WHY WHICH STRATEGY?

HOW PATH-DEPENDENCY AND EXTERNAL SHOCKS SHAPED PHARMA COMPANIES' STRATEGIES

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Abstract:

Since its creation in the late19th century, the pharma industry has seen numerous shifts in the leading companies underlying strategies. These shifts have been driven by internal and external shocks such as the 2008 financial crisis, scientific progress and, favorable demographic trends. The evolution of the pharma industry has led some scholars to argue that the industry and the companies active within it show signs of its development being a result of Path-Dependency and path-dependent processes. The thesis' aim is, therefore, to through a deductive qualitative case study of two of the industry's leading pharma companies (AstraZeneca and Johnson & Johnson), a historical review of the industry, and interviews with industry experts to investigate if the strategic evolution within the industry has been affected by Path-Dependency and if it can be explained to be the result of path-dependent processes. Hence, the research question is: *How has the strategic positioning of the pharma industry leaders been affected by path-dependent processes?* The thesis concludes by analyzing its gathered empirical evidence, using the Path-Dependency theory and leading strategic frameworks, that the strategic positioning of the focus companies has been affected by Path-Dependency, and their strategic positioning can be explained as to be the result of path-dependent processes. A limitation of the study is the narrow-investigated focus group since the conclusion is only applicable to them even though they both are large and significant players within the industry. To draw a more comprehensive industry conclusion, more case studies need to be conducted. The thesis further highlights that the phenomena of Path-Dependency could have been, to a more significant extent, prevailing in the industry prior to the new millennium. It might not be as prevalent in the 21st century due to the rapidly changing nature of the industry in recent years. To test this interesting observation, further research should be conducted to enlarge the understanding of this industry and how it might develop in the future.

Keywords:
Pharma, Path-Dependency, Strategy, Strategic positioning, External shocks

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Glossary

Active substance (API)
The substance in a drug or product that provides the medicinal effect.

Agricultural chemicals
Chemicals purposed for use within the agricultural sector. Examples are pest control chemicals and fertilizers.

Astra
Astra AB.

Biotech
Biology based technology that harness biomolecular to develop technologies and products to improve lives and health.

Blockbuster drug
A drug with annual sales of at least one billion USD.

Branded products
The first drug with the specific molecule or effect on the market.

Cardiovascular diseases
A category of diseases that affects the heart or blood vessels.

Central nervous system diseases
A category of diseases that affects the brain and its functions.

Clinical testing
The process of testing the efficacy and security of a new drug.

Drug lifecycle
The lifecycle of a New Molecular Entity (see appendix 1).

Dyestuff
A product that is a soluble substance with the intent of dying another product like cloth.

E7 market
Emerging 7 markets are the major emerging markets that consists of China, India, Brazil, Russia, Mexico, Indonesia and Turkey.

EMA
European Medicines Agency.

Ethical drugs
A drug that is only available after a prescription from e.g., a doctor or a dentist.

FDA
Food and Drug Administration.

Frist generation of pharmaceuticals
Small molecule pharmaceuticals which is chemically synthesized.

Gastrointestinal diseases
A category of diseases that affects the tract from the mouth to the rectum.

Generic drug
A drug that imitates the molecule or chemical substance of a previous patent protected drug and sold at a much cheaper price since it does not have to endure the R&D cost of developing the molecule. Also named non-branded products.

Infectious diseases
A category of diseases that is caused by an organism like bacteria, parasite or virus.

Large molecule
A molecule of a relative larger mass since it consists of more atoms. Common large molecules are RNA, DNA or antibodies.

Line extension
It is the term used to describe a company perusing patent rights for the NME for treatment of other then the originally intended disease.

Life Science
A branch of science that deals with life processes and living organisms e.g., biology and medicine.

Life Cycle Management
Manage and maximize the value of a company's products to the costumers.

Molecular entity (ME)
A molecule that can be separated as an entity on its own.

New molecular entity (NME)
An ME that have not been patented before.

Orphan disease
A rare disease that according to the US' criteria affects fewer than 200,000 people in their population that equals to 0.06 percent. The European criteria according to EMA is fewer than 0.05 percent of the population.

Orphan drug
A drug with the purpose to diagnose, prevent or treat an orphan disease.

Over the counter drugs – OTC
A drug that is sold directly to the customer without any requirement of a prescription.

Pain control/anesthesia
All drugs that focus on temporary pain relief either at home or during surgery.

Pharma
The industry for companies focusing on products related to healthcare, I.e., healthcare consumer goods, medical devices and pharmaceuticals.

Pharmaceuticals

Branded and non-branded products (generics) sold both on prescription and no prescription (over the counter drugs).

Purified organic chemicals

Organic chemicals that have been extracted through purification from other biological and non-biological chemicals. Oftentimes referred to as the second and third generation of drugs.

R&D
Research and development.

Respiratory diseases
A category of diseases that affects the lungs or other parts of the respiratory system.

Second generation of pharmaceuticals
Protein based pharmaceuticals such as antibodies.

Small molecule
A molecule of a relative small mass that consists of less atoms and most common within the first generation of pharmaceuticals.

Specialist chemicals
A broad category of chemical products which has a specific functional use and purpose. Examples are machine lubricants, artificial flavors and fragrances.

Third generation of pharmaceuticals
Cell & Gene Therapy consistent of large molecules such as DNA and RNA.

TRIPS
An agreement signed by the WTO member countries in 1994 which aimed to unify the patent protection among the WTO member countries. TRIPS stands for Trade-Related Aspects of Intellectual Property Rights.

Zeneca
Zeneca Plc.

Contents

1. Introduction

1.1 Background

In the 1990s, the on-going globalization integrated previously protected markets. Companies now competed more directly against each other, because the governments removed the 'protective cushions' of national markets. In the context of accelerating globalization of trade and foreign direct investments people in business, politics and academics agreed competing companies (as well as countries) would converge on 'best practices'**.** Differently put, global competition would force economic actors to select the winning strategies and organizational practices – or they would be outcompeted. Still, the notion of convergence proved wrong for chiefly two different reasons. Firstly, different companies and countries still chose different paths to specialization in the world economy. (Berger, 2005) Therefore, divergence persists in the world economy as there are many different ways to 'get rich'. (Kogut, 2003) Secondly, the economic actors do not make strategic decisions in a vacuum: the organizations past and the context in which it operates somehow shape the decision-making process (Hall & Soskice, 2001; Hall & Thelen, 2009). In other words, history matters. The big questions are, of course, *how* and *why* history matters in strategic decision-making. Increasingly, academics studying industrial change have found to the concept of *Path-Dependence* useful for studying how past experiences and resource specialization influence decisions about the future (Layton & Duffy, 2018; Barnes, 2004; Greener, 2009). This bachelor thesis tries to add to that theoretical tradition by investigating the development of strategies within two major pharma companies, AstraZeneca and Johnson & Johnson that compete in the global pharmafield. The pharma industry is defined as the industry that incorporate the three sub industries, pharmaceuticals, medical devices and healthcare consumer goods (Interviewee 2, 2021).

