechanism can be defined as the process of creating value to its customer (Seddon et al., 2004; Zott et al., 2011). The business model becomes a system of firms exchanging with external parties (Zott & Amit, 2008, 2011), and its purpose is to show the activity systems which are used to deliver value to its customer (Zott et al., 2011; Seddon et al., 2004).

In the broadest sense, a value creating mechanism is an activity. In Michael Porter's book "*Competitive Advantage*" (1985) he explains value mechanism as any activity conducted by the firm, which makes the customer willing to pay more. Porter (1986) states that operational efficiency is not enough, and that competitive advantage comes from deliberately choosing different activities and perform them in a unique bundle (Porter, 1996).

Innovation is by many considered to be one of the main sources of value creation. J.A. Schumpeter (1934) states that technological change and innovation is the process of value creation. He further identifies any of the following elements to be a source of innovation: (1) introducing a new good, (2) application of new methods of production, (3) creation of new markets where the industry was not represented, (4) acquiring new source of supply of raw material or semi-finished goods, or (5) reorganizing industries through the creation or destruction of a monopoly position. The theory places innovation in the center of value creation, and Schumpeter emphasizes the importance of technology and considers novel combinations of resources as the foundations of new products and productions methods. Schumpeter also emphasizes that it is under economic depression that the entrepreneurs dare to foster innovation, and the likelihood of introduction of new goods, production methods or creation of new market increase. He further sees this as the explanation of the economic growth during recessions. Industry transformation and disruption explains how technological and institutional innovations can reconstruct industries by changing scale or scope.

Schumpeter (1928) explains value creation as the activity of combining resources in a novel way, thereafter deploying them in a new context (Di Gregorio, 2013). Combining resources in new ways can in the beginning be seen as an inefficient allocation, as the resources are moved from their most efficient state. However, Di Gregorio argues that over time this can result in developing new uses for the resources, and lead to what North (1990) calls adaptive efficiency. This brings the process of innovation close to a resource based view (RBV).

The resource based view identifies the internal resources as a source of competitiveness (Wernerfelt, 1984). It focuses on how heterogeneous resources can be a source of competitiveness if the competing firms are unable to imitate the resources (Amit & Schoemaker, 1993; Barney 1991). The RBV views the firm as a bundle of resources and capabilities, and uniquely combining a set of specialized resources and capabilities can lead to value creation (Amit & Schoemaker, 1993; Barney, 1991; Penrose 1959; Peteraf, 1993; Wernerfelt, 1984).

The definition for what makes a resource valuable is often defined in relation to its market environment (Amit & Schoemaker, 1993). For instance, Barney (1991) states that a resource is only valuable if it exploits opportunities, and/or neutralizes threats in a firm's environment. In his later work, Barney (1991) states that a “resource or capability is valuable only if it reduces a firm’s cost, or increases its revenue compared to what would have been the case if the firm did not possess those resources”. By this definition, a value creating mechanism is taking place whenever a resource or capability is bundled in such a way that the realized value from sales is greater than the sum of the price it took to acquire the resources used.

Value creation mechanisms often go beyond the value which can be created by simply looking at Schumpeterian innovation or reconfiguration of activities (Porter, 1985). These value drivers can be mutually reinforcing and must be used in a combination of value appropriation.

2.3.5 Value Appropriation Mechanism

Figuring out how to create value for the customer, and to capture value while doing so, are the key issues in designing a business model: it is not enough to do the first without the other (Teece, 2010). Indeed, the business model promotes a dual focus on value creation and value capture (Zott et al., 2011). The objective is to increase the proportion of contributed value retained as profit (Drucker, 1954).

By performing its activities efficiently and effectively a firm can appropriate value from a portion of those activities for the firm developing and operating in it (Chesbrough, 2007; Fjeldstad & Snow, 2018;). How much of the total value the firm captures, however, depends on the sources of revenue and mechanisms that protect the innovation from imitation (Fjeldstad & Snow, 2018), from now on referred to as *revenue mechanisms* and *protection mechanisms*.

From an economical view, Teece (1986) defines value appropriation as the firm's capability to retain profit from the value creation. One cannot achieve superior performance only through the process of creating value, one must also create barriers to prevent imitation from market competitors (Alvarez & Barney, 2005; Jacobides et al., 2006; Lepak et al., 2007; Mizik & Jacobson, 2003; Porter, 1985; Teece, 2000). The process of appropriating value is a central part in the strategy research domain, however, not necessarily explicitly mentioned. The value appropriation mechanism is the firm's ability to restrict competitive forces from imitation. However, viewed from a more economic view, if the mechanisms of protecting the value are not in place, there is little motivation for the firm to engage in value creating processes.

The resource based view, as explained in the paragraph above on value creation mechanism, has also a central role in value appropriation. It claims that the superior position a company can achieve is only sustainable if the competitors cannot invest in the same resources (Alvarez & Barney, 2004). Value appropriation can therefore be viewed as process of making a resource, imitable or non-substitutable.

Effective appropriation will incentivize the firm to innovate because of expectation of capturing the value which is created (Teece, 1986). The innovation

is valuable for the customer, the amount of value appropriated is valuable for the firm innovating, and the rest of the value which is not appropriated is distributed among the rest of the market. Following Drucker (1954) we separate the value appropriation mechanisms into two parts: revenue mechanisms and protection mechanisms:

Revenue Mechanisms: How value is monetized is an important part of value appropriation. Baden-Fuller and Haefliger (2013) indicate that monetizing equals value captures itself. They argue that the concept of monetization is often explained too shallow - monetization involves more than just pricing. Instead, they divide monetization into three sub-components; When, How and What money is raised (Baden-Fuller & Haefliger, 2013). The authors stress the importance of timing and effectiveness which constitute an additional value capture dimension. Possibilities concerning pricing strategies, Teecee (1986) stresses the strategic role of a complementary assets. He denotes that complementary assets can leverage monetization opportunities. Zott and Amit (2010) also discuss the importance of pricing strategy for specific products or services - so it refers to the specific modes in which a business model enables revenue generation.

***Protection Mechanisms*:** Lepak et al. (2007) state that appropriating value can be done by isolating resources, and further define these protecting mechanisms as "any knowledge, physical, or legal barrier that may prevent replication of the value-creating new task, product, or service by a competitor". Some crucial mechanisms are (1) the protection of knowledge, (2) technological capabilities, (3) market based asset and (4) first mover advantage (Lawson et al., 2012).

Intellectual property rights: Schumpeter (1934) sees innovation as "the market introduction of a technical or organizational novelty, not just its invention". An innovation can be defined as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD, 2005). Protection of innovations and appropriability of returns from the innovation can be retained through legal intellectual property rights. The mechanisms that may be used, are for instance, patents, designs,

trademarks, plant varieties or copyright (EUIPO, 2017). Patent protection is a crucial part of protecting the innovation from imitation, however, its effectiveness may vary within and across industries (Cohen et al., 2000).

Protection of firm-specific knowledge: Firm-specific knowledge, i.e. a firm's ability to protect the knowledge residing in new products or processes, can be protected in two ways. It can be legally protected through intellectual property rights, or it can be guarded within the organization through secrecy. The capability to protect knowledge of a process or a new product is an important process in the field of management (Hurmelinna-Laukkanen & Puumalainen, 2007).

Technological capabilities: Barriers to imitation can be raised by technological capabilities, if the firm-specific knowledge is tacit and embedded in social, complex routines (Nelson & Winter, 1982; Spender, 1996). The tacit knowledge that is embedded within the organization is often idiosyncratic to the organization, increases the causal ambiguity (Szulanski, 1996) and makes it difficult to imitate (Zander & Kogut, 1995).

Market-based asset: In the context of value appropriation (and creation), market-based assets refer to the firm's capability of marketing their brand name to increase reputation and the effectiveness of commercialization (Srivastava et al., 2001). Those capabilities are made from knowledge about the market and understanding of its condition and development (Nonaka & Takeuchi, 1995), such as insights and assumptions of its customers' needs and the market dynamics (Glazer, 1991). These capabilities can also create information asymmetry and change the degree of interdependence, thus increase the bargaining power, and appropriate value from the negotiation process. (Bacharach & Lawler, 1981; Lavie, 2007).

Increased reputation and branding can create differentiation and be perceived as increased value by customers. These capabilities can strengthen the relationship with the customer, and are a product of intangible benefits, and thus not imitable (Amit & Schoemaker, 1993; Barney, 1991).

First-mover advantage: Schumpeter (1934) claims that first-mover advantage can realize monopoly rents by pre-accessing geographical scope, space or customer (Lawson et al., 2012). Thus, a first-mover advantage hinders or delays the competitors' ability to compete by the increase of imitation cost, time and effort (Carow et al., 2004).

"A business is created when a firm matches its product/service offerings to a set of customers. The firm matches its value proposition to what customers value and therefore are willing to pay" (Fjeldstad & Snow, 2018). These elements are interconnected and closely tied to value creation. Altogether, the five business elements allow researchers to describe and specify a business - how it creates and appropriates value. We believe this framework in itself will provide us with an in-depth understanding of the pharmaceutical business model. Yet, we believe we can obtain an increased understanding of a business model by applying the concept of value configurations to the concept of business models.

2.4 Applying Value Configurations to Business Models

The value chain, value shop, and value network are three distinct generic value configuration models explored by Stabell and Fjeldstad (1998). The typology is an extension of Michael Porter's acclaimed value chain framework (1985) which is a framework used to decompose the firm into strategically important activities to understand their impact on cost and value (Stabell & Fjeldstad, 1998). However, Fjeldstad and Stabell claim that the value chain logic cannot be applied to all industries as the description does not capture the essence of value creation in industries such as insurance and banking. Consequently, two new generic value configuration concepts were added to the typology; value shop and value network.

The chain-shop-network typology by Stabell and Fjeldstad (1998) is a concept which draws on Thompson's (1967) research of long-linked, intensive, and mediating technologies. By utilizing the three distinct generic value configuration models, one can understand and analyze firm-level value creation logic across a range of industries and firms. Further, it serves to develop an understanding of the current competitive position of the firm and how this position can be both maintained and strengthened (Stabell & Fjeldstad, 1998).

2.4.1 Value Chain

The main value creation driver of a value chain is the transformation of inputs into products, as in a traditional manufacturing firm (Stabell & Fjeldstad, 1998). The product itself is the medium for transferring value between the firm and the customer, and the role of the customer is to be a recipient of the products and services. The value proposition in a value chain is product benefits, while scale, capacity utilization and flow of components are key cost driver (Fjeldstad & Snow, 2018). An important distinction to the value focus in a value chain is that it is predominantly cost-oriented (Stabell & Fjeldstad, 1998).

2.4.2 Value Shop

In a value shop, the value creation logic is to solve customer problems through creating and combining competencies. Thus, intangible resources like knowledge and competence are key resources to achieve competitive advantage. The shop schedules activities and applies resources in a fashion that is dimensioned and appropriate to the needs of the client's problem, thus the problem to be solved determines the intensity of the activities (Stabell & Fjeldstad, 1998). The role of the customer is characterized to be co-producing as the client may take an active role in the process of creating solutions (Skjølsvik et al., 2007). The value proposition in a value shop is the promised solution quality, and reputation is a key value driver (Fjeldstad & Snow, 2018). The value focus differentiation in this model is a value-orientation (Stabell & Fjeldstad, 1998).

2.4.3 Value Network

A value network creates value through linking customers, things or places. The firm provides services that allow various kinds of exchanges among them, and the customers co-produce value for both themselves and others by being available for networking. The key value proposition is connectivity and conductivity, and both key cost drivers and value drivers are scale and capacity utilization (Fjeldstad & Snow, 2018).

The three value configurations represent a foundation for a theory of firm-level analysis of competitive advantage, they provide means to deal with uncertainty,

and buffer the core technology of the organization from environmental uncertainties (Stabell & Fjeldstad, 1998). The value configurations can be analyzed separately and independently, however most organizations are not pure instances of a single distinct value configuration. The production of goods (chain) can for instance be supplemented by assisting customers in their problem-solving activities (shop) or by value-adding new products/services on the distribution infrastructure (network). Such hybrids might have an overall primary activity logic, but where decomposition of activities requires the application of other value creation logics (Stabell & Fjeldstad, 1998).

The chain-shop-network typology of value configuration by Stabell and Fjeldstad (1998) provides an activity-centered representation of firm value creation (Fjeldstad & Snow, 2018). In accordance with Fjeldstad and Snow (2018), we believe that by applying the concept of value configurations to the concept of business models, we will be better equipped to analyze the pharmaceutical business model. Furthermore, that it will provide us with increased insight and in-depth understanding when exploring the characteristic similarities and differences related to the five business model elements, and this is why we have chosen to apply this concept to our analysis (Fjeldstad & Snow, 2018). The value configuration acts as a contingency variable as each of the elements of a business model is affected by an organization's value configuration depending on whether the organization is a value chain, value shop or a value network (see table 2.2) (Fjeldstad & Snow, 2018).

Table 2.2 Relationships Among Value Configurations and Business Model Elements

Value Configuration	Business Model Elements			
	Value Proposition	Role of Customer	Value Creation Mechanisms	Value Appropriation Mechanisms
Value Chain	Product benefits	Recipients of products and services	**Activities**: Inbound logistics, operations, outbound logistics, sales, marketing, post-purchase service. **Resources**: Brand, product, process technology **Economics**: Cost economies of scale, value from differentiation.	**Revenue Mechanisms**: Pay for product. Pay for post-purchase service. **Protection Mechanisms**: Patents, Embodying technology in products or processes
Value Shop	Promised solution quality	Co-producing clients	**Activities**: Problem-finding and acquisition, problem-solving, choice, implementation, evaluation. **Resources**: Competencies, reputation. **Economics**: Information asymmetry, learning and knowledge	**Revenue Mechanisms:** Pay for resource utilization. No cure - no pay licensing. **Protection Mechanisms**: Status, Patents
Value Network	Connectivity and conductivity	Co-producing network members or owners of network nodes	**Activities**: Network promotion and contract management, service provisioning, infrastructure operations. **Resources**: Network (set of nodes) **Economics**: Direct and indirect network externalities	**Revenue Mechanisms**: Subscription and transaction fees, third-party payment, interconnection and roaming fees **Protection Mechanisms**: Lock-in from network externalities

Source: Fjeldstad & Snow (2018)

2.5 Facilitating for Business Model Innovation

Changing environments and technological development force organizations to change, hence, business models need to be reactive to industry dynamics (Chesbrough, 2010). Furthermore, it has been acknowledged that firms must adapt and innovate their business model in order to appropriate value from technological innovation (Baden-Fuller & Haefliger, 2013; Hacklin et al., 2018)

A business model innovation can be any fundamental change in the existing business model and changes in the relationship between business model elements (Björkdahl, 2009; Fjeldstad & Snow, 2018). Indeed, improving a business model can be viewed as a key source of competitive advantage (Zott et al., 2011). In accordance with Fjeldstad and Snow (2018), we suggest that by applying the value configurations on the concept of business model innovation we can characterize and explain many of the business model innovations in the literature.

Changing an existing business model occurs in two radically different ways. The first advocate incremental business model innovation changes, such as adjusting elements around the current value configuration. This concerns adjustments such

as changes in revenue mechanism and activities for value creation mechanism. This business model innovation occurs *within* the configuration (Fjeldstad & Snow, 2018).