1.2 Problem Area

The pharma field is a field that constantly has had the public eye on it where both internal and external shocks have through its development been prevailing and during the last two decades repeatedly changed the field (Malerba & Orsenigo, 2015; Interviewee 2, 2021). Being active in the pharma field is a challenging task but in which giants like Johnson & Johnson, Novartis and AstraZeneca among others have emerged as industry leaders over the course of history, but neither them nor any other actor in the field are immune to the ever-changing environment. The arguably long innovation cycles that characterize the field together with the previously explained constantly changing environment creates a need for the companies within this field to understand how their past effects the present (Malerba & Orsenigo, 2015; Interviewee 2, 2021).

1.3 Purpose and Research Question

This thesis aims to contribute to the understanding of why the actors within the pharma field have developed in different ways. More specifically, why companies have chosen different strategies and industries within the overall pharma field to be active within and what have made them successful in them. The thesis' research question is therefore:

How has the strategic positioning of the pharma industry leaders been affected by path-dependent processes?

1.4 Scope

This theis' primary focus will be aimed at two selected companies out of the largest within the industry, Johnson & Johnson (hereafter referred to as J&J) and AstraZeneca. Together, these companies will hereafter be jointly referred to as the focus companies. Both companies started their business more than a hundred years ago and have since ascended to be two of the largest actors within the industry. The focus companies have, although been among the largest in the industry, chosen two very different strategies for getting there and hence make good and valid subjects for the thesis to use in its aim to answer its research question. The thesis will furthermore bring in the evolutionary perspective of the industry to give an overview of how it has changed and forced the industry actors to adapt to these changes over the course of history. The thesis will not investigate the evolution of small- to midsized companies within the industry unless they affect the strategic choice of the industry leaders or the environment of the industry.

The geographical scope of the thesis will be the global industry, since all the industry companies compete on the global market and because the global company strategy is for these companies set to target the global market. It would therefore have little effect to investigate the market strategy for one market, national or regional, since it would differ little from the global strategy pursued by these companies. Moreover, the thesis will focus on the combined strategy of a company and not the strategy for one segment within the companies' businesses, that would lie outside of the aim for the thesis.

1.5 Contribution

The thesis aims to contribute to the research by providing both researchers and companies that are active within the pharma industry with (1) a better understanding of what underlying mechanisms have affected their choice of strategic positioning and (2) how new shocks may affect the industry leaders' choice of strategic positioning. The understanding of these two areas have been limited in the existing literature and hence the thesis will aim to contribute to the enhancement of this understanding.

1.6 Disposition

In order to answer the research question, the thesis will initially present relevant theories that the thesis' analysis is based on. Followed by the methodology section and then a presentation of the empirical investigation including interviews with industry experts. The thesis is then concluded with an analysis and discussion with conclusions. Finalizing the thesis is the presentation of references and appendix.

2. Theoretical frameworks

The thesis will use one theory and two frameworks to answer the research question and all three will be presented in this section. Firstly, the Path-Dependency theory will be presented, secondly Porter's Five Force framework and thirdly Porter's Generic Strategies framework. Although the Path-Dependency theory is most central to the thesis in answering its research question the two frameworks are necessary as they support the analysis with increased insights in external shocks and the strategic shifts that the thesis aims to explain.

2.1 Path-Dependency Theory

That history matters in decision making and effects future business decisions is an ordinary starting point for social science and strategy scholars trying to explain the present and the way there (Vergne & Durand, 2011). The way scholars have responded, is by proposing the theory Path-Dependency which explain and describe how past events have affected the present (Layton & Duffy, 2018). The theory has gained a lot of traction among many different scholars and the use of it has steadily increased among articles published in leading management and organizational journals (Vergne & Durand, 2010). Drawing conclusions on these publications and others, Mahoney and Schensul distinguished six attributes of event sequences that might in isolation or combined may reveal an underlying Path-Dependency (Vergne & Durand, 2010). The attributes are summarized below:

- The past affects the future.
- Initial conditions are causally important.
- Contingent or external events are casually important.
- Historical Lock-in occurs.
- A self-reproducing sequence occurs.
- A reactive sequence occurs.

These attributes have since then been picked up by Sewell and especially the first, in his formulation of Path-Dependency as the idea that: " What has happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time" (Layton & Duffy, 2018). The theory has since then been further developed and staged into three phases. The first phase called Preformation is defined as "The future is unclear and decisions made during this time ignite the process. Growth and stability lie in the future". Characteristics for this phase are several available actions, the outcome of these are for the time unknown and that these actions might lead to a self-reinforcing sequence of events. The phase is said to be completed when a critical junction is reached. The second phase is named "Formation" and is defined as "The dynamics of self-reinforcing processes begin to emerge, increasing returns, network formation, infrastructure investments and political links developed. Increasing decision skills will all be major drivers". Characteristics for the phase are that an emergent path

starts to become clear, and that social structures and norms are being established around it. The final stage is named *Lock-in*, and it is defined as "The dominant decision pattern becomes deterministic, and choices are bound to a particular path". Characteristics for this final phase are that the path chosen is dominant to the extent that flexibility to adopt to other superior alternatives is lost. The definition is not static and Lock-in may occur in an earlier phase which may not be permanent or unchangeable, as is argued by Arthur, Ebbinghaus and Beyer. They furthermore argue that either internal or external events may shake the system and set it on a new path (Layton & Duffy, 2018). This is also supported by other scholars examining the theory and commonly named as an exogenous shock or shocks (Vergne & Durand, 2011; Vergne & Durand, 2010).

The vast usage of Path-Dependency theory has resulted in some scholars questioning the empirical support for the theory as they see it as a theoretical artifact. This has resulted in the thesis to choose a narrow definition of Path-Dependency to counteract these concerns and to easier allow for others to validate the findings of the thesis through simulations, experiments or counterfactual modelling (Vergne & Durand, 2010). The chosen definition for the path-dependent process has further been influenced by the desire to both stress the positive and negative self-reinforcement mechanisms and is the same as Vergne and Durand uses in their article which states that:

Path dependence is about stochastic processes triggered by contingent events and subject to self-reinforcement over time. A path dependent process contains at least two possible equilibria, selected contingently along the way (Vergne & Durand, 2011).

The definition inherits strong resemblance to the definition proposed by the same authors in their article "The Missing Link Between the Theory and Empirics of Path Dependence: Conceptual Clarification, Testability Issue, and Methodological Implications" and contains two distinctive conditions: contingency and self-reinforcement. They further stress that a path-dependent process causes a Lock-in in the absence of exogenous shocks, which this thesis further acknowledges in its definition of Path-Dependency (Vergne & Durand, 2010).

Contingency is referred to as it is described by Vergne and Durand as an occurrence in Path-Dependency when initial conditions are followed by contingent event or events that happen by chance. These events need to have a greater influence on the path taken then the initial conditions (Vergne & Durand, 2010).

Self-Reinforcement is defined as various mechanism that increase the likelihood for a certain outcome at a certain time in the process. This leads to the requirement that the path's mechanism decreases the attractiveness of other alternative ways over those for which has a higher likelihood (Vergne & Durand, 2010).

Lock-in is defined as the outcome of a path-dependent process and a state where you reach an equilibrium which can be hard to escape from (Vergne & Durand, 2010).

2.2 Porters Five Forces Framework

Porter's five forces framework will be in the thesis used to investigate which external shocks have impacted the Pharma industry and what impact it has had on the focus companies in their choice of strategy. Hence, further nuance the analysis section and help explain how the shocks have affected the focus companies' chosen paths. The core of the framework will be presented below.

In the published article *Competitive Strategy* written by Michael Porter a description of the "five forces" was introduced and have since then become one of the most well-known and used frameworks in strategy (Tanwar, 2013). The five forces provide a framework to depict the industry and the dependencies among different actors in the field. The forces impose different threats against the industry that needs to be considered by actors already operating in the industry and the ones thinking of entering. In practice when an industry player correctly assesses the different forces and acts in accordance it can protect itself from outside threats and influences (Porter, 2008). The forces, as described by Porter, are listed in table 1 with a short explanation of how the force may impact the industry.

Force or threat within an industry	Explanation of the force or threat
Threat of Competitive Rivalry	Rivalry will increase price discounts and demand for new products.
Threat of Buyers/ Buying Groups	Powerful buyers will keep the prices low and demand better quality and capture more of the value.
Threat of Suppliers/ Supplier Groups	Powerful suppliers' charges higher prices and do not increase the quality and therefore gets more of the value.
Threat of New Entrants	New entrants will put pressure in prices to maintain or gain market shares.
Threat of Substitutes	A substitute has the same or similar purpose/ performance and can replace the offering from your company.

Table 1. Porter's five forces summarized with a short descroption on how the force may impact the industry.

(Porter, 2008)

2.3 Porters Generic Strategies Framework

Porter's generic strategies framework will be in the thesis used to investigate the potential shifts in strategy, that the focus companies have made over the course of history. These insights will help to map out the direction that the focus companies have taken and which the thesis then will try and explain using the Path-Dependency theory. The core of the framework will be presented below.

As described by Michael Porter, there are several ways to reach a strategic competitive advantage. Depending on the width of the scope and the source of competitive advantage, four generic strategies can be formulated as seen in table 2 (Tanwar, 2013). The framework further explains that these strategies depend on two variables: Scope and Source of competitive advantage and how the four generic strategies relate to these two variables, can be seen in figure 1 to the right.

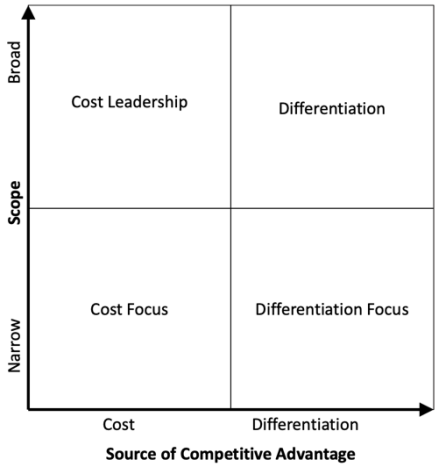


Figure 1. Porter's four Generic Strategies framework, which showcase a firms strategy based on two variables, scope and competitive advantage.

Generic strategy	Explanation of generic strategy
Cost Leadership	A broad scope and cost as source of Competitive Advantage.
Differentiation	A broad scope and differentiation as source of Competitive Advantage.
Differentiation Focus	A narrow scope and differentiation as source of Competitive Advantage.
Cost Focus	A narrow scope and cost as source of Competitive Advantage

Table 2. Explanation to Porter's Generic strategies and what each of them imply.

No strategy is superior to another since several factors affects how profitable the company will be in the specific industry. The different capabilities of companies provide the possibility to conduct different strategies to secure a competitive advantage (Dobbs, 2012).

3. Method

3.1 Research Approach

In order to answer the research question and fulfill the thesis, an investigation of the pharma industry and the focus companies have been conducted with a qualitative approach (Alvesson & Sköldberg, 2008). The qualitative approach suited the investigative and descriptive nature of the research question, which aimed at understanding the relationship between the Generic strategies and the industry best and was therefore chosen (Bell, Bryman, & Harley, 2019).

As the theoretical framework has presented, the Path-Dependency theory, Porter's Five Forces framework and Porter's Generic strategies framework have all been used to analyze the history of the focus companies and the pharma industry. Hence, the thesis has used a historical-sociological approach to conceptualize the previous and present forces within the industry and the focus companies, to understand the reasons for the changes that have formed them and the industry Furthermore, the paper has been conducted as a longitudinal qualitative case study as it has used existing theories to explain its observations in the pharma industry and the two cases, which has been gathered through a historical literature review of the pharma industry, a review of the focus companies' past 20 annual reports, other historically relevant documents connected to their history, a review of the past 20 annual reports from three other; Pfizer, Novartis and Roche, (Sagonowsky, 2021) of the largest global companies active in the industry based on revenue and through four interviews with industry experts (Alvesson & Sköldberg, 2008). The collected empirical data has then been analyzed through the earlier presented theories to understand the history and development of the industry, in order to answer the research question.

3.2 Archival Data

To understand the past and present Pharma industry, a literature review on the evolution of the industry, was conducted. The insights found in this review was then combined with insights from Consulting reports, from the leading consulting firms, to give an even more nuanced picture on how the industry has evolved. These publications were gathered from Peer-Reviewed stamped articles and papers via the SSE Library's portal respectively the Consulting firms' official websites. To understand the past of the focus companies, a review of their history was conducted which was done through accessing available data on their official website, official document and through articles listed on Pharma specific online forums which are written by industry experts. Furthermore, to nuance the picture of the focus companies, a review of their 20 last annual reports, which was gathered from their official websites or investor relations functions via email.

3.3 Interviews

To better understand the industry and fill the empirical gaps after the literature review, four interviews with knowledgeable professionals who are active within different segments of the industry was conducted. See table 3 for information about the interviewees.

Interviewee	Title	Company	Interview
Interviewee 1	Executive Vice President Business Development	Interviewee 1 is active within a mid-sized life science company present on the global market.	Interview 1 – Introduction to pharma Interview 4 – The evolution of the Pharmaceutical Industry
Interviewee 2	Managing Partner Healthcare & Life Sciences	Interviewee 2 is active within in one of the leading consulting firms, present within the field of Pharma.	Interview 2 – Strategies within pharma
Interviewee 3	Associate Director	Interviewee 3 is active within in one of the leading consulting firms, present within the field of Pharma.	Interview 2 – Strategies within pharma
Interviewee 4	CEO	Interviewee 4 is active within a Swedish industry organization focused on the Pharma industry.	Interview 3 – The collaborative environment

Table 3. Short summary of the interviewees.

The interviewees were selected through a snowballing effect, where the thesis' first interviewee helped the thesis to connect with the second, third and fourth interviewee. The method was chosen due to the high complexity surrounding the subject and the narrow share of knowledgeable people within the authors region. Hence, the method was seen as the most appropriate in selecting the interviewees.

All the interviews were conducted in a semi-structured manner, since it was seen as most appropriate as the thesis strives to understand the mechanisms that have formed the focus companies' strategic evolution. An interview guide was developed in collaboration with our supervisor, after the literature review had been conducted and with the aim to help fill the gaps from the literature review. The interview guide can be seen in appendix X.

3.4 Structure and Analysis of Empirical Findings

A historical-empirical approach has been applied to investigate how the pharma industry has evolved from its emergence in the middle of the 19th century to present. This is done to distinguish potential exogenous shocks and trends in the industry that might have affected the paths taken by the focus companies. This empirical data of the history of the pharma field has further been used to determine the field's industries' definitions, for which the focus companies were and are active within using Porter's Five Forces framework. The data used in this analysis have been collected through both a historical literature review and through the interviews held with industry experts to gain a more nuanced understanding of the evolution of the industry.