In some instances, a greater transformation is needed to sustain the value creation and value appropriation. These changes might derive from forces within the organization or the environments in which they are embedded, or mixture of both. Nonetheless, this demands a more radical transformation of the business model, i.e. a *cross* value configuration occurs. That is, a shift from one value configuration to another. Such business model innovations are evidently more challenging than innovations within the business model, as cross value configurations transformations can be highly disruptive (Fjeldstad & Snow, 2018).

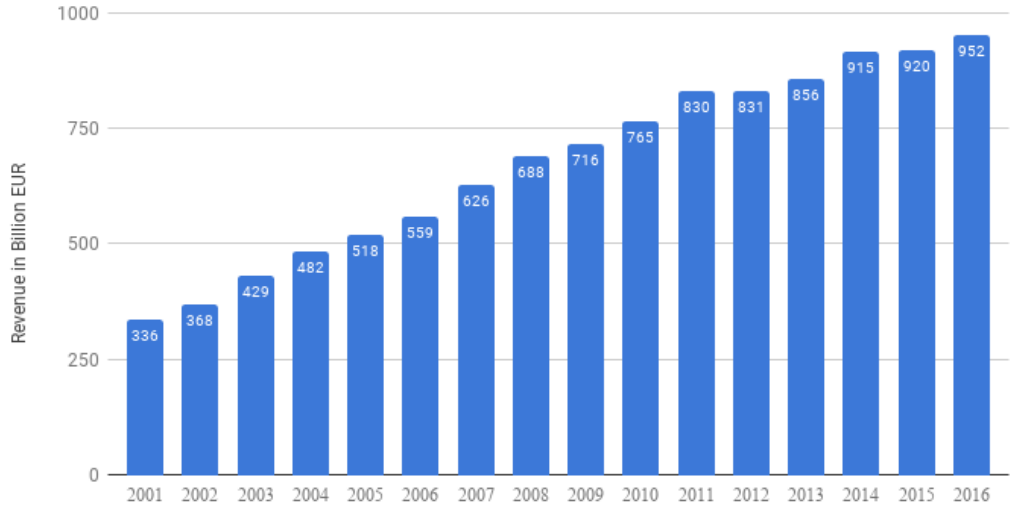
The two theoretical frameworks presented above will be used as a basis in our further research for analysis. In the following section, we will provide an overview of the global pharmaceutical industry. We will present its major challenges and the current situation for the pharmaceutical business model.

3. Pharmaceutical Industry - Overview & Challenges

3.1 Overview of the pharmaceutical industry

The pharmaceutical industry is composed of companies responsible for research, development, production and marketing of drugs and medications (Statista, 2018). The industry is characterized by uncertain and protracted R&D processes, intense competition for intellectual property, restrictive governmental regulations and strong purchaser pressure (Batiz-Lazo & Holland, 2001). Although these factors put high pressure on the companies operating in the pharmaceutical industry, the pharmaceutical market has experienced growth for a very long time. From 2006 to 2016 the industry's compound annual growth rate was 5.5%, however, with a declining rate for the last five years as the rate was 2.8% from 2011 to 2016. The total pharmaceutical revenues worldwide were in 2016 estimated to EUR 952 billion (Statista, 2018).

Graph 3.1. Pharmaceutical Market: Worldwide Revenue 2001-2016



Source: Statista, 2018

The pharmaceutical industry is, as previously mentioned, characterized by the traditional blockbuster business model, where a blockbuster drug is a product generating sales above EUR 1 billion per year for the producing company (Malik, 2007). The blockbuster model generates high sales revenue, and for decades the pharmaceutical companies have relied on this business model to generate sales. For instance, the prescription drug with highest global revenue in 2017 was Abbvie's Humira®. Humira® generated EUR 15.93 billion of revenue in 2017, which accounts for 65% of Abbvie's total revenue. Traditionally, the blockbuster drugs were solely high-volume drugs addressing needs of many patients, however, today specialty medicines also have the potential to become blockbusters (Gassmann et al., 2018). The following tables show the top ten largest global prescription drugs in terms of sales in 2017 and the global top biotech and pharmaceutical company in 2017.

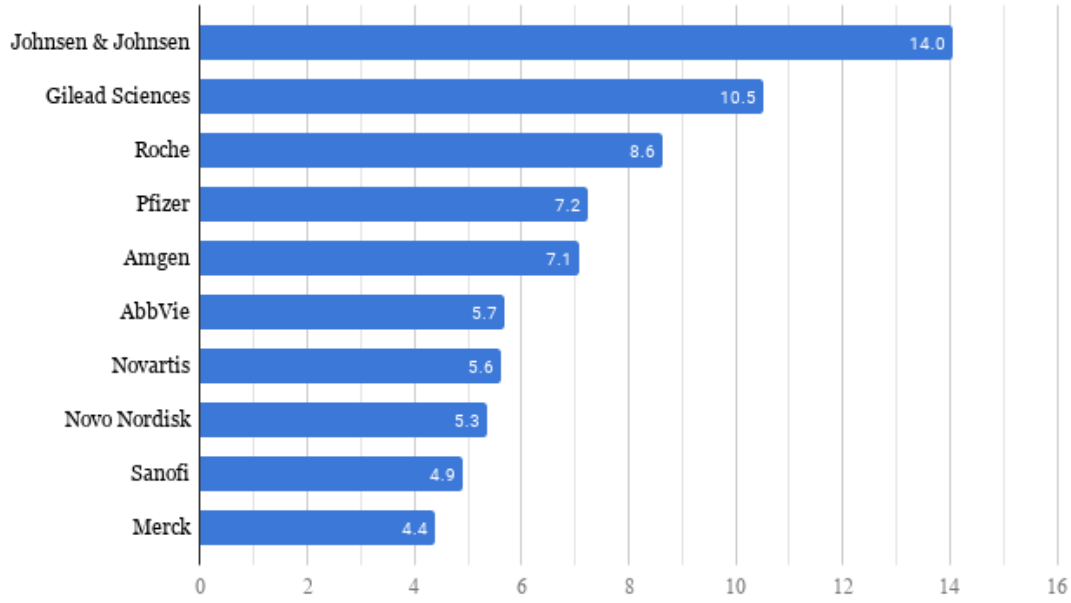
Table 2.1. Top 10 Global Prescription Drugs in 2017 in Terms of Sales

#	Brand Name	Company	2016 Sales (EUR BN)	2017 Sales (EUR BN)
1	Humira®	AbbVie	13.90	15.93
2	Rituxan®	Roche, Biogen	7.83	7.99
3	Revlimid®	Celgene	6.03	7.08

4	Enbrel®	Amgen, Pfizer	7.67	6.82
5	Herceptin®	Roche	6.22	6.43
6	Eliquis®	Bristol-Myers Squibb, Pfizer	4.37	6.39
7	Remicade®	Johnson & Johnson, Merck & Co	7.12	6.18
8	Avastin®	Roche	6.22	6.14
9	Xarelto®	Baver. Johnson & Johnson	5.12	5.70
10	Eylea®	Bayer, Regeneron Pharmaceuticals	4.62	5.22

Source: Philippidis (2017)

Graph 1.2. List of Global Top 10 Biotech and Pharmaceutical Companies Based on Net Income in 2017 (in Billion EUR)



Source: Statista (2018)

The pharmaceutical industry is under growing pressure from both internal and external elements and is facing intense challenges to its traditional business model. Among these are declining R&D productivity, continued patent expiration pressure, increased customer influence, governmental pressures and technological development. We will now explain these more in detail.

3.1.1 Declining R&D Productivity

In 2016, the pharmaceutical industry spent EUR 136 billion on research and development, which constitutes for the second highest R&D spending industry (Statista, 2018). Moreover, pharmaceutical companies invest one of the highest shares of total sales back into R&D. In 2016 they spent on average 14% of their total sales in R&D, which is a significantly higher proportion compared to other sectors (Gassmann et al., 2018; Khanna, 2012). The high R&D expenditures per company is a result of the high direct costs needed to bring one single New Molecular Entity (NME) successfully to market launch (Paul et al., 2010). It is also a result of the disproportionate large number of failed R&D, where only one in every thousand compounds reach the market.

R&D productivity can be defined as the relationship between the value (medical and commercial) created by a new medicine and the investments required to generate that curative substance. Another way of viewing R&D productivity is through the following two dimensions: inputs leading to outputs (R&D efficiency) and outputs leading to outcomes (R&D effectiveness) (Paul et al., 2010). The challenge for the pharmaceutical companies results from contrasting the output of R&D (the number of NMEs launched to the markets) to the input (the total costs of R&D) (Gassmann et al., 2018).

The pharmaceutical industry is experiencing increasing R&D costs and development time before being able to launch of NMEs. In addition, the R&D timeline increases, the post-market reward for an innovation remains the same or decreases (Lietzan, 2017). Thus, the industry is facing a productivity paradox; revenue growth with decreasing profit margins (Hunt et al., 2011).

3.1.2 Continued Patent Expiration Pressure

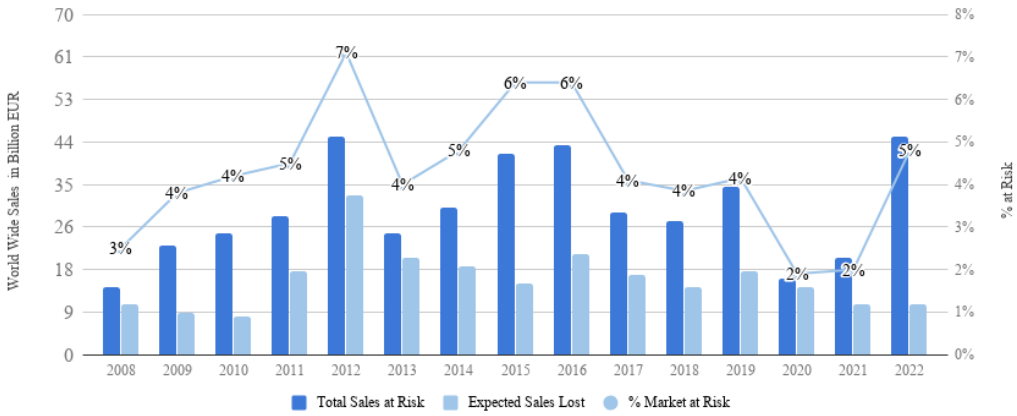
The first major step in developing a new drug is the application process for a patent. A patent offers an exclusive right to the inventor/creator or his assignee to fully exploit his invention/creation for a given period (Saha & Bhattacharya, 2011). When the patent has been granted, the research and clinical studies will be initiated. The grant is valid and protected for 20-25 years, however the research period is estimated to last approximately 8-12 years. Hence, the more time the

pharmaceutical companies spend on research and clinical studies, the less time the patent will be protected in the market (LMI, 2018; Schuhmacher et al., 2016). When the patent protection expires, generic manufacturers enter the market with drugs that are equivalent to the innovator's medicament, but at a significantly lower price (Pearce, 2006). When a blockbuster drug goes off-patent, annual sales often fall by around 75%, as they are quickly replaced by generics (Altavista Research, 2018).

Global spending on brand name (patent-protected) drugs was projected to have grown less than 5% cumulatively between 2012 and 2017, while spending on generic drugs was forecast to increase by more than 60% over the same time. This is due to the patent expiration issue, where many of the blockbuster drugs from the 1990s and 2000s have lost patent protections over the past years. This trend is estimated to continue the next two years (Altavista Research, 2018).

With extraordinary high margins, Big Pharma have long considered the blockbusters as one of the few feasible ways to comply to investors constant demands for growth (Gassmann et al., 2018). The generic companies have obtained increased market power and are today competing with the traditional pharmaceutical companies. An example is the generic company Teva which generated EUR 19 billion in revenue in 2017 (Teva, 2018). The generic competition impose an increased threat for Big Pharma, as patents are expiring and the market for generic drugs are growing. It is estimated that the loss of market share can reach 80% within the first quarter of expiration (Gassmann et al., 2018). In 2012 the loss to the generic market reached a peak with a total loss of EUR 32 billion. As illustrated in the patent analysis model below, the loss in sales has decreased after it reached its peak (Urquhart, 2015). However, many believe the low risk, high-yield opportunities have already been exploited (Lietzan, 2018). The time and cost of developing new blockbusters are increasing. This has resulted in a reduced exclusivity right to sell the drug on the market (DiMasi et al., 2016).

Graph 3.3 Worldwide Sales at Risk from Patent Expiration (2008-2022)



Source: Urquhart (2015)

3.1.3 Increased Customer Influence

Another pressure the pharmaceutical industry is facing, is the increasing influence by customers. The customer is empowered with the availability of information following the transition into the digital era (Hagberg et al., 2016). By being more informed, the customer has become more demanding, and his/her expectations have risen with a different set of requirements. They are demanding medicines that satisfy their requirements, proof of effectiveness in the form of improved health at viable prices, and a greater role in their own care. The customers require more than just the product itself. They seek tailored, value-added services.

3.1.4 Governmental Pressures

The healthcare sector is heavily regulated. A prescription drug is not released for publication until a clearly defined time frame has been established for clinical trials. Furthermore, governments are putting pharmaceutical companies under pressure to reduce prices for drugs because of exploding costs in healthcare environment (Puschmann, 2001). Additionally, during the past decades' serious concerns have been raised about the industry's integrity and transparency, compromising the industry's image, and resulting in increased regulatory scrutiny (Paul et al., 2010).

With a decreasing number of blockbusters in the pipelines, more specialty drugs are now being introduced to the market. The biopharmaceutical industry is increasing focus towards personalized medication. More technical complex development of personalized medicines are reducing regulators tolerance of risk and are negatively affecting the NME approval rates and associated costs (Schuhmacher et al., 2016).

3.1.5 Technological Development

As the internal and external pressures are becoming more and more prominent, the pharmaceutical companies are looking to other sources to remain competitive. Thus, companies from other industries are now entering the pharmaceutical industry. Technology companies specializing in IT, short-cycle innovations, big data analysis and consumer behavior are now entering the pharmaceutical market, and they are challenging the traditional blockbuster business model (Accenture, 2017).

Data analytics have been receiving more attention in most industries following the constantly increasing data-power. During the last decades, a vast amount of medical information has been generated, and data science is now embedded on all levels, utilizing medical imaging, genomics and medical records (Stotz et al., 2017). These new technologies are now providing the pharmaceutical companies with the possibility to improve patients' health outcome, rather than only providing a drug.

New technologies provide opportunities of using vital tracing devices, remote monitoring, as well as platforms and mobile apps where patients can log their daily conditions and symptoms to create improved reporting for possible side effects (Stotz et al., 2017). Pharmaceutical companies like Novartis, GSK, and Roche are investing in partnerships with technology companies such as Google, IBM and Qualcomm. Additionally, traditional device manufacturers such as Apple and Samsung are researching beyond wellness products and are aiming for the patient care market (Kemppainen et al., 2017).