The thesis has then used the focus companies' historical information, annual reports and the information provided by industry experts to analyze their Generic strategy or strategies within the industries for which they were and are active within, to distinguish any shifts using Porter's Generic strategies framework. Porter's Generic strategies framework have not been used to showcase the profitability within the different Generic strategies, but rather to visualize the strategic positioning of the focus companies. These potential shifts have after being identified, been analyzed through the Path-Dependency theory, to distinguish the mechanisms driving them. In this effort, both the focus companies' specific information and the evolution of the industry have been used. The combined analysis has thereafter been used to answer the research question in the discussion and conclusion of the thesis.

3.5 Research Reliability

Due to the continuously evolving social environment and the inability to of freezing this environment, the external reliability, descried as the extent of replication of the thesis, is a challenging criterion to meet in a thesis of qualitative nature (Bell, Bryman, & Harley, 2019). Nevertheless, a mitigation of this challenge for future research could be to adopt a similar standpoint as the social environment as during the study. The use of historical data is therefore a mitigator since future researchers can easily access the same data and reproduce the thesis. There is, however, a risk in reliability from the viewpoint of the subjectivity of the interviewees' provided answers and the authors interpretation of them. This is, however, seen as a small risk since the aim of the interviews was to nuance the historical evolution of the industry and, hence, are not crucial to the conclusion of the thesis.

The internal reliability is defined as to what extent the authors agree on the observations made by the thesis (Bell, Bryman, & Harley, 2019).This has by the thesis been ensured through always having both authors present during the interviews. Furthermore, the internal reliability of the thesis' findings has been increased by interviewee 1 who has read through the thesis in its entirety and expressed the empirical content to be accurate.

3.6 Research Validity

Internal validity is referred to the thesis' ability to answer the research question (Bell, Bryman, & Harley, 2019). The aim for the thesis is to give the reader a better understanding of the mechanisms that have shaped the strategic evolution of leading companies within the pharma industry and how shocks have affected their choice in strategy. Due to the format of the Bachelor thesis and the difficulty in conducting interviews with relevant company employees, the thesis has had to rely on secondary sources, public company information and input from industry experts. To assert the expertise of the thesis' interviewees, a thorough background research in consultation with the authors' supervisor to assert their expertise and ability to provide the thesis with insightful insights have been conducted. The recurring theme in the interviews that have been conducted and the fact checks that have been conducted during the interviews have further strengthened the empirical findings and, hence, the validity of the thesis. That Path-Dependency theory has in the literature been said to be present in the industry and a good theory to use in investigating the evolution of pharma companies, further strengthening the thesis' approach for answering the research question (Malerba & Orsenigo, 2015).

External validity is referred to as the thesis' findings' ability to be generalized across other social settings (Bell, Bryman, & Harley, 2019). The prevailing literature stating Path-Dependency to be prevailing within the pharma industry strengthens the thesis' external validity (Malerba & Orsenigo, 2015). It should, however, be highlighted that this is only applicable in the pharma industry and among the larger companies, as these have been the target for the thesis and not necessarily applicable for the small- and medium-sized companies (Interviewee 3, 2021). Due to the specific nature and industry climate of the pharma industry, the external validity of the thesis towards other industries and large companies is seen as low.

4. Empirical Findings

4.1 The History of the Pharma Industry

The Pharma industry has since its emergence in the 19th century been constantly changing as a result of external shocks, agents (consumers, regulators, universities, politicians and companies), new technologies and emerging political opportunities. It is a traditionally highly innovative industry, but which at the same time is and has always been characterized by marketing, pricing and political lobbying. The industry leaders have consisted of a stable group of companies who have throughout the evolution of the industry held a large and to some extent dominant position in the global market, while other smaller companies have prospered in the smaller niche markets. A point worth mentioning is that although these companies have currently and previously had a large global presence and are to their size measured in revenue large, they hold a low share of the total market of around 10 percent, making the industry concentration low. This is an unusual pattern to see in an R&D intensive industry since they often have a high concentration, and where the dominant players in the market stand out. The evolution of the Pharma industry can, hence, be described as the outcome of a co-evolutionary process consisting of many factors and aspects (Malerba & Orsenigo, 2015).

4.1.1 The Establishment of the Pharma Market (1880-1940)

The pharmaceutical industry has its origin in the specialty chemicals industry which originally consisted of dyestuff and purified organic chemicals and started to take shape in the late 19th century. The originators of the industry can be traced back to central Europe, Germany and Switzerland in particular, where companies like Bayer and Sandoz (today owned by Novartis) that still exist, started their business in this way (Malerba & Orsenigo, 2015; Walter, Reingardt, Gafner & Billod, 2014).

Patent protection at the time was weak because of the small geographical coverage and the limitation of not being able to yet patent biological entities which forced the companies to patent the extraction process instead. This resulted in a moderate R&D industry with few new drugs being brought to the market. The money was instead invested in marketing and the pioneers in this area saw significant growth, due to the premiums that it generated. Therefore, two distinct categories of companies can be identified; the companies that specialized towards production and marketing of their own drugs, which were sold over the counter, and those who focused on producing ethical drugs which targeted doctors and pharmacists and were sold on prescription (Malerba & Orsenigo, 2015).

4.1.2 The Establishment of Big Pharma Companies (1940-1970)

The establishment of the larger pharmaceutical companies happened after the second world war, and it was the outcome of several factors. The first seen as the drastic increase in the willingness of the major pharma companies to develop capabilities within innovation. It was

driven by an increase in worldwide government spending within innovation related to therapeutical areas but also by the US Patent Office in 1946 for the first-time giving patent protection for a biological entity. Another reason was the increase in demand for better pharmaceuticals which can be derived from the growing population and increasing living standard as well as the emergence of the welfare states in Europe and the healthcare insurance in the US. The companies could during this time extract high premiums due to the high information asymmetry (Malerba & Orsenigo, 2015).

The increased attractiveness of the industry resulted in the industry R&D spending to dramatically increase which it has since then continued to do. This can be seen as the time when the pharma companies started to form large and structured internal R&D programs which to this day still exist (Malerba & Orsenigo, 2015).

The industry during this period can be described as an industry consisting of a few leading companies and a lot of smaller ones, but with a low aggregated market concentration. Furthermore, during this period that the larger companies started to establish a global presence to further capitalize on their innovations. Although, a lot of options prevailed during this period, two distinct directions among the leading companies can be identified. The R&D intensive companies which primarily focused on developing NMEs and the marketing intensive companies which focused more on licensing and copycat drug development as well as to some extent commodities (Malerba & Orsenigo, 2015).

4.1.3 The Biotechnical Revolution (1970-2000)

During the 1970s the investments made in the industry increased and this together with the increased knowledge of the human physiological mechanisms and the body's immune system, sparked an acceleration in innovation. The development that followed was driven by large technological advances which allowed the innovators to design actual NMEs and, hence, allowing the industry to take a step back from the previous extensively used trial-and-error approach (Malerba & Orsenigo, 2015).

The shift in the industry, described in the previous paragraph was further driven by an increase and extension of the patent protection laws during this period (Malerba & Orsenigo, 2015). The introduction of the Orphan Drug Act proposed in 1983, furthermore, amplified the possibility for the Biotech companies to exist, as it increased the attractiveness of the niche markets which often was the target for these companies (U.S. Food & Drug Administration, 2018). Looking on a global level, the same trend prevailed, with the adoption of TRIPS in all WTO member countries (Malerba & Orsenigo, 2015). Another important regulatory measure taken during this period was the Waxman-Hatch Act enacted in 1984, which allowed generic drugs to not have to go through the same lengthy process as an NME (U.S. Food & Drug Administration, 2018).