It is estimated that the amount of health data is growing by approximately 48% each year (Stanford, 2017). Yet, few companies are utilizing these data, rather than only generating and analyzing them (Morrison et al., 2017). Stanford Medicine (2017) claims that medical research is among the areas within healthcare where the power of big data can have the most viable impact. A recent trend shows that many small actors are now starting to leverage the use of data using artificial intelligence. By analyzing data from health systems and combining them with information from patients, they are trying to turn it into concrete recommendations (Stanford, 2017). Indeed, providing the best drug is no longer the sole focus, but rather providing the best data-enabled holistic solution (Morrison et al., 2017).

3.2 The Current Situation for the Pharmaceutical Business Model

The global healthcare expenditure represented around 10% of the global gross domestic product (GDP) in 2015. Besides, the healthcare spending is growing at a faster pace than the overall economy where prescription drugs account for the fastest increase (Deloitte, 2016). These increasing costs put an increased pressure on governments due to the economic unaffordability (Deloitte, 2016).

The sector is under a growing economic pressure, and costs continue to increase regardless of value delivered (Porter et al., 2006). This illustrates how measuring value remains largely unmeasured and misunderstood. Value of the product delivered has been measured by volume and profitability, regardless of the outcome delivered (Porter, 2010). According to Porter (2010), value is something that should be defined around the customer and achieving high value for patients must become the overarching goal. He further denotes that value depends on results, not inputs. Thus, value in healthcare should be measured by the results achieved, not by the volume of services delivered, and shifting focus from volume to value is the core problem (Porter, 2010).

The traditional blockbuster business model might not in itself sustain successful growth. The buyers of their products are changing, the products themselves are changing, and the nature and number of their competitors are changing (Spence et al., 2017). As this is evident, the pharmaceutical industry is facing significant

pressures, both internally and externally, which is forcing fundamental changes for the companies operating in the industry. Changes towards a more value-based health care (Porter & Lee, 2013).

Accordingly, the business environment in which the pharmaceutical companies are embedded, impose serious challenges on multiple, unrelated areas of the traditional blockbuster business model. Changing environments and technological advancements force organizations to change, thus forcing business models to be reactive to industry dynamics (Chesbrough, 2010). Additionally, the redefinition of how value is measured and the emergence of new technological companies, are all elements that impose encouragement of a revision of the pharmaceutical business model. In the following section we will present how we have proceeded to obtain a deeper insight into the pharmaceutical business model.

4. Methodology

In this section, we explain the methodological steps of our thesis. First, we present and justify our research strategy and then we clarify the methods used for data collection. Our overall approach to this research is qualitative, with regard to our theoretical analysis of the concept of business model and our comparison of elements of different models. But on the empirical side, we have conducted in-depth interviews with representatives for Roche, and other relevant stakeholders, which form our case study, to gather fundamental data and relevant information concerning Roche. By this approach we combine the method of presentation and description with a comparative method, in order to make sense of the empirical material that we have gathered from different sources.

4.1 Research Design and Research Strategy

The objective of this thesis is to increase our understanding of the business models of pharmaceutical companies. Furthermore, we seek to obtain a deeper insight into how Big Pharma is pursuing in the quest for finding and developing a sustainable business model, and we also want to clarify how the industry is working to mitigate the diminishing returns obtained from the blockbuster model. Thus, our study besides the theoretical framework, is inductive in nature, in which the theory emerges from the data collected (Strauss & Corbin, 1998). Utilization

of such "bottom-up" approach, allows the research findings to emerge without the restraints imposed by structured methodologies (Thomas, 2006). This method suited our study well as it allowed us to identify new aspects of the business model of the pharmaceutical companies.

To be able to answer our research question, we needed to gain a better comprehension of the business model of the pharmaceutical industry. Therefore, our choice of research strategy was as already stated a qualitative approach. Qualitative research is a research strategy emphasizing on words or meaning rather than quantification in the collection and analysis of data (Bryman & Bell, 2015). This method was a natural choice, as we believe that it is the objects of the social science, the people, who are capable of attributing meaning to their environment, and who will provide us with the most valuable insight regarding our research question (Bryman & Bell, 2015). Furthermore, we seek to analyze potential changes of the business model of Big Pharma. For this purpose, we found the qualitative strategy to be useful as it often conveys a strong sense of change and flux and emphasizes the processes itself (Bryman & Bell, 2015).

An exploratory study is valuable when the objective of the study is to discern new insights or investigate a phenomenon in a new light, whereas a descriptive study has the objective to describe or portray a person, event or situation in an accurate way (Saunders et al., 2009). A descriptive research might be performed prior to an exploratory study, or it might be performed as a complementary study along with the exploratory study. In our thesis, we have decided to use a combination of the two research methods. The reasoning for this choice was that we wanted to describe the pharmaceutical business model, as well as explore it in a new context. Furthermore, we sought to apply a descriptive study to describe the business model at hand. At the same time we sought to apply an exploratory study to obtain a deeper understanding of what has contributed to the composition of the current business model. Our aim was to investigate how the current business model is constructed, and we believe that the exploratory study is a suitable methodological approach to examine this.

For the purpose of our research objective and seeking best result to our research question, we found the case study most suitable. The reasoning behind this choice

of conduct was due to the case study's ability to group a phenomenon considering its context, and that a case study offers deep insight into a particular company or industry. A case study strategy allows a researcher to empirically investigate a particular contemporary phenomenon within its real-life context (Robson, 2002). Thus, a case study allows us to thoroughly examine the business model of a large, incumbent pharmaceutical company. On the contrary, a case study limits the scope of the findings to a particular company and the external validity of our findings can thus be questioned. Indeed, it can be debated how a single case study can be representative to yield findings that can be applied more generally to other cases (Bryman & Bell, 2015). However, the objective of our thesis is not to generalize on the behalf of the global industry, but to reveal aspects of the current business model with a central player in Oslo.

To investigate how the industry is reacting to the decaying blockbuster model it can be beneficial to analyze company activities in respect to business model alterations in a larger perspective. A cross-sectional survey could be an adequate research approach as it allows the collection of data across numerous companies. Thus, it establishes variation between cases, and detects patterns of associations (Bryman & Bell, 2015). This method could also establish a strong foundation for the exploration of business model as it is a strong methodological tool to collect a rich variety of data, generating representative results (Saunders et al., 2009). However, this research approach lacks internal validity which can cause the outcome to be attributed to causes other than the designed interferences.

A cross-sectional survey could be a favorable approach in detecting *if* and *how* the pharmaceutical business models are evolving. However, it may not reveal *why* they are evolving. The "why" aspect is important to us in investigating to employment of an exploratory study. Thus, this gave us confidence in the decision of choosing case study as research approach. It provided us with the opportunity to understand the underlying logic behind an evolving business model.

4.2 Data Collection

To answer our research question and gain deeper insight into the pharmaceutical industry in Oslo, we recognized the need for primary data. Deconstructing

business models requires detailed and comprehensive information about a company, and we believe in-depth interviews is the most suited approach to provide the information needed. To gather information, we conducted in-depth interviews with managers of Roche, a large pharmaceutical company, as well as relevant industry stakeholders.

4.2.1 Primary Data

The primary data were collected through in-depth interviews with representatives of Roche, OCC, NOMA and LMI. The structure of the interviews varied according to the purpose of the interview, from unstructured to semi-structured interviews with follow-up questions to ensure we received answer on more specific topics. We followed a pre-planned interview guide which was developed with focus areas and key questions. Our reasoning behind developing an interview guide was that we had some thoughts regarding the information we were looking for, however, we adjusted the interview to allow new ideas to be brought up.

By conducting unstructured and semi-structured interviews, the interviewees were not given the exact same questions. We considered conducting structured interviews where the questions are standardized and very specific. But an advantage of this practice is that the potential for variability in the interview situation is low compared to an unstructured and semi-structured interview (Bryman & Bell, 2015). Another advantage of structured interviews is that it facilitates for aggregation and ease of data processing, which then can be analyzed quantitatively (Bryman & Bell, 2015). However, we wanted to avoid the interviews to be influenced by our attributes. We also wanted to avoid the notion that survey researchers presume that interviewer and respondent share the same meanings of terms activated in the questions.

We saw unstructured and semi-structured interviews as the best fit for our study. We sought to provide the participant with enough flexibility to deviate from the questions and add valuable reflections on the matter, and to secure information on those topics we saw as relevant to our study. Conducting the interviews in such a flexible and “ad hoc” manner allowed us to gather important information that we did not qualify or consider when we developed the interview questions.

As we conducted the research within a limited time frame we decided to do a few, though thorough, interviews, as this is considered to be an effective method to elicit depth on the topic of interest, with nuances and contradictions (Saunders et al., 2015). Our main company of interest was the pharmaceutical blockbuster company, Roche. As we sought to learn more about their business model, it was crucial that the participants had extensive knowledge about the company that they represented. Thus, our choice of interviewees in Roche was General Manager of Roche Norge AS, Ms. Rajji Mehdwan (R.M.), and General Manager of Roche Diagnostics Norge AS, Daniel Malarek (D.M.). In addition to the interviews with the two managers at Roche, we interviewed three relevant stakeholders who play a significant role in the pharmaceutical industry in Oslo. This was to obtain a detached view and to observe the topic from different angles, and also provide more depth to our understanding. Our choice of stakeholder companies was Oslo Cancer Cluster (OCC), The Norwegian Medicines Agency (Statens Legemiddelverk, NOMA), and The Association of the Pharmaceutical Industry in Norway (Legemiddelindustrien, LMI), where we conducted in-depth interviews as well. Ideally, we wanted to interview a few other relevant stakeholders. However, these were disregarded as we did not manage to get in contact with them.

Each interview lasted from one hour to one hour and fifteen minutes. The interviews were performed in English and Norwegian, according to the interviewees preferred language. This was to promote more natural answers, and an attempt to avoid unnecessary misunderstandings. The interviews were grouped into three focus areas. The first group concerned questions regarding the general trend and challenges the pharmaceutical industry is currently facing. The second concerned questions about the business model of Big Pharma. The third concerned questions regarding the impact of the highly dynamic environment.

4.2.2 Secondary Data

We have drawn preliminary and more definitive conclusions from primary data. Secondary data were used as a tool to organize what we gathered from the interviews, and exploring the industry. Data regarding the industry were collected from reports published by private institutions/public firms, reference books,

websites of governmental institutions, and of pharmaceutical companies. Utilizing secondary data may increase the value of research, as it is cost- and time efficient and pre-analyzed. With a limited time frame within this thesis, the use of available research became a valuable source of data.

Unpredicted circumstances led to cancelling some appointments. Time constraint made rearrangements of these meetings difficult, and the number of interviewees was therefore reduced. For this reason, secondary data provided by Roche became a greater part of the data gathering than initially planned. Documentations published by Roche were assessed when collecting secondary data and provided us with insight regarding the company's strategy, activities and economic development. Being a listed company, there is a multitude of available information published by Roche, ranging from annual reports to press releases, which also was used.

4.3 Limitations

We recognize that our selection of one actor in the industry could possibly affect, or even reduce the sustainability of our findings, and if we were to choose another actor than Roche, the results could have differed. An in-depth study of only one player is a small and narrow sample and of course this will also be reflected in our findings. In order to strengthen our findings regarding our case study, interviews of industry experts and stakeholders were conducted. However, as previously mentioned, our research is not meant to be generalized and we still see our research selection as valid.

Ideally, we would run our case study at the Roche Holding AG headquartered in Basel, Switzerland. Interviewing employees from the headquarter would have provided us with deeper insight regarding the overall strategy and structure. In this his way, we could possibly have obtained more hidden or secret information about Roche's business model. Under the given circumstances, the choice of interviewing Roche's affiliates in Norway was made on the basis of their availability and willingness to participate. Nonetheless, we still consider our research selection as valid since the GM of Roche Norge AS and GM of Roche Diagnostics Norge AS have deep insight into Roche's overall strategy.

Furthermore, Roche follows a decentralized internal organization model, and the affiliates are given a high degree of autonomy, and our aim was to explore the affiliate's situation in Oslo, Norway.

On the basis of the obtained primary and secondary data, the business model of Roche was formed and analyzed. The descriptive empirical data which provides an in-depth understanding of the situation in the pharmaceutical industry in Oslo will be presented below.

5. Empirical Data Review

The following section presents the pharmaceutical industry in Norway, in which we will introduce the context for the analysis. To give meaning to the empirical data that we present, we saw it necessary to explain the roles of the stakeholders that were chosen to build up this research. Not only is it important to outlay the empirical data, but also to explain the roles of the stakeholders that were chosen to build up this research. Most of the data presented have been gathered from interviews and supplemented with secondary data where we found it necessary.

We intend to introduce, describe and discuss the issue in five separate parts:

1. The pharmaceutical industry in Oslo, Norway
2. Growth of biotech companies in the industry
3. Introduction of the stakeholders in the industry
4. Case study - Roche
5. We raise a core problem: Does the industry and other players facilitate for innovation?

Part 1-3 will highlight the industry and in part four Roche will be introduced as a case study. In part five we intend to gather all the parts in a common view in order to discuss and interpret details, and sum up a conclusion.

5.1 The Pharmaceutical Industry in Oslo, Norway

The pharmaceutical industry in Norway had an estimated revenue of NOK 26 600 million in 2017, and is expected to grow by approximately 5% in 2018 (Jakobsen et al., 2018). The size of the workforce in the industry was in 2017 around 3 565

persons. Compared to Switzerland this is not a substantial number as they have a workforce of 43 848 persons in the industry (EFPIA, 2018) out of a population of 8.37 million (Federal Statistical Office, 2018). Although the majority of the international pharmaceutical companies have offices in Oslo, the companies producing in Norway are spread over the smaller towns in Norway. However, most of them are located in the Gardermoen area, thus still in the Oslo region. Hence, the pharmaceutical industry is overrepresented in the Oslo area by nearly 90% of the companies (Jakobsen et al., 2018).

In *Knowledge Based Health* (2011), Amir Sasson refers to the lack of scientific articles on the Norwegian pharmaceutical industry and suggests it might be a result of its perceived low importance**.** There is no Norwegian tradition for large pharmaceutical companies. However, the Government has for a long time increased it focus towards biotechnology (Nærings- og handelsdepartementet, 1998). Because of the focus on long-term commitments and research, there has been a significant growth in the Norwegian biotech companies (Kunnskapsdepartementet, 2011). Indeed, several biotech companies that stems from the research of The Norwegian Radium Hospital have experienced international success, such as Nordic Nanovector, Photocure, PCI Biotech and Targovax, as well as Algeta which was acquired by Bayer in 2014 (OCC, 2018).

Table 5.1. Characteristics of Key Stakeholders in the Pharmaceutical Industry in Oslo, Norway

Characteristics	Oslo Cancer Cluster	LMI	NOMA
Headquarter	Ullern, Oslo	Majorstuen, Oslo	Helsfyr, Oslo
Founded	2006	1994	1974
Type of Organization/ Owners	Part of Norwegian Centers of Expertise (NCE) - A collaboration between the state-owned enterprises Innovation Norway, Siva and Research Council of Norway	Independent self-governing agency	State-owned enterprise
Key Activities	Accelerates the development of new cancer diagnostics and treatments The Incubator: Provides labs and office space, business development, training seminars and connections to the industry	Promotes business and health policy views, behalf of the members to influence authorities. Assess all submitted proposals (methodology and method assessments) of medicines	Approves all medicines sold in Norway, and provide information about medicines and health. Sets prices on all prescription drugs- Ensure that all experiment with drugs on human are carried out safely, and ensures drug production is safe

Source: OCC (2018), NOMA (2018), LMI (2018)

5.1.1 Oslo Cancer Cluster

Oslo Cancer Cluster (OCC) is an oncology research and industry cluster working to accelerate the development of innovative cancer diagnostics and treatment through partnerships between research institutions, universities, university hospitals, government agencies, biotechnology companies and the Cancer Society. The non-profit organization has as aim to be a neutral field in the context of the private and the public sector. Since its establishment in 2006, it has received a status as a Norwegian Center of Expertise in 2007. Today it consists of roughly 90 members, and among these are many of the large multinational pharmaceutical companies such as AstraZeneca, Pfizer, MSD, Roche and Sanofi Aventis (OCC, 2018).