In addition, the previously discussed increase in government spending and technological advancements also spurred new smaller companies to enter the market. Even with these remarkable advancements in the industry, the approval and marketing process remained highly expensive. Therefore, small entrants had to mostly serve as suppliers to larger globally

established companies, since their small size created difficulties to capitalize and gain on own innovations. Another identified trend during this period was a surge in mergers between larger players in the industry, which previously had been pursuing different strategic paths (Malerba & Orsenigo, 2015). This was especially evident for the more R&D intensive companies, who often got acquired or merged with marketing focused companies, here the merger between Astra and ZENECA provides a prime example (ZENECA Group PLC; Astra AB, 1999).

4.2 The Current Pharma Industry Looking into the New Millennium

4.2.1 The Beginning of the Millennium

At the beginning of the millennium, the questions about patent protection and company profits versus global health, was heavily debated. The questions brought up primarily concerned the newly instated TRIPS, the ethical aspect of actively trying to block out competitors, Life Cycle Management and the true benefits of patent protection to increasing industry innovation versus affordable care were raised, and put on its tip in the Pretoria trial in 2001 (Malerba & Orsenigo, 2015).

Another concern at the beginning of the millennium was the decrease in innovation produced by the industry and rise in the cost of innovation, which, as previously mentioned, had steadily been increasing since the 1980s. In the industry general administration and sales cost rose with 15 percent from 1995 to 2005 and the total industry investment in R&D had almost double since the last decade (see appendix 1) with 20 percent of it going into line extension projects which all in all worsened the industry results (PricewaterhouseCoopers, 2007). This led to as earlier described first a wave of mergers and acquisitions between the larger pharma companies and in the beginning of the millennium an increase in collaborations and licenses between the larger pharma and biotech companies. The larger pharma companies, hence, relied more and more on the innovation from the smaller biotech companies which collaborated with the academic sector (Malerba & Orsenigo, 2015). Another important shift was the shift regarding where to focus, treatment or prevention and where the second started to become even more important. At the same time as this happened the E7 market started to become even more important for the major companies which further put the pressure on the larger companies to act (PricewaterhouseCoopers, 2007).

The two major directions within the industry that started to take form during the establishment of big pharma were still in place. The ratio between R&D and revenue (see appendix 2) tells a lot about the focus for the company and therefore the source of competitive advantage (Interviewee 2, 2021).

4.2.2 After the Financial Crisis of 2008

The financial crisis of 2008 put a lot of pressure on the pharma industry, like many other and led to several shifts within the industry. One was the shift in the companies' pipelines where companies went from having most projects within the field of small molecules to instead have

more focus on large molecules. Driven by a will to understand the disease on a more end to end basis, it accelerated this shift further, since companies started to target more narrow area of diseases. This led to an even more complex R&D process, which put smaller Biotech companies in a favorable position since they according to Deloitte seemed to better handle the increased complexity (Interviewee 1, 2021; Deloitte Centre for Health Solutions, 2019).

Furthermore, the financial crisis of 2008 resulted in a need and will among healthcare buyers to further cut their costs. It is a trend which has been apparent since the beginning of the millennium but one that became even more apparent after the crisis. This in combination with the increase in R&D spending (see Appendix1) which was due to the increased complexity of developing NMEs resulted in a lower IRR for NMEs among the pharma companies during this period (Deloitte Centre for Health Solutions, 2019).

The broad target group in drug development, which had been most common among the larger pharmaceutical companies could be questioned as the market was further seized by generics. In 2019, generics comprised 80 percent of the total industry volume and were expected to comprise 30 percent of the total industry revenue by 2021. The larger pharmaceutical companies were under pressure and thus increased their M&A activities in order to obtain innovation. However, this started to get more difficult as the smaller and mid-sized companies started to find increasing leeway for commercialization of their products on their own. The dependency on larger companies that had previously been seen was not as apparent anymore, since they started to share more intellectual capital between each other rather than with the larger companies. Additionally, they gained early-stage financing through other channels (Deloitte Centre for Health Solutions, 2019).

4.3 Information of the Competitive Landscape – Past and Present

4.3.1 Past Competitive Landscape for the Focus Companies

4.3.1.1 Consumer Goods

The original buyers for J&J's consumer products, were railroad workers. Notwithstanding, the customer base soon expanded to the ordinary people as the benefits of the products became more tangible (Pharmaphorum, 2021). Supplies for the first type of consumer goods were usually sourced regionally such as the cotton in J&J's BAND-AID® (DeMelo, 2018; Hanson, 1979). The emergence of the consumer goods market was driven by the rise of consumerism in society, were the distrubution of products started to spread from the regional or local markets, to the national market (Church, 2000). Pioneers who established a strong market pressence within the consumer goods industry, proved their advantage in the industry in comparison to competitors, which entered later (Robinson & Fornell, 1985).

4.3.1.2 Pharmaceuticals

The landscape for new companies poses a multitude of challenges, mostly related to cash management: firstly, R&D activities are cash demanding, secondly, time to market is long and,

hence are cash cycles as well (see Appendix 3). It was also common for smaller companies to either get acquired or to license their innovation to the larger global established companies (Interviewee 3, 2021). The buyers of ethical drugs were either well-fare states or insurance companies and the information asymmetry led to the possibility to extract even higher premiums for the companies up until the patent expiration (Interviewee 2, 2021). Substitutes during the validity of the patent were few due to the research often being the first of its kind, but which shifted when the patent expired (Interviewee 2, 2021). The suppliers could be separated into both innovation suppliers and suppliers of raw materials. The innovation suppliers were other companies that collaborated to achieve research discoveries or an outsourced manufacturer which was quite common. The resources and raw materials used in the first generation of drugs was chemicals that was bought in a bulk (Interviewee 1, 2021).

4.3.1.3 Medical Devices

The industry for medical devices in heritage a close resemblance to the one for pharmaceuticals. However, it differs in who the buyers are since it is mostly institutional buyers and other companies active within other industries (Interviewee 2, 2021).

4.3.2 Present Competitive Landscape for the Focus Companies

4.3.2.1 Consumer Goods

The consumer goods industry has seen a shift in the competitive landscape driven by (1) customers preferences in favor of smaller brands compared to the larger brands (McKinsey & Company, 2016/2017) and (2) the introduction of new entrants (Iyer, 2015). Digitalization and the pandemic of COVID-19 has also increased the awareness of the consumer in the terms of purschase price and value for money (McKinsey & Company, 2016/2017).

The latter has resulted in the need for pharma companies to strenghten their supply chain resiliance. On the supply side, a shift has been seen towards the suppliers becoming larger and supply chains becoming more unreliable (McKinsey & Company, 2010). The latter has resulted in the need for pharma companies to strenghten their supply chain resiliance (Deloitte, 2021).

4.3.2.2 Pharmaceuticals

The previously touched upon collaboration among the small- and midsized companies in the industry have increased as well as with universities and enhanced their ability to go to market on their own (Interviewee 3, 2021). Buyers for the pharmaceuticals have during the last 20 years increased their price pressure (Interviewee 2, 2021). The industry can still be characterised by low concentration with many of low- to midsized companies and a few large (Interviewee 2, 2021).