A great amount of the research and activities which is conducted by the cluster is performed in a tight collaboration with the Cancer Register of Norway, the Oslo University Hospital and the Norwegian Radium Hospital (OCC, 2018).

Oslo Cancer Cluster Incubator (OCCI): The Oslo Cancer Cluster Incubator is an integrated part of the Oslo Cancer Cluster Innovation Park, and their task is to

support promising oncology biotechs to commercialize cancer projects successfully. It is located strategically in the Oslo Cancer Cluster Innovation Park, together with Ullern Upper Secondary School, the Oslo University Hospital, and the Cancer Registry of Norway. The incubator represents around 15 startups, and 20 other companies from Big Pharma, suppliers, investors, etc. (OCCI, 2018).

The incubator resides on 5000 m^2, with full laboratory services, meeting room facilities, and offers an Incubator team which provides business development services, an international network, as well as facilitating for investors contacts (OCCI, 2018).

5.1.2 The Norwegian Medicines Agency

The Norwegian Medicines Agency (NOMA) is a governmental agency under the Ministry of Health and Care Services. This agency ensures that all medicines prescribed to patients in Norway are of adequate quality, safe to consummate and have the desired effect. Main responsibilities for the NOMA is to approve clinical trials and make sure they are conducted in a responsible way, approve medicines that are launched, and price medicines on prescription. The NOMA also monitors the side effects and make sure that they do not surpass the benefits (NOMA, 2018).

5.1.3 The Association of the Pharmaceutical Industry in Norway

The Association of the Pharmaceutical Industry in Norway (LMI) is the trade organization for the pharmaceutical industry, for Norwegian as well as foreign companies. It covers the whole chain of pharmaceutical companies, either it is relating to developing, manufacturing, sales, or marketing in Norway. It consists of 59 members, including large multinational companies, as well as small Norwegian entrepreneurial companies working in the life science industry. The main purpose of the association is to support the interests of its members. An important task for the association is political influence on behalf of the industry, and to promote the views of the members (*LMI*, 2018).

5.2 Roche

5.2.1 Roche Holding AG

The founder of Roche, F. Hoffmann-La Roche, started to commercialize medicine in the beginning of the second industrial revolution. Today Roche is one of the largest pharmaceutical companies worldwide and is still partially (45%) owned by the descendants of the Hoffmann-La Roche. Roche is divided into two main divisions: Pharmaceuticals and Diagnostics (Roche, 2018).

Table 5.2. Characteristics of Roche

Characteristics	Roche
Headquarter	Basel, Switzerland
Founded	1896
Revenue	CHF 53.3 billion (Pharma 41.2, Diagnostics 12.1)
Key Activities	The research, development, production, and sale of medicines and other biomedical compounds, and diagnostic equipment, in the field of oncology, immunology, infectious diseases, ophthalmology and neurology. Additionally, in vitro diagnostic in tissue-based cancer diagnostic, and diabetes management.
Key Activities in Norway	Roche Norway AS: Sales and marketing of pharmaceuticals. Medicines in cancer, immunology, infectious diseases, ophthalmology and neurology. Roche Diagnostics Norge AS: In vitro diagnostics, medical and biotechnology research and PCR-based tests.

Source: Roche (2018)

With an origin of composing vitamins, Roche Pharmaceuticals is focusing on oncology, immunology, infectious diseases, ophthalmology and neurology. Diagnostics delivers a wide range of in-vitro solutions, from laboratory automation to self-testing and molecular diagnostics. The way Roche works with diagnostic and pharmaceutical combined is deeply rooted in their strategy. As D.M., Roche Diagnostics Norway, explains:

"There are only a few companies that are positioned in that same way, having both a pharmaceutical and diagnostic division. From that aspect I think Roche is relatively strongly positioned. And this was actually the approach the

group decided on already 20 years ago and it is interesting to see how the decision that they made 20 years ago shapes the whole environment today, and is actually more valuable today than it was 20 years ago."

Strategy: Roche operates across the whole chain of healthcare, from initiating research, clinical trials, to manufacturing, sales and distribution. The focus of Roche Norway is sales and marketing, and it is divided into two entities "Roche Norge AS", and "Roche Diagnostics Norge AS". R.M., Roche Norway describes their organizational structure as decentralized; "*As an affiliate, 90% of the decisions are made here. We negotiate with our region on our targets, but then we have quite a lot of autonomy on what we do here."*

Roche's strategy for the future is to invest and focus more heavily on personalized healthcare. By acquiring technological capabilities, especially within the analytical domain, Roche seeks to utilize deep data to take personalized healthcare to a new level. By partnering with GE Healthcare to develop a digital diagnostic platform, collaboration with Pfizer to collect data, and acquiring technological companies such as Flatiron health and Foundation Medicine (Roche, 2018). R.M., Roche Norway explains:

"We have invested in Flatiron and Foundation Medicine. We have made collaborations with GE Healthcare, IBM Watson and with Pfizer to collect data. So, we are going pretty big into the personalized healthcare model, and this is a huge part of Roche's strategy going forward."

5.3.1 The Potential for Development of the Pharmaceutical Industry in Oslo, Norway

The Trippel Helix Model (Etzkowitz & Leydesdorff, 1997) illustrates the importance of the dynamics of the university/research area, industry and government to create innovation. The model has received abundant of academic attention and credential, and the Norwegian government has been utilizing the model to build industries. BI professor Torger Reve notes that there are two crucial elements missing in the model. He emphasizes that the model has been successful in developing existing business, however the lack of focus on the

entrepreneur and the venture capital leads to a weak commercializing process and is therefore hindering the creation of new businesses (Reve, 2018).

Entrepreneurship and commercialization are topics which have received great attention in Norway during the recent years, and as a result, Reve's two crucial objections have been added to the model.

Norway's spending on healthcare per capita is the highest in the world. The Legatum Prosperity Index (2017) ranks Norway as one of the top healthcare systems in the world based on physical health, infrastructure and the availability of preventative care. There are several top research institutions and universities in Norway, such as the Norwegian Radium Hospital and the University of Oslo. In addition, some world leading research milieus have been established and developed in Norway, for instance on cancer. Even though the Norwegian population has an above average high education and training (Jakobsen et al., 2018), employment in the pharmaceutical sector per capita is the lowest among the European countries (EFPIA, 2018).

Most of the basic research which is turned into applied research in the pharmaceutical industry, stems from the public sector, and this industry is relatively young in Norway (Jakobsen et al., 2018). Bjørn Klem (B.K.) from OCC comments that this is notable when it comes to Norwegian investors. He explains that there is a general lack of understanding of the industry, of course with exceptions, and that investors rather invest in the oil-sector, salmon-business or real-estate, and he further notes that there is a lack of venture capital. R.M., Roche Norway comes with a similar remark, that it is a "cultural thing" or lack of knowledge about the pharmaceutical industry:

"There is this cultural thing. Health is a very basic public need and we should all have equal access. What is forgotten, is the dimension of all the innovation, and the investments are coming from the private sector. It is not well understood how much it takes and how much investment it takes to bring them into work. In Switzerland 30% of their GDP comes from science. I think some of the challenge is that you have no large traditional pharmaceutical companies from Norway, so there has never been a focus on really expanding this."

Following the decline in the petroleum sector, the Norwegian government has emphasized the need for innovation in other sectors and proposed the pharmaceutical industry as an area with potential for industrial growth (HO21, 2018). A highly educated population, research of high quality, good health registers and biobanks, and a strong policy implementation system, are some of several beneficial factors that already are in place for the Norwegian pharmaceutical industry to flourish (BMI, 2010). However, regarding production and clinical studies, low-cost countries such as China and India, even US, are preferred and chosen, as the market in these countries are perceived to have a greater potential (LMI, 2018; NOMA, 2018).

5.3.2 Facilitation for Business Model Innovation

One of the trends in the pharmaceutical industry is the increasing cost of research, due to the complexity of some medical conditions. The need for development of more advanced medicines has led to more collaboration between the large pharmaceutical companies, and OCC denotes: *"There is more cooperation than before, simply because the projects are so expensive."*

Since Chesbrough in 2006 introduced the paradigm shift of open innovation, the process within the pharmaceutical industry is now more evident than ever. OCC comments on how Big Pharma are opening their labs and creating co-working spaces. He explains how the large pharmaceutical companies have taken more actions towards collaboration not only world-wide, but also in Norway. Many of the smaller biotech companies have been made more visible through OCC, which has resulted in the large pharmaceutical companies are taking a greater part of the activities taking place at OCC.

5.3.3 The Government's Role in the Pharmaceutical Industry

In a report published by Menon (Jakobsen et al., 2018), over 60% of the pharmaceutical companies agreed that approval from the Ministry of Health was a bottleneck for their development (Jakobsen et al., 2018). However, this does not exclude that the government is working towards change. The Norwegian Medicines Agency (NOMA) states that;

"NOMA's public mission, role and self-understanding have changed quite a bit. From being a very traditional regulation and approval authority and approval committee, to now functioning more as a supporter. It is not our responsibility to build the industry. However, we have started to take a more active part since we need to make sure that the research being done is focused on the right medicines. This is a new trend from our side."

One initiative that NOMA has conducted is to start being accessible at OCC. They seek to lower the threshold for companies to enter a dialogue with them, bearing in mind that a reduced cost for a pharmaceutical company in developing a drug, the cheaper it will be for the payer in the end. It is also in everyone's best interest that the right medicine reaches those who need it.

In the context of the digital era, there are a lot of new technological terms in the pharmaceutical industry. NOMA identifies many of them today as being hypes, however, fully aware that this can have major impact in the years to come. As a regulator they are preparing for new products and solutions to come for approval. Today, they have ongoing projects where they seek to learn how to handle big data and real-world data. They believe that it is important that they have built up enough competence around those subjects to understand and handle them when they emerge and become manifest.

"Real world data and big data records are very much talked about. It may change a lot of the industry in the long term, so it's important that we understand what's coming. If an organization comes with a dataset, and claim it is real world data, then it is important that we as a regulator understand the context of it, and how it works."

5.3.4 Stakeholder Responsibility for Implementation of Change

All stakeholders are connected to each other, and there are no isolated parts in the pharmaceutical industry. The difficulties of making radical changes in an industry of such a size and complexity is a fact all stakeholders acknowledge. B.K. from

OCC explains:

"It's challenging to implement a radical change in this industry, even though the idea is brilliant, because there are so many elements that need to be in place. It's a very conservative and heavy regulated industry. If you come up with an idea or product that requires alteration of the entire IT infrastructure, it will be very difficult. So, when you are developing new methods you have to make sure it fits with existing solutions and routines."

The Government and NOMA are explicit that their function is not to build the industry but support it. Their activities on the digital front is another example of their role. They seek to prepare and facilitate for change so the infrastructure is developed and ready when the industry start utilizing these technologies. The Government does not always see the need for a change of the regulatory framework, so the change must grow out from the pharmaceutical companies and the authorities will adapt thereafter.

The industry makes remarks that there has been a lack of capability to commercialize. The value of an investment in research from the government can be lost if the projects never get commercialized, or are bought early by an international actor, and taken out of Norway. OCC comments that it is a lack of capital in the commercializing process, however, through state-owned institutions such as Siva and Innovation Norway, the government is now increasing its support for the commercializing process.

5.3.5 A Shift Toward Risk Aversion

One trend affecting the whole industry, is the risk aversion of the large pharmaceutical companies. A combination of more complex diseases and smaller patient groups has increased the downside of failing and decreased the upside of succeeding (economically speaking). The companies are more focused on cost than ever before and are thus more risk averse. When speaking about direct capital investments in research projects or joint ventures, B.K., OCC explains:

"The incumbents have become more risk averse. The small biotechs hope to have the Big Pharma in on projects as soon as possible since the resource pool becomes so much larger. However, the incumbents have withdrawn more and more from the early stages since the risk is so high there. They are looking for more mature projects, where the risk is lower."

When the income is reduced, the cost side must improve its efficient. There are several activities that simply cannot be removed due to the regulatory barriers, and this increases the complexity. The importance of getting through the clinical phase and test the new substance on a patient as fast as possible, is therefore even more important.

The combination of increased number of Norwegian biotech startups and the risk aversion of the incumbents, has left the industry short in venture capital (OCC, 2018; Storvik, 2017).

This section presents an overview of the pharmaceutical business model in Oslo and provided the basis for further analysis. In the next section, the business model of the blockbuster model and the current model are constructed, compared and analyzed on the basis of Drucker's (1954) and Fjeldstad and Snow's (2018) theoretical frameworks.

6. Empirical Results

Based on the data collected through the in-depth interviews, along with secondary data, we analyzed the business model of the blockbuster model and the current business model of Roche based on Drucker's five business model elements: customer, value proposition, product/service offering, value creation mechanism and value appropriation mechanism. Subsequently, the chain-shop-network typology of value configurations by Stabell and Fjeldstad (1998) is used to analyze the blockbuster model as opposed to the current business model of Roche.

Applying the concept of value configurations to the concept of business models allows us to obtain deeper insight into the different business model elements and to analyze the pharmaceutical business model in a new manner. All elements of

the business model and value configuration are analyzed according to the theory discussed in the literature review.

6.1 Analysis of the Blockbuster Business Model

6.1.1. Customer

Knowing your customer is an important element of the business model (Drucker, 1954). Following a blockbuster business model, the pharmaceutical companies aim to reach the mass market. The mass market does not distinguish between different customer segments, and views the entire market as one segment. By targeting the mass market, their customers consist of one large group with predominantly similar needs and the same general health issue, such as high blood pressure or heart disease. Examples of this are treatments for conditions such as asthma, unstable cholesterol and depression, which all can be prescribed by general practitioners, thus reaching the mass market (NOMA, 2018). In the blockbuster business model, the customer is the physician, although the products are developed for the patient who is the end-consumer. The model focuses on what drug the physician is most likely to prescribe, which is why it ends up developing medicines for less complex diseases.

6.1.2 Value Proposition

The value proposition explains a promise of value to be delivered regarding the outcome that the customer can realize from utilizing the product/service. The value proposition of a blockbuster business model is the delivery of a product, i.e. a patented blockbuster drug, often targeting chronic diseases or conditions. The value to be delivered, is the usage of a drug, that has a clinical positive outcome. The customers pay for the total quality of the product. This value proposition is costly, as it requires high R&D investments. Only a few products make it through the pipeline, because the products need to be of high quality and show proven effect. The products that make it through the pipeline consequently need to gather high revenue to cover the high R&D costs, and the short exclusivity period. As soon as the patent expires, the generics out-compete the drug at a lower price. Thus, this value proposition is both driven by cost and value. The value proposition is the clinical outcome of the drug being prescribed.

6.1.3 Product/Service Offering

This element describes the concrete offering the customer receives. In the case of blockbuster business model this offering is identical to the value proposition, i.e. a single product. The product takes shape of a medication, which is prescribed by a general practitioner. The objective of a blockbuster drug, targeted at the mass market, is to obtain revenue above EUR one billion a year. The pharmaceutical company provides a new product in form of a medicine, that the physician can prescribe to his/her patients.

6.1.4 Value Creation Mechanism

Value creation mechanisms concern how an organization organizes its resources and activities to generate revenue. In a blockbuster business model, value is created by transforming inputs into products. Activities that are crucial in this transformation process include the R&D drug discovery, preclinical, clinical development (phase 1-3), production, distribution, marketing and sales. Moreover, in the blockbuster business model these activities are traditionally more or less all controlled and performed in-house. Producing the drug and commercializing them through massive salesforces is an important part of the blockbuster model, in particular, process technology and operational effectiveness.

To understand how value is created, it is important to understand whom it is created for. The physician evaluates clinical value of the drug that can be prescribed to the patients. Once that clinical value has been created, one must ensure that all resources being used as input to create the clinical value are of lower value than the value being created (Porter, 1985). In a blockbuster business model value is created through economies of scale. By increasing the effectiveness of activities to control the resources it is possible to create maximum value. Both scale and scope are as wide as possible to achieve economies of scale. Exploitation is the fundamental activity and incremental improvements of present knowledge and technologies are at focus (March, 1991). When operating in a blockbuster model, tangible resources, such as laboratories, manufacturing facilities, and a large salesforce are particularly important in order reach the production volume needed.

6.1.5 Value Appropriation Mechanism

The last business model element concerns how an organization can appropriate value from the value that has been created for the customer. The first and foremost way of appropriating value for a blockbuster model is by legal protection, through patents. The patent provides the firm with the exclusive rights for a fixed period, before the drug is being replaced by identical, yet cheaper, generics. Since the patent starts to run once it is filed, maximum value can be appropriated from the innovation through operational effectiveness. So it is crucial to ensure that the medicine reaches the market as fast as possible. The revenue mechanism being used in the blockbuster model is pay-for-product, and the revenue is generated by selling the ultimate product.

6.2 Analysis of the Business Model of Current Operations

The healthcare sector is quite unique when defining the customer, as the customers can be divided into three groups. First, is the one who prescribes the medicine/use the medical device on a patient, often a physician. Second, the patient her-/himself, who is the end-consumer. The third group is the payer. Who the payer is varies a great deal globally, from US with a free market and a competitive insurance-based system, to Scandinavia with a health economic system driven by cost-effectiveness and built on reimbursements from the government. There are also different categories of payers, and it is crucial to understand their respective roles and drives, because that determines how to deal with them. Following Drucker (1954) we view the business model as customer centric and understanding who the customer is and what the customer needs, will to a great extent affect all other elements.

6.2.1 Customer

There has been a redefinition of the customer for Big Pharma over the last years. They are now seeking a more personalized relation with the customer, seeking active feedback from patients, increasing collaboration and engagement in co-creating.

Big Pharma has gone from targeting general practitioners to an increasing number of specialists. The market for general diseases and conditions are being filled up, and they are moving towards specialty areas. These medicines are prescribed in hospitals by specialists. This results in targeting many small niche markets, instead of one large mass market.

Roche: Roche has adjusted its view from a physician focus to an increased stakeholder-centric view, which also includes the patient and the payer. Using more advanced technologies and an increased understanding of the biological process by focusing on few areas of diseases, they can target more complex diseases and medical conditions. This has led them to target smaller niche markets. The customer change from general practitioners to specialists, has two major impacts. Firstly, it has led to a more personalized relationship with the physician as they need to understand how to treat these conditions. Secondly, it has forced them to understand how it is for a patient to have these conditions. This motivates Roche to increase co-producing with their customers, as it can lead to better insight and understanding of their customers. By engaging in such activities, Roche establishes a closer relationship with their customers. The increased complexity in treatments leads to a higher demand for increased competence within the commercialization process than the blockbuster model.

6.2.2 Value Proposition

The value proposition of the current business model has shifted focus over the years. The changes regarding who the customer is, has led to more "jobs to be done". With their increased focus on multiple stakeholders, Roche can provide a value proposition for the physicians, patients and the payers. In this way it is possible to define the value proposition being of both clinical and economical value for its stakeholders.

Roche: Defining the customer is an important part of defining the value. Roche clearly defines to whom they deliver value in their annual report 2016; "*Bringing significant medical benefit for patients, doctors and payers"* (Roche, 2016). There is a notable change in Roche's value proposition from 2015 to 2016, namely how

they have shifted towards putting the patient in the center. Roche's choice of words shifts:

From 2015 annual report: *"We are a research-based, global healthcare company with combined* ***strengths in pharmaceuticals*** *and diagnostics. (...) We* ***develop, manufacture*** *and* ***deliver innovative medicines*** *and diagnostic instruments and tests that help millions of patients globally."*

To 2016 annual report: *"Our focus is on* ***fitting treatments*** *to* ***patients: providing the right therapy for the right group*** *of* ***people at the right time****." (...) "We are guided by our purpose:* ***Doing now what patients need next****. Our company has a 120-year history of advancing the field of medicine and bringing novel treatments and diagnostics to patients. The patient is and will remain at the core of what we do, the reason we come to work every day."*

This change in strategy focus is a clear indicator of a shifting value proposition. An important note is the change from "*develop, manufacture and deliver innovative medicines"* to "*doing now what patients need next*" (Roche, 2015). Thus, Roche is changing the definition *from* being a drug producer *to* engage in solving problems the patients are facing. This change in vision is a formal way of communicating their shift to personalized healthcare.

The Norwegian affiliate does not directly engage in the scope of research, and for this reason their communication with patients and customers remain an important part of their business. In Norway this, among other factors, has resulted in a significant change in their initiatives in communication with the Norwegian government. Roche's perspective on the government has changed from seeing them as a regulator that hinder innovation, to consider them a customer.

- *Value Proposition for the Physician/Provider:* The physician values clinical results. A shift from general to specialist does not necessary change the value proposition for the physician. Increasing focus on bringing the right treatment to the patient, Roche is helping the physician to provide a solution to the patient. Roche's increasingly investments in immunology provides better technology and enable them to better understand the patient's condition, and the physician can

therefore focus on a cure of the medical condition, rather than just treating the symptoms. In this way, Roche is altering the value proposition from treatment to cure the problem, and through insight they can help to guide the treatment decision (D.M., Roche Diagnostics Norway, 2018; Nelson, 2017).

- *Value Proposition for the Patient***:** The ease of retrieving information has empowered the consumer in most industries, which leads to a more demanding customer. Roche has increased their communication directly towards the patient and established a stronger relationship than earlier periods (LMI, 2018; NOMA, 2018). The value proposition towards patients is clear "*doing now what patients need next*."

- *Value Proposition for the Payer:* The Norwegian healthcare system is funded by taxation. In the current business model, the government functions predominantly as the payer (NOMA, 2018). They want medicines at a low cost, and a healthy population with the smallest use of medicines as possible. When acting on a political level the pharmaceutical companies are using lobbyists such as LMI for communication and influence. Roche also communicates directly with the government, an example of this is R.M., Roche Norway's letter to "Finansavisen" on April 4, 2018, where the value proposition concerns helping the government in solving one of the largest health threats, the antibiotic resistance:

"It's urgent. We must learn to do things differently and we all have to be agile. Not only the industry but also the health authorities. The learning curve will be steep forward. We clearly see that the Norwegian authorities share these visions as well and are open to a closer dialogue about how we can change each other's work."

Roche Norway uses a lot of resources to promote the health benefits the pharmaceutical industry can provide the population, thus showing the authorities how their overall value proposition can improve health outcomes for the society.

6.2.3 Product/Service Offering

The key offering Big Pharma is providing is still a product, i.e. the drug. However, we see an adaption towards the inclusion and delivery of services. A shift towards offering a service, more than just purely a product. Roche is leveraging technologies through strategic partnerships and acquisition with organizations that operate outside their boundaries to position themselves within the personalized healthcare (Roche, 2018). Roche does no longer seek to solely deliver the results, they seek to use their capabilities to interpret the results as well. The general manager of Roche Diagnostics Norway, D.M., explains how they want to simplify the process of getting a treatment:

"If you've got a rash somewhere, what do you do? I just google it. By the time I go to see my doctor I know more or less what I have and the treatment for it. The doctor can know immediately what it is, but the doctor is not all knowing. So why don't we actually help the doctor in this process and assist in the decision making. Now that's a new way of creating value, providing doctors with that kind of support. The only question then is what do you need a doctor for...."

This illustrates an initiative where Roche is striving to provide value added service in the process of helping the physician in detecting the right treatment for the patient, thus providing increased medical effect. To succeed in these kinds of offerings Roche sees it as crucial to capture data, however, as they admit they are not yet ready to commercialize the concept as D.M., Roche Diagnostics Norway, denotes; "*This is where capturing the data is absolutely critical, and right now it's not really happening"*.

6.2.4 Value Creation Mechanism

The value creation mechanisms are the processes of creating value for the customer. But the topic of value creation is complex and needs an analysis. Innovation is considered to be one of the main sources of value creation, and in the pharmaceutical industry it is often measured in number of patented drugs and are closely related to the R&D activities. Innovation in the current business model is still predominantly the creation of a new product. What Roche can

commercialize from the R&D process, is at the core of pharma, and the mechanism of how that clinical value is created.

Acquisitions have for a long time been a central activity within the pharmaceutical industry to achieve growth. However, scrutinizing the purpose of achieving growth, a more strategic perspective has emerged. The recent acquisitions made by Roche are built on obtaining technologies they can continue developing. Additionally, the acquired firm's integration level has changed from being fully integrated, to now operating with complete autonomy. The acquisition of Genentech made Roche the world's largest biotechnology company and was done to increase the technological capabilities in the field and to create new superior products (Gatignon & Xuereb, 1997). Genentech's work in developing humanized monoclonal antibodies helped Roche to build the leading position within oncology. Flatiron is another example where Roche is aiming to access capabilities, and following Schumpeter's theory of innovation (1934), Roche is moving their innovation from new products to developments of new markets. Roche's increased focus on immunology may exemplify the following: The attention on molecule areas instead of diseases has created different opportunities, and they are working on developing a new market. The patient may not necessarily be aware of the value of this today, as an individual patient's need of treatment expands within a relatively short period of time, unlike the payer who has a longer perspective of time.

The value creation of providing ecosystems in the pharmaceutical industry, such as the work of OCC, may not be evident for the patients, however, it creates value for several other stakeholders. This type of ecosystem promotes partnerships resulting in cooperation which can lead to cost benefit for all parties (Lavie, 2007). The activities that develop in these ecosystems might have higher value for the society (e.g. the government) in the end, as the industry structure may change following new monopoly creation or destruction (Schumpeter, 1934).

6.2.5 Value Appropriation Mechanism

The value appropriation mechanisms most frequently used in the pharmaceutical industry, is to enforce property rights (Porter, 1985) through patents. This is a

result of how the industry is structured and how it functions. Today, the system of patents is still the most deployed mechanism to protect the innovation being imitated by a market competitor. Roche states on their website:

"Like all research-based companies, Roche needs patent protection to be able to recoup its long-term investments in research into new medical solutions and to pursue further innovations. Without patents and pricing that encourages real progress, innovation is impossible."

The blockbuster drugs are often easy to assemble once the chemical recipe is available, and this must be made public when applying for clinical trials. When patents run out, it is a simple process for generic companies to re-produce a generic version.

The combination of continued patent expirations (value appropriation), and the decreasing number innovation of large blockbuster drugs (value creation), constitute the core of the pressure the pharmaceutical companies are facing. Severin Schwan, the CEO of Roche, puts it this way (Neville & Atkins, 2018):

"The question is… to which degree can we make this up with productivity improvements? How can we organize ourselves in a more efficient way? How can we increase productivity? And how can we compensate for this portfolio mix effect which is obviously negative on the bottom line."

The effectiveness of protecting knowledge with patents has a negative aspect, and Roche acknowledges the need to initiate other activities that can function as value appropriation mechanisms. The increased complexity in diseases, the ambiguous processes, and the high competence required to develop personalized healthcare, can create barriers for competition. Roche's expertise in oncology and companion diagnostic with their pharmaceutical products can result in isolating mechanisms such as superior technological capabilities which are difficult to imitate and makes it possible for Roche to detain a larger portion of the value created. Roche states that personalized healthcare is more about the understanding and knowledge of how to treat the patient: "*It is more important to know what sort of person has a*

disease than what sort of disease a person has" (Roche, 2018). The competence that is being developed of understanding the patient is not easily imitated.

Moving from general practitioners to specialists creates a higher demand for expertise and competence. Bargaining power and the negotiation process become increasingly important as there is less value to be extracted from each deal when targeting small markets. Roche sees it as necessary to be the leader within their molecule field, to be able to provide the highest competence, as D.M., Roche Diagnostics Norway, denotes:

"One thing that I would say we are good at is focus. Before we had vitamins, minerals, fragrances and perfumes business. A very diverse business in other words. But every time you take a step like that you are diluting your focus and it becomes more and more challenging to have a sustainable model. Then we decided to focus on pharma and diagnostics because we needed to be strategically focused on our core competence."

A firm's ability to differentiate is often linked to value appropriation. Increased reputation and branding are elements that can create such differentiation. Roche has increased its communication out to the public, which can be evaluated as an effort to increase the positive reputation of the company. OCC and NOMA remark that the general spending of the pharmaceutical companies is tightened, however, the marketing budget seems not to have the same restrictions.

The frequency and size of partnerships have increased during the last years. Digitalization is a vital enabler for the facilitation of personalized healthcare. Roche is to a large extent using partnerships to leverage this technology, as Gregg Talbert, Global Head of Digital and Personalised, states (Roche, 2018): *"Our partnerships around data, analytics, and apps are a critical component to achieving our objective of improving patient care."* Partnership with GNS healthcare and Syapse (Roche, 2018) are co-operations that are focusing on developing the analytical capabilities. With the announcement of the partnership with GE Healthcare in the beginning of 2018, a digital platform for diagnostics was initiated. Developing digital capabilities can be a slow process and there is a risk that the technology is outdated before it has been integrated. To some extent,

Roche is gaining access to these digital capabilities through partnership and seeks monopoly rents by achieving first-mover advantage.

In the end, the economic incentives are the reason why Roche is existing (Friedman & Schwartz, 1965). If Roche as a business is unable to appropriate some of the value created through innovation, there is no incentive for Roche to pursuit the process of innovate medical products or services.

6.3 The Analysis of the Business Models in a Brief

The most clear and explicit change is the move from general to special physician, thus a shift from the mass market to many, yet smaller markets. However, a change that is somewhat more indistinct, though equal impact, is that the payer and patient also are seen as customers. This customer redefinition has significant implication on the other business model elements. For instance, there is no longer one value proposition, with three distinct customers, the value proposition changes thereafter. Furthermore, Roche strives to provide value added services in addition to their patented drugs and focusing on helping physicians to make better medical decisions. Their new vision "doing now what patients need next" is a clear signal that the patient's health is their new value proposition, and a signal to the authorities that they are participating in addressing health issues in societies. Hence, their product/service offering is no longer exclusively patented drugs, but includes value added services.