The highly collaborative environment has created a more integrated suppliers of innovation. Another important aspect, is the trend to move manufacturing closer to the core and not outsource it in the same extent as before. The supply of raw materials are now in comparison

to before more complex, as it is sourced from more specilized companies than it previously was (Interviewee 1, 2021).

4.3.2.3 Medical Devices

The medical device segment has seen similar shifts as the pharmaceutical segment has. Nevertheless, an identified difference is among the customers where the buyers are still mainly institutional and some pharmaceutical companies, which is the main difference between the industries (Interviewee 1, 2021).

4.4 Industry Actors

4.4.1 AstraZeneca

4.4.1.1 Prior to the Millennium

4.4.1.1.1 Astra

Astra was founded in 1913 and was sprung out of the need and desire for Sweden to create the resources and capabilities to produce pharmaceuticals, since the country had previously been relying on German and Swiss companies. The company's first products were produced through fermentation and were copies of already prevailing products in the markets, but which helped Astra to quickly established a dominant position in the Swedish market. The surplus produced from these products funded the company's research in the years to come and laid the foundation of their main therapeutical categories: gastrointestinal, cardiovascular, respiratory and pain control/anesthesia (Pharmaphorum, 2020). Their main drugs in 1997 were LOSEC® and SELOKEN® which accounted for 48 and 18 percent of their revenue respectively (ZENECA Group PLC; Astra AB, 1999).

4.4.1.1.2 ZENECA

ZENECA originated from the former British chemical giant, Imperial Chemical Industries (ICI), created in 1926. The company produced a large variety of chemical related products and was the industry leader in this segment. A result of the vast variety of products and industries that the company engaged in was the complexity problems that early on emerged. Although efforts had been made, the problems still prevailed in the beginning of the 90s, when the conglomerate was worth less than their individual parts. This led to the demerger of ZENECA from ICI in 1993 which would contain ICI's former pharmaceutical division, agricultural chemicals division and some specialist chemical divisions that possessed synergies with the other divisions (Owen & Harrison, 1995). Following the demerger, ZENECA started to invest in their pharmaceutical segment through example, their acquisition of Salick Health Care (Pharmaphorum, 2020). This together with other actions taken during this period led to them having at the end of the 20th century a pipeline within oncology, primary care and specialist hospital care (ZENECA Group PLC; Astra AB, 1999). They divested their specialist chemical business in 1998 (Pharmaphorum, 2020).

4.4.1.1.3 The Merger of Astra and ZENECA

On the 9th of December 1998, the boards of Astra and ZENECA announced that they had unanimously agreed to merge. At the time of the merger, Astra held a strong product portfolio but lacked in their global sales and marketing reach while ZENECA on the other hand, held a weak product portfolio but had a strong global reach with their sales and marketing channels (MooreStaff, 1998). The strategic rationale for the merger was that the combined company would have an increased financial strength and flexibility, a more solid R&D platform and opportunity for further innovation and growth, and the increase in global reach by their combined sales and marketing organizations (ZENECA Group PLC; Astra AB, 1999). The proposed Chairman Percy Barnevik summed up the merger as follows:

"AstraZeneca combines the best of two innovative companies with successful track records of organic growth. AstraZeneca will have a strong base for considerable expansion, especially in research and development and geographical presence. I am convinced that we will see considerable growth in the years ahead." (ZENECA Group plc; Astra AB, 1998)

The combined company became the world's second largest ethical drug company. Another key reason for the merger was the strength in the combined pipeline, which would have the opportunity to counteract the patent expirations in the coming years for key blockbuster drugs such as LOSEC® (ZENECA Group PLC; Astra AB, 1999).

The merger was completed on the 6th of April 1999 and the corporate headquarter was decided to be situated in London UK, its research headquarters in Södertälje Sweden (Williams, 1999). A chairman origin from Astra in Percy Barnevik and a CEO from ZENECA in Sir Tom McKillop were assigned. AstraZeneca's main therapeutical areas were gastrointestinal, cardiovascular, respiratory, oncology and general anesthesia (ZENECA Group PLC; Astra AB, 1999).

4.4.1.2 Phase 1 (1999-2003)

The first phase of the newly merged AstraZeneca had a clear focus on integrating the former two companies into one unified entity. At the same time, the strategic aim of the company changed and become more specified towards medical and pharma. This strategic aim was shown when AstraZeneca announced that ZENECA's agrochemical business would be divested (AstraZeneca, 2000).

During this phase, AstraZeneca had a diverse product portfolio with several focus areas within pharmaceuticals such as: gastrointestinal, cardiovascular, oncology, respiratory, pain control and central nervous system. LOSEC® was still the top selling drug despite the expired patent and made gastrointestinal the largest segment according to revenue. The patent protection for omeprazole, the active substance in LOSEC®/PRILOSEC® expired in the late years of the 20th century but got an extended protection until 2003 in some countries and, hence, the still high contribution to the revenue stream. As a reaction to the expired patent of LOSEC®, AstraZeneca launched NEXIUM® in the year of 2000 (Astra, 1999; AstraZeneca, 2000; AstraZeneca, 2002; AstraZeneca, 2004; ZENECA Group PLC, Astra AB, 1999).

4.4.1.3 Phase 2 (2003-2007)

As the merger was considered as finalized in 2003, the company revised their strategy from a new perspective as the company was more competitive. The new strategy focused on expanding their drug pipeline through in-house discovery, which they hoped would deliver their next wave of differentiated products. This was a strategic shift, since their previous strategy had been more general and focused on a broad R&D and entering the US market. Another significant change was that AstraZeneca sold their food business, Astra Food to further narrow their industry focus. Their more differentiated focus can also be seen in their increased R&D spending (see Appendix 1). A key market for AstraZeneca during this period was the Asian market and especially the Chinese as it was growing significantly (AstraZeneca, 2004; AstraZeneca, 2005; AstraZeneca, 2006; AstraZeneca, 2007; AstraZeneca, 2008).

There was during this phase, a fear among senior managers that the company did not have a sufficiently good pipeline to sustain their competitiveness as loss of validity of key patents would happen in the coming years. This put a lot of pressure on the company's R&D to deliver. To manage this, AstraZeneca took several actions. The first was that they started to engage more in outside collaborations to create synergies without acquisitions. The second was the strategic acquisitions which they conducted to both gain drugs ready for distribution but also to strengthen their new strategy (AstraZeneca, 2004; AstraZeneca, 2005; AstraZeneca, 2006; AstraZeneca, 2007; AstraZeneca, 2008).

The most significant acquisition of the time was made in 2007 when AstraZeneca acquired MedImmune, a pharmaceutical company focusing on vaccines. Medimmune brought for the first-time vaccine technology and first-class biologicals to their pipeline (AstraZeneca, 2008).

A new CEO in David Brennan took office on the 1st of January 2006 after the retirement of Sir Tom McKillop at the end of this period. When David Brennan took office, he had a history of leading positions within AstraZeneca's North American business and over 30 years of experience within the pharma industry (AstraZeneca, 2006).

4.4.1.4 Phase 3 (2007-2012)

Patent expiration of key patent like the ones for NEXIUM®, SEROQUEL XR® and CRESTOR® heavily affected the company during this period as the new drugs did not compensate for the loss. Although the loss of revenue was not instant, it became certain that it was inevitable. As a response, AstraZeneca conducted two large layoffs where the first one took place in 2007 and resulted in the loss of 12 600 positions within sales and marketing, and the second in 2009 which resulted in the loss of 9000 positions within R&D. This resulted in a net reduction of employees (see Appendix 4) (AstraZeneca, 2008; AstraZeneca, 2009; AstraZeneca, 2010; AstraZeneca, 2011; AstraZeneca, 2012; AstraZeneca, 2013).

Another action taken by AstraZeneca was to create one unified R&D organization to replace the previous fragmented organization. Their strategic priorities taken during the previous phase continued to prevail although they did acknowledge that some areas within pharma had greater

potential. They, therefore, increased their R&D spending within these areas where one example is oncology. Another step taken backed by their strategic priorities was the divestment of Astra Tech, which worked within dental and healthcare tech (AstraZeneca, 2008; AstraZeneca, 2009; AstraZeneca, 2010; AstraZeneca, 2011; AstraZeneca, 2012; AstraZeneca, 2013).

4.4.1.5 Phase 4 (2012-present)

The present phase of AstraZeneca is clearly influenced by their current CEO Pascal Soriot, who joined the company after several years at Roche. To bring in expertise from a more narrowly focused competitor have influenced AstraZeneca significantly and made the conpnay to narrow their strategic priorities and to only focus on three main areas instead of six and which are: cardiovascular, oncology and respiratory (Interviewee 2, 2021). Furthermore, they have created an independent subsidiary classified as a Biotech company, to increase their innovative capabilities and support their more narrowed focus (AstraZeneca, 2013; AstraZeneca, 2014; AstraZeneca, 2015; AstraZeneca, 2016; AstraZeneca, 2017; AstraZeneca, 2018; AstraZeneca, 2019; AstraZeneca, 2020; AstraZeneca, 2021).

In their 2017 annual report, Pascal Soriot explained their strategy as follows:

"*To be a pure-play, global, science-led biopharmaceutical company that focuses on the discovery, development and commercialization of prescription medicines, primarily for the treatment of unmet medical need in three therapy areas*" (AstraZeneca, 2018)

AstraZeneca did in 2014 receive a $118 billion offer from Pfizer, which they declined. The reasons for this were: the low valuation, the good momentum and delivery of their defined strategy and the risk for their shareholders. Following the offer, the Chairman of AstraZeneca did the following statement:

"As 2014 finished, it brought to a close an exceptional year for AstraZeneca. We ended it fully focused on the delivery of our strategy as an independent company. This means turning our attractive growth prospects and a rapidly progressing pipeline into life-changing medicines and value for shareholders." (AstraZeneca, 2015)

4.4.2 J&J

4.4.2.1 Foundation of J&J and Prior to the Millennium

J&J was founded by the Johnson family in 1886, in New Jersey USA, with the intention of addressing an unmet medical need, by providing mass-produced sterile equipment to both professionals and nonprofessionals. One of J&J's more iconic brands, BAND-AID®, originates from this time. Their next launch was within baby and delivery care, which together with their medical equipment business, formed the base of the company. The company went public in 1944, the year after their current CEO, General Robert Wood Johnson, had drafted their Credo which still to this day guides the company (see Appendix 5) (Chatterjee, 2019; Johnson, 1943). The company continued to further expand their healthcare portfolio through important launches and acquisitions during the middle of the 20th century. Two of the more central were the launch

of Ethicon Inc. and the acquisition of Janssen Pharmaceuticals which added more advanced surgical equipment and prescriptive drugs with the aim of creating blockbuster drugs, respectively to their portfolio. The trend of launches and acquisitions continued to prevail during the remainder of the century with J&J adding more and more companies to their conglomerate (Chatterjee, 2019).

4.4.2.2 Phase 1 (2000-2006)

J&J focused, at the beginning of the millennium, on three areas within healthcare: consumer goods, pharmaceuticals, and medical devices, which are segments they started to form in 1961. The company was as prior to the millennium, driven by their Credo and it laid the foundation for their four business priorities during this phase, and which were: broadly based in human health, managed for the long term, decentralized and on a foundation of strong values (Johnson & Johnson, 2001; Johnson & Johnson, 2002; Johnson & Johnson, 2003; Johnson & Johnson, 2004; Johnson & Johnson, 2005; Johnson & Johnson, 2006; Johnson & Johnson, 2007).

Several key acquisitions were made during this phase, in expectation of several losses of patent validity in 2005, making up 6 percent of the company's total revenue. The acquisitions were primarily related to allowing them access to technology and innovation within the second and third generation of pharmaceuticals. Examples of acquisitions made during this period are: Alza pharmaceuticals, OraPharma Inc. and Scios Inc, and targeted both their medical device and pharmaceutical segments. Another important acquisition was the one of Pfizer's consumer goods division, which further strengthened their consumer goods segment (Johnson & Johnson, 2001; Johnson & Johnson, 2002; Johnson & Johnson, 2003; Johnson & Johnson, 2004; Johnson & Johnson, 2005; Johnson & Johnson, 2006; Johnson & Johnson, 2007).

4.4.2.3 Phase 2 (2007-2011)

A restructuring program was announced in 2007 with the aim of generating $1.3-1.6 billion in annual savings through consolidating back-office functions among their pharmaceutical companies and would involve the layoff, of 4400 employees. This was done in anticipation of a slower growth in the years to come due to increased generic competition, when key patents expired. At the same time as the previous restructuring program was complete in 2009, another restructuring program was announced as a response to what the current CEO William Weldon described in their annual report, as one of the most challenging year in the company's history. The newly announced program's expected annual savings was never disclosed, but it would involve the layoff of 7500 employees, and it was a response to the rising development cost within the industry and in anticipation of further patent expirations (Johnson & Johnson, 2008; Johnson & Johnson, 2009; Johnson & Johnson, 2010).

J&J continued to, during this phase, invest in their pipeline to prepare for the second and third generation of pharmaceuticals and related medical devices. Some of their more central acquisitions were: Omrix Biopharmaceuticals Ltd, Cougar Biotechnology, Inc., Micrus Endovascular LLC, Synthes, Inc. and Incheon which also gave them access to the resources and capabilities associated with vaccine development (Johnson & Johnson, 2008; Johnson & Johnson, 2009; Johnson & Johnson, 2010; Johnson & Johnson, 2011; Johnson & Johnson, 2012).

The company chose to remain faithful to its underlying values rooted in their Credo and enhanced its strengths, even though the challenges and pressure on them rose. They did, however, choose to, at two points, change their business priorities. Firstly in 2007 when they named them as: winning in healthcare, capitalizing on convergence, accelerating growth in emerging markets and developing leadership and talent. Secondly in 2009 when they were changed to: innovative products, robust pipeline, global presence and talented people (Johnson & Johnson, 2008; Johnson & Johnson, 2009; Johnson & Johnson, 2010; Johnson & Johnson, 2011; Johnson & Johnson, 2012).

The years 2010 and 2011 brought several scandals and setbacks to J&J. The wide recall of products from their McNeil brand, the seizure of three factories by the FDA due to serious quality issues and several legal proceedings, severely damaged the company. This led to questions starting to arise, about the fit of senior management (Johnson & Johnson, 2011; Johnson & Johnson, 2012; Silverman, 2012).