Roche's value creation mechanisms are following a dual focus. The innovation and creation of new products are still considered an important value creation mechanism. However, Roche is also following an extensive novel strategy with new partnerships and acquisitions of technological companies. With this new focus they aim to access knowledge within the digital space to engage in the problem-solving activities which the personalized healthcare entails. Thus, Roche seeks to enter and develop new markets with use of available data. The business of personalized healthcare is complex and demands high competence and digital capabilities.

Roche's value appropriation mechanisms are also following an ambidextrous focus. Patents are still the most deployed mechanism to protect the innovation. However, Roche is acknowledging the vulnerability of patent dependency and is therefore aiming to gain superior competence within the field of personalized healthcare. Superior competence can create barriers for competitors. Thus, with intense investments in personalized healthcare, they seek to achieve discernment not easily imitable within the field. Being a leader in this area can create the reputation needed to reduce their dependency of patens.

6.4 Linking Value Configurations to Business Models

The chain-shop-network typology of value configuration by Stabell and Fjeldstad (1998) provides an activity-centered representation of firm value creation (Fjeldstad & Snow, 2018). By following Fjeldstad & Snow's (2018) research of adding value configuration as a contingency variable to the business model analysis, we believe that we are better equipped to conduct a thorough analysis of the business model elements of the pharmaceutical industry in a new and profound manner.

What was evident when evaluating the traditional blockbuster business model, as opposed to Big Pharma's current business model, is that we see a reconfiguration of the pharmaceutical business model. Following several explanations, the traditional blockbuster business model is no longer sustaining successful growth. The model has been highly successful for decades at delivering treatment to people. However, the market for the treatments the blockbuster covered is now saturated, and while patents are running out, this product/service offering is no longer sufficient. Our analysis shows an adaptation towards the inclusion of added value to improve patients' health. These changes rock so fundamentally with the parts of the pharmaceutical value chain, that we believe we can see an adoption towards a value shop.

In the following we will go through key points from the in-depth interviews and secondary data that provided us with the basis for why we state the fundamental building blocks of the pharmaceutical value chain is diminishing, and a shift is apparent.

6.4.1 More Collaborations Between the Diagnostics and Pharmaceutical Division

With the increasing demand for Big Pharma to improve health results in the sense of value-added services, Roche is quite uniquely positioned as they have both a diagnostic division and a pharmaceutical division. Traditionally, these two separate legal entities have operated with a great deal of autonomy. However, in recent times the two divisions have experienced a convergence towards one another in the form of more collaborating projects and initiatives. Roche has discovered ways of using their two divisions as a source of competitive advantage by integrating the two divisions to a higher degree. R.M., Roche Norway, denotes:

"Roche is quite unique in the sense that we have a very strong diagnostic division along with the pharmaceutical division. And this has become one of our biggest strengths, as we are taking personalized health care to a whole different level because of collaborations between the two divisions. Diagnostics has increasingly become a part of pharma. If you look at two thirds of our products in pharmaceuticals they carry a companion diagnostic because we go for very specific tumors. So, we are investing more, not as separate businesses, but more in concert with each other."

GM of Roche Diagnostics Norway AS, D.M., also affirms this remark:

"We definitely see more collaborations with pharma and diagnostics. Now more than ever, and I think it will increase even further. And that's a bit of a competitive advantage and makes Roche relatively strongly positioned. There are only a few companies that are positioned in that same way of having both pharma and diagnostics divisions."

6.4.2 Treating Diseases - A Complex Process Requiring High Degree of Competence

Treating diseases today has become much more complex. Historically, identifying a disease and treating it with a targeting drug was considered a simple process.

However, it has now been identified that diseases are all interconnected in a complex manner, D.M., Roche Diagnostics Norway, asserts. He further explains:

"For example, when you look at oncology (cancer) diagnostics, all of a sudden you get into something extremely complex. If I'm a treating physician and you come to me with a certain type of cancer, how can I find the right type of treatment when there are so many different types and different treatments?

So, what I do is to collect the fact base. First, you can try and take biopsy of the cancer and do tissue staining to identify the cancer, or you can sequence it and look for specific mutations. You can also take a PCR test, MRI scan and a CT scan. Then you need a radiology expert and you need a pathologist. So, in the end you have all this information from different labs and different doctors. And only once you have all these players at the table explaining what everything means, then, maybe I feel comfortable to choose the right medicine. So, the simple diagnostics, simple treatment - does not work, everything is interconnected. And now I'm just giving you the example of cancer."

Finding treatments has become a process so complex, that selling products today requires a lot more problem-finding-, problem-solving-, choice-, and evaluation-activities than before. This has made resources like competencies and relationships become increasingly critical drivers for competitive advantage. *When* such intangible resources are most critical, depend on the level of resource-competition (Haanes & Fjeldstad, 2000). As the blockbuster business model focuses heavily on operational efficiency and exploits old certainties, the current business model is increasingly leaning on problem-solving activities and the exploration of new possibilities (March, 1991). Thus, the resource-competition of the current business model shows a different situation, an increasing need for intangible resources to provide *solutions* (Haanes & Fjeldstad, 2000).

Continued patent expiration forces the pharmaceutical companies to focus more on complementary assets, and with the current complex reality of treating diseases, tacit knowledge has become a natural key resource in Roche's current business model. Tacit knowledge in the sense of problem-finding, problem-solving and evaluation in a highly complicated process. This new focus on tacit

knowledge and competencies requires a different way of viewing the company. D.M., Roche Diagnostics Norway, explains:

"Historically, it wasn't rocket science, but now it is rocket science. It is getting more difficult. So, in the end, for us, this is becoming more and more critical; to not only just provide results but to help interpret those results. And this is where the value chain is shifting."

6.4.3 Collaborations and Acquisitions for a New Purpose - A New Ecosystem is Arising

During the last year, Roche made acquisitions and collaborations that show a deviation from the traditional blockbuster strategy. Deviations in the sense that Roche signals an interest in exploring possibilities to provide something more than patented drugs aimed at the mass market. For instance, in January 2018 it was announced that Roche and Genentech (GE) entered partnership. GE Healthcare is a company specialized in harnessing data and analytics across hardware, software and biotech. The aim of the collaboration is to develop an industry-first digital platform, using advanced analytics to provide workflow solutions and apps which support clinical decisions (Roche, 2018).

Furthermore, Roche is also performing an experiment with IBM Watson to help physicians in detecting the right treatment for the right patient. In oncology, Roche recently partnered with GNS Healthcare to bring big data and machine learning to improve patient care. Furthermore, Roche has entered a collaboration with Foundation Medicine and acquired Flatiron Health. Flatiron Health is a leading technology company in oncology, and this collaboration is evaluated to be an important step in Roche's personalized healthcare strategy (Roche, 2018). D.M., Roche Diagnostics Norway, explains the acquisition as follows:

"Three weeks ago, we bought a company called Flatiron. They run around 260 cancer centers in the US and has 15-20% of all the cancer patients in the US and are running medical records of these institutions, and they have everything connected. That real-world data is critical to understand how patients react to treatments. It is critical for Roche regarding product development, but it is also

important if we were to say from now on we want to provide clinical support. This is something Roche is equally interested in and that is part of our strategy."

Personalized healthcare involves expanding from companion diagnostics to a more comprehensive view of patients' health, generated from a wide variety of data sources that requires a new ecosystem of partnerships with pharmaceutical and technology companies (Roche, 2018). Gregg Talbert, Global Head of Digital and Personalised Healthcare Partnering in Roche, acknowledges in a newsletter by Roche the importance of these new partnerships (Roche, 2018):

"Our core business is discovering and developing medicines, and we recognize that we must have robust partnerships to tap into innovation that's outside our walls. Our partnerships around data, analytics, and apps are a critical component to achieving our objective of improving patient care."

The new acquisitions and partnerships between pharmaceutical and technological companies have resulted in that a new ecosystem is arising. In the quest of staying competitive and providing value to their customers, a more multidimensional approach is needed. These new digital collaborations constitute a complex system of interconnected elements with data about patients and medicine. However, in a traditional industry, this new ecosystem requires facilitation, promotion, and support in enabling such novel types of collaborations.

As previously mentioned, The Trippel Helix model (Etzkowitz & Leydesdorff, 1997) illustrates the importance of the dynamics of the university/research area, industry and governments to create innovation. By adding Reve's (2018) two elements, entrepreneur and venture capital, together this model provides the basis for the promotion and creation of innovation and new businesses. In Norway, these two newly added elements have to a high degree been embedded into the model and system. Consequently, several new initiatives that facilitate for collaborations between the different actors have emerged. For instance, Oslo Cancer Cluster has been highly successful at assembling companies and promoting collaborations in the pharmaceutical industry. B.K. from OCC affirms this:

"Oslo Cancer Cluster has operated for 12 years now and been highly successful at making biotechnological companies more visible. The incumbents are showing an increased interest and engagement in our cluster and our activities these days. Many of our meeting rooms are now sponsored by the incumbents and they arrange several meetings here now. More and more of them wants to come work in our offices. The interest for our cluster has generally increased a lot, and within two years we will open our new "innovation building" which is on 8000-9000 sq.m."

Michele Pedrocchi, Head of Global Strategy and Business Development for Roche Diagnostics, as communicated on their website, acknowledges the need for robust partnerships in order to discover, develop and deliver medicines to the patients in a more targeted fashion (Roche, 2018): *"Whereas our partnerships used to be one-to-one, now we have to bring many partners together in an ecosystem that has standardization and flexibility."*

6.4.4 Roche Diabetes Care

Diabetes is a chronic disease that affects one in every eleven adults worldwide, and without effective prevention and control, diabetes will become the seventh leading cause of death globally by 2030 (WHO, 2017). Diabetes type 2, which accounts for up to 90% of the cases, is known to be generally preventable. Simple lifestyle measures such as a healthy diet and regular exercise have been proven to be effective in preventing or in delaying the disease (Roche, 2018).

Roche has established a business unit called "Diabetes Care" where the aim is to deliver services and solutions for effective treatment management. Increasing access to early diagnosis, self-monitoring, education and individualized treatment can reduce the risk of serious short and long-term complications associated with diabetes (Roche, 2018). Recently Roche took their Diabetes Care one step further by acquiring MySugr which is an app-based service, which captures data on everything from blood-sugar to workouts. D.M. elaborates further on this easy-to-use digital diabetes management solution:

"We acquired a company called MySugr which has an app all about lifestyle, and with over a million users. This is an aspect of disease management and lifestyle changes which helps you manage your disease with diet and exercise advices, plus much more. So, in this area we are definitely going in the direction of providing solutions and health outcomes in terms of preventable services."

Diabetes constitutes a complex problem which cannot simply be solved with a new insulin. Diabetes requires effective and innovative solutions for prevention and control. Roche Diabetes Care embarks the complex problem of diabetes with a holistic view. Empowered with technology and integrated solutions, Roche can now use this system to analyze the data to help diabetes patients improve their health outcome. This Diabetes Care unit is signalizing a move towards a value shop and towards promised solution quality. Additionally, Roche is experimenting with "payment for results" solution with a local insurer in Denmark and hopes to use this outcome-based payment more broadly (Kresge, 2018). Experimenting with paying on results is a novel way of thinking in healthcare, and a fundamental deviation from a value chain revenue mechanism.

6.5 The Reconfiguration of the Pharmaceutical Business Model

The pharmaceutical industry is experiencing fundamental changes in their business model and we believe a business model innovation is occurring. This, because the returns obtained from the blockbuster model are diminishing, and a transformation is needed to sustain value creation and value appropriation. These changes derive from forces both within the organization and from the environments in which they are embedded. The changes involve such fundamental elements of the old business model that we believe we are witnessing a radical business model innovation.

Overall, over the last years, we can observe several aspects regarding Roche's strategy and activities, which rock with fundamental building blocks of the traditional value chain. One of the most prominent differences, in our view, is the new focus on value proposition. A shift from innovation focus to patient focus indicates a clear deviation from a value chain mentality. Additionally, Roche's recent acquisitions and collaborations also constitute significant indicators

signaling that Roche is entering an era where their new focus relates more to delivering health outcomes, and preventing diseases, rather than only curing them.

Moreover, Roche's new strategy and activities have also changed the role of the customer. Targeting the mass market, the role of the customer was limited to being recipients of a drug, whereas now their role in Roche's operations is more active. Roche has at present a more personalized relationship with their customers. For instance, with the Diabetes Care, customers provide feedback, collaborate, and co-produce with Roche. Subsequently, success is no longer only depending on large return from a small number of drugs, although this still constitutes a crucial part of Roche's revenue. Success today increasingly depends on the health outcome of the customer.

As explained previously, most organizations are not pure instances of a single distinct value configuration, and neither are the pharmaceutical companies. Even though we talk about the blockbuster business model as a value chain, we are aware that the production of drugs is supplemented by the R&D process which constitutes more of a value shop. However, what we try to justify is that we can observe that the current business model of the pharmaceutical companies now involves more value shop activities along the value chain, and that the overall primary activity logically no longer has an isolated value chain focus. The value chain is now supplemented with more value-adding services and products. Therefore, we argue that we see a reconfiguration of the pharmaceutical business model.

We believe that the changes we are observing in the context of the pharmaceutical business, are so radical that the business model innovations we are witnessing is a cross value configuration. To sustain the value creation and value appropriation, the pharmaceutical business model has been forced to exert a reconfiguration. Although the changes are not as radical as a complete shift from value chain to value shop, the changes are nonetheless so fundamental that we believe we see movements *towards* a value shop. Thus, we are not talking about a disruptive business model innovation, but rather a reconfiguration of the pharmaceutical business model.

6.6 Summary of Empirical Results

The objective of this section is to two-folded: First, the goal is to conduct a thorough analysis of the business model of Roche's traditional blockbuster model as opposed to their current model based on Drucker's five business model elements. Second, to obtain a deeper understanding of the two business model elements by applying the concept of value configurations to the concept of the business model.

Through the combination of the theoretical approach and the in-depth interviews, we were able to describe and explore the business model of the pharmaceutical company, Roche. The results in the empirical analysis illustrate the major reconfigurations the pharmaceutical business model is facing, and these results indicate a change in value configuration, from a value chain towards a value shop. Hence, the answer to our research question *"How does the pharmaceutical industry respond to the diminishing return obtained from the blockbuster model, and how can a new model mitigate it?"* is illustrated in the following tables. Table 6.1 and 6.2 presents a summary of our findings:

Table 6.1. A Comparison of the Blockbuster Model and the Current Model

Business Model Element	Blockbuster Business Model	Current Business Model
Customer	Mass market No clearly defined customer segment Customer: "General Physicians"	Customer redefinition: Payer - Patient - Physician Co-Producing customers Targeting more niche-markets.
Value Proposition	Blockbuster drug "Develop, manufacture and deliver innovative medicines" Creates value through usage of a drug	Diversified drug portfolio - niche therapies Tailored value proposition for each customer "Doing now what patients need next" Selling pharmaceuticals + value-added services
Product/Service Offering	A product - blockbuster drug A medicine for treating diseases	Still products + an adaption towards the inclusion + delivery of services. Patient-centric products/services.
Value Creation Mechanism	R&D Financing Introducing new goods Commercializing of blockbuster drugs High R&D investments, high risk of failure	R&D Innovation in form of: - Creation of new markets - Applying new processes - Reorganization of industries (by creating a monopoly position)
Value Appropriation Mechanism	Legal protection - patents Pay per prescribed medicine	Legal protection - patents Barriers to imitation through ambiguous processes Higher market-based assets: - Increased reputation - Higher competence specific molecules areas

Table 6.2. An Illustration of how the Current Business Model Follows a Dual Focus

Value Configuration	Business Model Elements			
	Value Proposition	**Role of Customer**	**Value Creation Mechanisms**	**Value Appropriation Mechanisms**
Value Chain	A blockbuster drug: Producing innovative medicine	Recipient of drugs. Distant relationship, one-time transaction, low degree of interaction	**Key Activities**: In-house: R&D, production, sales, and marketing of medicines and diagnostic equipment **Key Resources**: Tangible resources (i.e. laboratories and manufacturing facilities), operational efficiency, and innovation.	**Revenue Mechanisms:** Pay-for-product **Protection Mechanisms:** Patents
Value Shop	Health outcome delivery: Solve problems the patients are facing	Close and continuous relationship. Active role, collaborates and provide feedback	**Key Activities**: Problem-finding, problem-solving, choice, and evaluation. Collaborations with **Key Resources:** Intangible resources such as competencies, tacit knowledge, and relationships to provide solutions	**Revenue Mechanisms:** Outcome-based payment, i.e. pay on results solutions **Protection Mechanisms:** Reputation, status and patents

7. Conclusion

Our study is based upon the concept of business model and how this concept is applied in the pharmaceutical industry. Drucker's five business model elements (1954) were chosen as theoretical framework for the purpose of describing and exploring the pharmaceutical business model. This framework allows us to understand how the elements are tightly interconnected and centered around the customer. Understanding the customers in the pharmaceutical industry became particularly important in order to map the business model elements. This allowed us to give meaning to our research question:

"How does the pharmaceutical industry respond to the diminishing return obtained from the blockbuster model, and how can a new model mitigate it?"

Analyzing the blockbuster business model as opposed to the current business model revealed fundamental alterations. The pharmaceutical industry is

responding to the diminishing return by moving away from the traditional blockbuster model. The most fundamental change concerns the definition of the customer. Moving from addressing general practitioners to medical specialists, Roche is shifting its focus from targeting the mass market to concentrate on smaller market segments. Including the payer and the patient as customers also depict a clear customer redefinition. Furthermore, Roche has shifted its overall vision and strategy, from providing medication to solving health issues. Indicating a clear shift in value proposition as well as product and service offerings.

Moreover, Roche's value creation and appropriation mechanisms are following a dual focus. As a Big Pharma, Roche is still relying on the creation of new, patented medicines. However, simultaneously, Roche is engaging heavily in a new strategy aimed at personalized healthcare. This entails acquiring and partnering with technology companies to access superior competence within the digital space. The new focus involves more problem-solving activities with a higher degree of competence which allows Roche to rely on more sustainable appropriation mechanisms.

By viewing the business model through the lens of value configuration we were able to obtain a comprehensive view to analyze the distinctive elements, as well as obtaining a more holistic understanding. Thus, we discern how some of the recent activities performed by Roche and the industry are not in alignment with the traditional blockbuster value chain. Firstly, the two distinct divisions, pharmaceuticals and diagnostics, have become more integrated in the pursuit of providing value added services. Secondly, as disease treatment is becoming more complex, Roche is increasingly relying on intangible resources, such as knowledge and competence, to resolve customer problems. Thirdly, a new ecosystem with collaboration between pharmaceutical companies and technological companies is arising to provide value in a new customer-centric way. Further, the industry is being restructured to facilitate collaboration. Lastly, Roche's initiative in helping diabetes patients manage and prevent the disease illustrates a clear deviation from a value chain alignment.

When exploring the business model of the pharmaceutical company through the two theoretical frameworks, we become aware of that a reconfiguration of the

pharmaceutical business model is emerging. The old blockbuster model is no longer sustainable and the returns obtained are diminishing. As a response, Roche is providing new ways to create value for its customers and appropriating value while doing so. With new customer segments and a new vision, Roche is aiming to gain superior competence within the field of personalized healthcare. They are creating a new pharmaceutical business model with health outcomes in focus, and the industry is restructuring to facilitate this change.

A business model innovation is emerging, and we believe that the changes we are observing in the pharmaceutical business model are illustrating a clear deviation from a traditional pharmaceutical value chain. With renewed focus and a new vision, we believe the reconfiguration of the pharmaceutical business model is clearly indicating activities tending towards prevent and solving health issues. The fundamental building blocks of the pharmaceutical value chain is diminishing, thus we see a shift towards value shop.

8. Managerial implications

We believe this thesis can provide useful insight for managers when developing and structuring their organization. The business model concept can be a useful tool for managers when strategizing and adjusting their organization in constantly evolving environments. Incremental changes to the business model can be sufficient in some instances, however a manager must be prepared to make radical changes if environments impose a greater change. Moreover, we believe this thesis can help managers in increasing their understanding of how value is created in an organization. Knowing the organization's value configuration and aligning the business model elements thereafter is crucial to best create and appropriate value.

8. References

Accenture (2017). *Technology for Patients: The New Age of Human Empowerment*. Retrieved from: https://www.accenture.com/t20180320T075055Z__w__/us-en/_acnmedia/Accenture/next-gen-5/insight-tech-life-sciences-2017/Life-Sciences-Tech-Vision-2017_ONLINE.pdfla=en#zoom=50

Alvarez, S. A., & Barney, J. B. (2004). Organizing rent generation and appropriation: toward a theory of the entrepreneurial firm. *Journal of Business Venturing*, *19*(5), 621-635.

Alvarez, S. A., & Barney, J. B. (2005). How do entrepreneurs organize firms under conditions of uncertainty?. *Journal of management*, *31*(5), 776-793.

Amit, R., & Schoemaker, P. J. (1993). Strategic assets and organizational rent. *Strategic management journal*, *14*(1), 33-46.

Amit, R., & Zott, C. (2001). Value creation in e- business. *Strategic management journal*, *22*(6- 7), 493-520.

Amit, R., & Zott, C. (2012). Creating value through business model innovation. *MIT Sloan Management Review*, *53*(3), 41-49.

Anderson, P., & Sherman, C. A. (2007). A discussion of new business models for 3D printing. International Journal of Technology Marketing, 2(3), 280-294.

Bacharach, S. B., & Lawler, E. J. (1981). *Bargaining: Power, Tactics and Outcomes*. Jossey-Bass Inc., 433 California Street, San Francisco, CA 94104.

Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long range planning*, *46*(6), 419-426.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, *17*(1), 99-120.

Bátiz-Lazo, B., & Holland, S.(2001). Strategy and structure of the pharmaceutical industry. *The Open University*.

Björkdahl, J. (2009). Technology cross-fertilization and the business model: The case of integrating ICTs in mechanical engineering products. *Research Policy*, *38*(9), 1468-1477.

BioMedisinsk Innovasjon (BMI), (2010). Retrieved from:https://www.regjeringen.no/globalassets/upload/kd/vedlegg/forskning/biotekkonferanse/bioteknologi_strategi_final.pd https://www.regjeringen.no/globalassets/upload/kd/vedlegg/forskning/biotekkonferanse/bioteknologi_strategi_final.pdfBryman, A. & Bell, E. (2015). Business research methods. *Oxford University Press, USA*.

Carow, K., Heron, R., & Saxton, T. (2004). Do early birds get the returns? An empirical investigation of early- mover advantages in acquisitions. *Strategic management journal*, *25*(6), 563-585.

Casadesus-Masanell, R., & Ricart, J. E. (2010). From strategy to business models and onto tactics. *Long range planning*, *43*(2-3), 195-215.

Centers for Disease Control (2015, September 03). Preventing Chronic Disease. Retrieved from https://www.cdc.gov/pcd/issues/2015/15_0131.htm

Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & leadership*, *35*(6), 12-17.

Chesbrough, H. (2010). Business model innovation: opportunities and barriers. *Long range planning*, *43*(2-3), 354-363.

Chesbrough, H., & Rosenbloom, R. S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin- off companies. *Industrial and corporate change*, *11*(3), 529-555.

Cohen, W. M., & Levinthal, D. A. (2000). Absorptive capacity: A new perspective on learning and innovation. In *Strategic Learning in a Knowledge economy* (pp. 39-67).

Deloitte (2016). Battling costs while improving care. *2016 Global Health Care Outlook*. Retrieved from:

https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-lshc-2016-health-care-outlook.pdf

Di Gregorio, D. (2013). Value creation and value appropriation: An integrative, multi-level framework. *Journal of Applied Business and Economics*, *15*(1), 39-53.

DiMasi, J. A., Grabowski, H. G., & Hansen, R. W. (2016). Innovation in the pharmaceutical industry: new estimates of R&D costs. *Journal of health economics*, *47*, 20-33.

Doherty, N. F., & Ellis-Chadwick, F. (2010). Internet retailing: the past, the present and the future. *International Journal of Retail & Distribution Management*, *38*(11/12), 943-965.

Drucker, P. (1954). The principles of management. *New York*.

Drucker, P. F. (1994). The theory of the business. Harvard Business Review, 72(5), 95–104.

EFPIA Publications (2018). Employment in the pharmaceutical industry (by country). Retrieved from: https://www.efpia.eu/publications/data-center/the-pharma-industry-in-figures-employment/employment-in-the-pharmaceutical-industry-by-country/

Eichler, H. G., Baird, L. G., Barker, R., Bloechl- Daum, B., Børlum- Kristensen, F., Brown, J., & Garner, S. (2015). From adaptive licensing to adaptive pathways: delivering a flexible life- span approach to bring new drugs to patients. *Clinical Pharmacology & Therapeutics*, *97*(3), 234-246.

Etzkowitz, H., & Leydesdorff, L. (1997). Introduction to special issue on science policy dimensions of the Triple Helix of university-industry-government relations.

EUIPO (2017). Protecting Innovation through Trade Secrets and Patents: Determinants for European Union Firms. Retrieved from https://euipo.europa.eu/tunnel-

web/secure/webdav/guest/document_library/observatory/documents/reports/Trade Secrets Report_en.pdf

Federal Statistical Office. (2018). Current situation and change- Key population and private household figures. Retrieved from: https://www.bfs.admin.ch/bfs/en/home/statistics/population/effectif-change.html

Felice, D. D. (2017). How Pharma Can Fix Its Reputation and Its Business at the Same Time. Retrieved from: https://hbr.org/2017/02/how-pharma-can-fix-its-reputation-and-its-business-at-the-same-time

Fjeldstad, Ø. D., & Snow, C. C. (2018). Business models and organization design. *Long Range Planning*, *51*(1), 32-39.

Friedman, M. (1965). Capitalism and Freedom. A Leading Economist's View of the Proper Role of Competitive Capitalism. With the Assistance of Rose D. Friedman. *University of Chicago Press*.

Gassmann, O., Schuhmacher, A., von Zedtwitz, M., & Reepmeyer, G. (2018). *Leading Pharmaceutical Innovation: How to Win the Life Science Race*. Springer.

Glazer, R. (1991). Marketing in an information-intensive environment: strategic implications of knowledge as an asset. *The Journal of Marketing*, 1-19.

Haanes, K., & Fjeldstad, Ø. (2000). Linking intangible resources and competition. *European Management Journal*, *18*(1), 52-62.

Hacklin, F., Björkdahl, J., & Wallin, M. W. (2018). Strategies for business model innovation: How firms reel in migrating value. Long range planning, 51(1), 82-110.

HelseOmsorg21 (HO21) (2018). Innspill fra HelseOmsorg 21-rådet til stortingsmedling om helsenæringen (Rep.). Retrieved from: http://nettsteder.regjeringen.no/helsenaeringen/files/2018/07/Innspill-fra-HO21-rådet-juni-2018.pdf

Hunt, V., Manson, N., & Morgan, P. (2011). A wake-up call for Big Pharma. *McKinsey & Company*.

Hurmelinna-Laukkanen, P., & Puumalainen, K. (2007). Nature and dynamics of appropriability: strategies for appropriating returns on innovation. *R&d Management*, *37*(2), 95-112.

Jacobides, M. G., Knudsen, T., & Augier, M. (2006). Benefiting from innovation: Value creation, value appropriation and the role of industry architectures. *Research policy*, *35*(8), 1200-1221.

Jakobsen, E. W., Lind, L. H., Theie, M. G., & Skogli, E. (2018). Helsenæringens Verdi 2018. *(Rep. No. 37)*. Retrieved from: https://www.menon.no/wp-content/uploads/2018-37-Helsenæringens-verdi-2018.pdf

Johnson, M., Christensen, C. and Kagermann, H. (2008) 'Reinventing your business model', Harvard Business Review, Vol. 86, No. 12, pp.50–59.

Kemppainen, P., & Liikkanen, S., (2017). Pharma Digitalisation: Challenges and opportunities in transforming the pharma industry. *European Pharmaceutical* Review. Retrieved from: https://www.europeanpharmaceuticalreview.com/article/51733/pharma-digitalisation-challenges/

Khanna, I. (2012). Drug discovery in pharmaceutical industry: productivity challenges and trends. *Drug discovery today*, *17*(19-20), 1088-1102

Kresge, N., (2018). Roche's Sinking Diabetes Unit Looks Towards a Monster for a Boost. *Bloomberg*. Retrieved from: https://www.bloomberg.com/news/articles/2018-02-26/roche-s-sinking-diabetes-unit-looks-toward-a-monster-for-a-boost

Kunnskapsdepartementet (2011). Nasjonal strategi for bioteknologi (Rep.). Retrieved from: https://www.regjeringen.no/globalassets/upload/kd/vedlegg/forskning/bioteknologistrategi.pdf

Kuula, S., & Haapasalo, H. (2017). Continuous and co-creative business model creation. In *Service Business Model Innovation in Healthcare and Hospital Management* (pp. 249-268). Springer, Cham.

Lavie, D. (2007). Alliance portfolios and firm performance: A study of value creation and appropriation in the US software industry. *Strategic management journal*, *28*(12), 1187-1212.

Lawson, B., Samson, D., & Roden, S. (2012). Appropriating the value from innovation: inimitability and the effectiveness of isolating mechanisms. *R&D Management*, *42*(5), 420-434.

The Legatum Institute Foundation (2017). The Legatum Prosperity Index (Rep. No. 11). Retrieved from: https://prosperitysite.s3accelerate.amazonaws.com/3515/1187/1128/Legatum_Prosperity_Index_2017.pdf

Legemiddelindustrien (2018). Medlemskap. Retrieved from: https://www.lmi.no/lmi/om-legemiddelindustrien/medlemskap/

Lepak, D. P., Smith, K. G., & Taylor, M. S. (2007). Value creation and value capture: a multilevel perspective. *Academy of management review*, *32*(1), 180-194.

Lietzan, E. F. (2017). The Drug Innovation Paradox.

LMI. (2018). Hvem er LMI? Retrieved from: https://www.lmi.no/lmi/om-legemiddelindustrien/hvem-er-lmi/

Magretta, J. (2002). Why business models matter.

Mailk, N. (2007). Has the Era of Blockbuster Drugs Come to an End? *BioPharm International*. *Retrieved from:* http://www.biopharminternational.com/has-era-blockbuster-drugs-come-end

Mansfield, G. M., & Fourie, L. C. (2004). Strategy and business models-strange bedfellows? A case for convergence and its evolution into strategic architecture. *South African Journal of Business Management*, *35*(1), 35-44.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization science*, *2*(1), 71-87.

Mizik, N., & Jacobson, R. (2003). Trading off between value creation and value appropriation: The financial implications of shifts in strategic emphasis. *Journal of marketing*, *67*(1), 63-76.

Morrison, C., Senior, M., & Giovannetti, G., (2017). Beyond Borders - Staying the course. *Biotechnology Report 2017, EY*.

Nelson, A. (2017) How Pharmas, Payers, and Providers Can Meet the 'Triple Aim'. *Pharmaceutical Executive*. Retrieved from: *http://www.pharmexec.com/how-pharmas-payers-and-providers-can-meet-triple-aim*

Nelson, R. R., & Winter, S. G. (1982). The Schumpeterian trade-off revisited. *The American Economic Review*, *72*(1), 114-132.

Neville, S., & Atkins, R. (2018). Roche prepares to feel chill of patent expiries. Retrieved from https://www.ft.com/content/8c2eab30-e5a4-11e7-97e2-916d4fbac0da

NOMA (2018). Legemiddelverkets oppgaver. Retrieved from: https://legemiddelverket.no/om-oss/organisasjon/legemiddelverkets-oppgaver#forvaltning

Nonaka, I., & Takeuchi, H. (1995). The Knowledge Creating. *New York*.

North, D. C. (1990). A transaction cost theory of politics. *Journal of theoretical politics*, *2*(4), 355-367.

Nærings- og handelsdepartementet. (1998). Nasjonal strategi for næringsrettet bioteknologi (Rep.). Retrieved from: https://www.regjeringen.no/no/dokumenter/nasjonal-strategi-for-naringsrettet-biot/id105263/

OECD (2005) The Oslo Manual, third edition. Retrieved from: https://rio.jrc.ec.europa.eu/en/library/oslo-manual-third-edition

Oslo Cancer Cluster (OCC) (2018). Member overview. Retrieved from: https://oslocancercluster.no/member-overview/

Oslo Cancer Cluster Incubator (OCCI) (2018). Oncology Incubator. Retrieved from: https://occincubator.com/oncology-incubator/

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons.

Paul, S. M., Mytelka, D. S., Dunwiddie, C. T., Persinger, C. C., Munos, B. H., Lindborg, S. R., & Schacht, A. L. (2010). How to improve R&D productivity: the pharmaceutical industry's grand challenge. *Nature reviews Drug discovery*, *9*(3), 203.

Pearce II, J. A. (2006). How companies can preserve market dominance after patents expire. *Long Range Planning*, *39*(1), 71-87.

Penrose, E. T. (1959). The theory of the growth of the firm. *New York: Sharpe*.

Hagberg, J., Sundstrom, M., & Egels-Zandén, N. (2016). The digitalization of retailing: an exploratory framework. *International Journal of Retail & Distribution Management*, *44*(7), 694-712.

Peteraf, M. A. (1993). The cornerstones of competitive advantage: a resource- based view. *Strategic management journal*, *14*(3), 179-191.

Philippidis, A. (2018). The Top 15 Best-Selling Drugs of 2016. *Genetic Engineering & Biotechnology News*. Retrieved from: https://www.genengnews.com/the-lists/the-top-15-best-selling-drugs-of-2017/77901068?page=2

Porter, M. E. (1985). Competitive advantage: creating and sustaining superior performance. 1985. *New York: FreePress*, *43*, 214.

Porter, M. E. (2010). What is value in health care?. *New England Journal of Medicine*, *363*(26), 2477-2481.

Porter, M. E., & Teisberg, E. O. (2006). *Redefining health care: creating value-based competition on results*. Harvard Business Press.

Porter, M. E., Lee, T. H. (2013) The Strategy That Will Fix Health Care. *Harvard Business Review*. Retrieved from: https://hbr.org/2013/10/the-strategy-that-will-fix-health-care

Porter, M. E., & Kramer, M. R. (2006). The link between competitive advantage and corporate social responsibility. *Harvard business review*, *84*(12), 78-92.

Porter, M.E., (1985). Competitive Advantage. *The Free Press, New York*.

Skjølsvik, T., Løwendahl, B. R., Kvålshaugen, R., & Fosstenløkken, S. M. (2007). Choosing to learn and learning to choose: Strategies for client co-production and knowledge development. *California Management Review*, *49*(3), 110-128.

Puschmann, T., Thalmann, O., & Alt, R. (2001). Healthcare Portals-Customer Centricity in the Pharmaceutical Industry. *ECIS 2001 Proceedings*, 83.

Porter, M. E. (1996). What is strategy. *Published November*.

PwC. (2016). Patient engagement: Pharma's strategy for success in the New Health Economy. Retrieved from: https://www.pwc.com/us/en/health-industries/health-research-institute/publications/new-patient-engagement.html

Reve, T. (2018). Hva som må til for å lykkes med innovasjon. Retrieved from: https://www.bi.no/forskning/business-review/articles/2018/08/hva-som-ma-til-for-a-lykkes-med-innovasjon/

Rezabakhsh, B., Bornemann, D., Hansen, U., & Schrader, U. (2006). Consumer power: a comparison of the old economy and the Internet economy. *Journal of Consumer Policy*, *29*(1), 3-36.

Ritzer, G., & Jurgenson, N. (2010). Production, consumption, prosumption: The nature of capitalism in the age of the digital 'prosumer'. *Journal of consumer culture*, *10*(1), 13-36.

Robson, C. (2002). Real world research: A resource for social scientists and practitioners-researchers. *Massachusetts: Blackwell Pushers*.

Roche (2018). Collaborations between healthcare and technology companies are driving the future of healthcare. Retrieved from: https://www.roche.com/partnering/partnering-in-a-digital-era.htm

Roche (2018). Diabetes: Tackling the staggering burden of this global disease. Retrieved from: https://www.roche.com/research_and_development/what_we_are_working_on/cardiovascular_and_metabolism/taking_on_the_global_rise_of_diabetes.htm

Roche. (2015). *Annual Report* 2015. Retrieved from: https://www.roche.com/investors/downloads.htm

Roche. (2016). *Annual Report* 2016. Retrieved from: https://www.roche.com/investors/downloads.htm

Roche. (2017). *Annual Report* 2017. Retrieved from: https://www.roche.com/investors/downloads.htm

Roche. (2018). Our Business Priorities. Retrieved from: https://www.roche.com/about/priorities.htm

Roche. (2018). Our history. Retrieved from: https://www.roche.com/about/history.htm

Roche. (2018). Our Strategy. Retrieved from: https://www.roche.com/about/our-strategy.htm

Saha, C. N., & Bhattacharya, S. (2011). Intellectual property rights: An overview and implications in pharmaceutical industry. *Journal of advanced pharmaceutical technology & research*, *2*(2), 88.

Sasson, A. (2011). Knowledge Based Health. *BI Norwegian Business School*. Retrieved from: http://web.bi.no/forskning/papers.nsf/0/69d8911df649d1b4c125787200273cda/$FILE/2011-04-Sasson.pdf

Saunders, M., Lewis, P. & Thornhill, A. (2009). *Research methods for business students*. Essex, Pearson Education Limited.

Schuhmacher, A., Gassmann, O., & Hinder, M. (2016). Changing R&D models in research-based pharmaceutical companies. *Journal of translational medicine*, *14*(1), 105.

Schumpeter, J. (1928). The instability of capitalism. *The economic journal*, *38*(151), 361-386.

Schumpeter, J. A. (1934). Change and the Entrepreneur. *Essays of JA Schumpeter*.

Schumpeter, J. A. (2017). *Theory of economic development*. Routledge.

Seddon, P. B., Lewis, G. P., Freeman, P., & Shanks, G. (2004). The case for viewing business models as abstractions of strategy. *Communications of the Association for Information Systems*, *13*(1), 25.

Sosna, M., Trevinyo-Rodríguez, R. N., & Velamuri, S. R. (2010). Business model innovation through trial-and-error learning: The Naturhouse case. *Long range planning*, *43*(2-3), 383-407.

Spence, P., Greene, J., Norris, T., Shah, K., Bean, A. (2017) The innovation imperative - Reshaping biopharma business models. Retrieved from: https://cdn.ey.com/parthenon/pdf/perspectives/ey-the-new-innovation-imperative.pdf

Spender, J. C. (1996). Making knowledge the basis of a dynamic theory of the firm. *Strategic management journal*, *17*(S2), 45-62.

Srivastava, R. K., Fahey, L., & Christensen, H. K. (2001). The resource-based view and marketing: The role of market-based assets in gaining competitive advantage. *Journal of management*, *27*(6), 777-802.

Stabell, C. B., & Fjeldstad, Ø. D. (1998). Configuring value for competitive advantage: on chains, shops, and networks. *Strategic management journal*, *19*(5), 413-437.

Stanford Medicine (2017) Health trends Report. Harnessing the Power of Data in Health, June 2017 . Retrieved from: https://med.stanford.edu/content/dam/sm/sm-news/documents/StanfordMedicineHealthTrendsWhitePaper2017.pdf

Statista (2018). Global Pharmaceutical Industry - Statistics & Facts. Retrieved from: https://www.statista.com/topics/1764/global-pharmaceutical-industry/

Storvik, A. (2017). Kreftforeningen investerer millioner i norske legemiddelselskaper. Retrieved from: https://www.dagensmedisin.no/artikler/2017/08/22/vil-hjelpe-selskapene-ut-av-dodens-dalnew-page/

Gatignon, H., & Xuereb, J. M. (1997). Strategic orientation of the firm and new product performance. *Journal of marketing research*, 77-90.

Stotz, D., Rotz, G., Mentesana, M., & Edmunds, R. (2017). 2017 Pharmaceuticals and Life Sciences Trends. *PWC*. Retrieved from: https://www.strategyand.pwc.com/trend/2017-life-sciences-trends

Strauss, A., & Corbin, J. (1998). Basics of qualitative research: Procedures and techniques for developing grounded theory. *Sage publications*.

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of the best practice within the firm. *Strategic management journal*, *17*(S2), 27-43.

Teece, D. J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research policy*, *15*(6), 285-305.

Teece, D. J. (2000). *Managing intellectual capital: Organizational, strategic, and policy dimensions*. OUP Oxford.

Teece, D. J. (2010). Business models, business strategy and innovation. *Long range planning*, *43*(2-3), 172-194

Teva . (2018). Teva Reports First Quarter 2018 Financial Results. Retrieved from http://www.tevapharm.com/news/teva_reports_first_quarter_2018_financial_results_05_18.aspx

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American journal of evaluation*, *27*(2), 237-246.

Thompson, J.D., (1967). Organizations in Action: Social Science Bases of Administrative Theory. *McGraw-Hill, New York*.

Ubel, P. (2016). "Is The Golden Era Of Pharmaceutical Profits Over?" Forbes. Retrieved from: https://www.forbes.com/sites/peterubel/2016/07/29/is-the-golden-era-of-pharmaceutical-profits-over/#a960e1e7207b

Urquhart, L. (2015). World Preview 2015, Outlook to 2020 *(8th ed., Rep.)*. *EvaluatePharm*.

Wernerfelt, B. (1984). A resource- based view of the firm. *Strategic management journal*, *5*(2), 171-180.

WHO (2017). Diabetes - Key facts. Retrieved from: http://www.who.int/news-room/fact-sheets/detail/diabetes

WHO, J., & World Health Organization. (2003). Diet, nutrition and the prevention of chronic diseases: report of a joint WH.

World Health Organization (2018). Ageing and health. Retrieved from http://www.who.int/news-room/fact-sheets/detail/ageing-and-health

World Health Organization (2018). Non communicable diseases. Retrieved from http://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

Zander, U., & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. *Organization science*, *6*(1), 76-92.

Zott, C., & Amit, R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic management journal*, *29*(1), 1-26.

Zott, C., & Amit, R. (2017). Business model innovation: how to create value in a digital world. *GfK Marketing Intelligence Review*, *9*(1), 18.

Zott, C., Amit, R., & Massa, L. (2011). The business model: recent developments and

9. Appendices

Appendix 1

Interview Guide for Roche

Opening Questions

1. What is your role/position in Roche?
2. What are your main responsibilities?
3. How long have you worked in the pharmaceutical industry?

The Pharmaceutical Industry

1. What do you consider as the major changes in the pharmaceutical industry during the last decade?
2. What do you consider as the major challenges in the pharmaceutical industry today?
3. Several industries are facing an increasing influence by the customer in the digital era as the customers are empowered by the availability of information. By being more informed, they are becoming more demanding and expects value-added services. To what degree is the pharmaceutical industry affected by this?

The Business Model

1. Do you see any changes in Roche's business model during the last decade? If so, what changes?
2. Have you experienced changes in Roche's value proposition? Has there been a change in Roche's offerings?
3. To what degree has the role of the customer changed?
4. Has there been any changes in what resources Roche sees as vital? By resources we mean everything a company possesses; such as capital, reputation, knowledge, employees, partnership, etc.

Technological Impact

1. Do you see any changes in Roche's business model as a result of digitalization?

2. How has (or will) products/services change(d) as a result of new technology/digitalization?
3. Has digitalization affected the degree of interorganizational activities, such as partnerships, joint venture and acquisitions?
4. Is there anything else regarding technological impact that you would like to add?

Appendix 2

Interview Guide for LMI, NOMA and OCC

Opening Questions
What is your role/position in LMI/SLV/OCC?
What are your main responsibilities?
How long have you worked in the pharmaceutical industry?

The Pharmaceutical Industry

1. What do you consider as the major changes in the pharmaceutical industry during the last decade?
2. What do you consider as the major challenges in the pharmaceutical industry today?
3. Several industries are facing an increasing influence by the customer in the digital era as the customers are empowered by the availability of information. By being more informed, they are becoming more demanding and expects value-added services. To what degree is the pharmaceutical industry affected by this?
4. How would you describe the degree of collaboration between the pharmaceutical companies? Have you experienced any changes regarding this?
5. How would you describe the relationship between the public and private sector? Have you experienced changes regarding this relationship?
6. What are the main drivers behind the pharmaceutical actors' ability to change/adapt?

The Business Model

1. Do you see any changes in Big Pharma's business model during the last decade? If so, what changes?
2. Have you experienced changes in Big Pharma's value proposition? Has there been a change in Roche's offerings?
3. To what degree has the role of the customer changed?

4. Has there been any changes in what resources Roche sees as vital? By resources we mean everything a company possesses; such as capital, reputation, knowledge, employees, partnership, etc.

Technological Impact

1. Do you see any changes in Big Pharma's business model as a result of digitalization?
2. How has (or will) products/services change(d) as a result of new technology/digitalization?
3. Has the digitalization affected the degree of interorganizational activities, such as partnerships, joint ventures and acquisitions?
4. Is there anything else regarding technological impact that you would like to add?