4.4.2.4 Phase 3 (2012-present)

On the 21st of February 2012, J&J announced the retirement of CEO William Weldon. He was succeeded by Alex Gorsky who started his career within J&J in 1988 as a sale representative for Janssen Pharmaceuticals. His most recent position, prior to being appointed CEO, was as the vice Chairman for J&J's executive committee (Johnson & Johnson , 2012).

The strategic priorities put in place in the years following the announcement of Gorsky were still inspired by their Credo and named as follows: creating value though innovation, expanding the global reach with a local focus, excellence in execution and leading with a purpose (Johnson & Johnson, 2013; Johnson & Johnson, 2014; Johnson & Johnson, 2015; Johnson & Johnson, 2016; Johnson & Johnson, 2017; Johnson & Johnson, 2018; Johnson & Johnson, 2019; Johnson & Johnson, 2020; Johnson & Johnson, 2021).

Alex Gorsky states and argues in their 2015 annual report for their strategy as follows:

> *"Our broad base structure is a strategic choice, not just our heritage, and it is one that is grounded in performance. Our broad base in human health care extends our reach, capabilities and strategic advantages for patients, providers and consumers around the world, and ultimately benefits our shareholders. We review and discuss our structure with our Board of Directors, and we believe it has a number of inherent advantages given the challenges and opportunities in today's evolving health care marketplace."* (Johnson & Johnson, 2016)

A new restructuring program was in 2016 announced, with the aim of generating $0.8-1.0 billions in annual savings within their medical device segment. The program aimed at being completed in 2018, which it later also was (Johnson & Johnson, 2017; Johnson & Johnson, 2019).

J&J continued during this period to further strengthen their portfolio through mergers, acquisitions and other types of agreements with other industry actors to respond to an increased need for innovation. Significant examples are Abbott Medical Optics, Actelion Ltd and Synthes, Inc. Another activity which aimed at boosting their innovative capabilities during this phase was the establishment of four innovation centers. The purpose of these innovation centers was to act as the gateway between J&J and the innovations coming from academic and startups present in the industry (Johnson & Johnson, 2013; Johnson & Johnson, 2014; Johnson & Johnson, 2015; Johnson & Johnson, 2016; Johnson & Johnson, 2017; Johnson & Johnson, 2018; Johnson & Johnson, 2019; Johnson & Johnson, 2020; Johnson & Johnson, 2021).

5. Analysis

5.1 AstraZeneca

5.1.1 AstraZeneca – Definition of Industry

5.1.1.1 AstraZeneca – Definition of Industry 1998

Astra can through their history be seen to always have been involved in the pharmaceutical industry, which is exemplified through their original mission. Nevertheless, they have had synergies with businesses outside the narrow definition of the pharma industry, such as their tech and food business segments.

ZENECA stemming from a British chemical conglomerate have in their heritage been involved in several other businesses which they still were, when they demerged from ICI. The core has since the demerger been within pharmaceuticals, which is proven by the acquisition of Salick Health Care and the later divestment of their specialist chemical business.

The two companies did at the point of the merger still have the heritage of Zeneca's and Astra's old side businesses. AstraZeneca's aim can be argued to become a pure pharmaceutical company which the result of the merger argues for, since they become the second largest ethical drug company. The thesis hence argues that the industry for which AstraZeneca was engaged in, was primarily the pharmaceutical industry and that the other businesses should be seen as the remains of their heritage and not industries for which they aimed to be engaged in (see Appendix 6 for industry analysis).

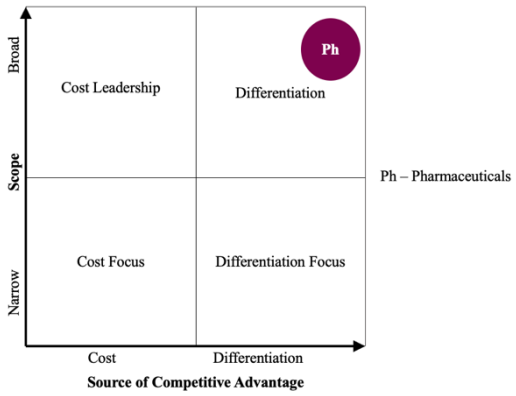
5.1.1.2 AstraZeneca – Definition of Industry 2021

The industry for which AstraZeneca in 2021 is engaged within is the pharmaceutical industry, which has since 1998 become even more clear since they have divested their other businesses that they possessed as a heritage from both companies before the merger (see Appendix 7 for industry analysis).

5.1.2 AstraZeneca's Generic Strategy

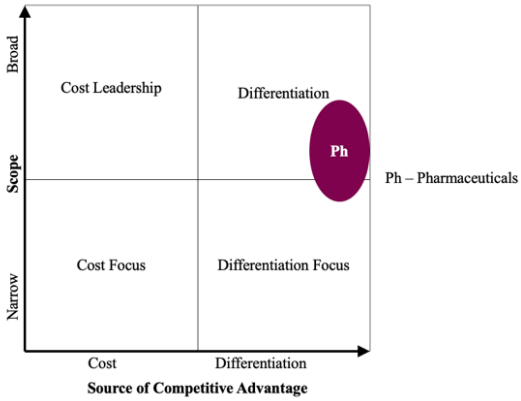
5.1.2.1 AstraZeneca's Generic Strategy 1998

By applying Porter's Generic strategies framework to distinguish the strategy that AstraZeneca pursued in the pharmaceutical industry in 1998, it can be argued that it was a broad differentiation. The reason for the thesis arguing for them targeting a broad group of patients is twofold, firstly because most of their revenue came from blockbuster drugs which target a large patient group and secondly because the research areas, they conducted research within targeted large unmet patient needs and not small such as orphan drugs. Another argument that further strengthens the prior, is that they were at the time only involved in branded products and not generics.



5.1.2.2 AstraZeneca's Generic Strategy 2021

By analyzing AstraZeneca in 2021 through Porter's Generic strategies framework, a shift can be seen as they have moved more towards a narrow differentiated focus than their previous only broad-focused approach. AstraZeneca has even further intensified and narrowed their focus as seen through both the halt of investments and divestments of certain areas, while seeing an increase in both the nominal R&D and the ratio between R&D and revenue (see Appendix 2). This can also be shown through the many acquisitions that the company have made since their merger to further enhance their resources and capabilities within the second and third generation of pharmaceuticals. These generations of drugs are targeted towards a more niche segment of patients among other within the field of orphan drugs. This proves a development towards becoming a more specialized company in both the aim of their research, seen through their narrower therapeutical focus, and their focusing towards what diseases they aim to cure. Thus, they have moved closer to the differentiation focus in the Porter's Generic strategies framework.



5.1.3 AstraZeneca's Strategic Path towards 2021

The preformation of AstraZeneca's path started with the merger of the companies Astra and Zeneca. AstraZeneca's future at that time was unclear since the combined company inherited history from both companies and a variety of business segments. The reasons behind the merger further stresses the uncertainty at that point in time due to both internal uncertainties, through the risk from loss of important patents, but also external uncertainty, through the increase in

price pressure from buyers and the price debate. The merger decision and the fact that the merged company, with soon loss of patent that would affect their revenue stream, highlights that they had the opportunity to go after either a pure player approach or a copycat approach combined with other businesses and hence shift their strategy at that point. Therefore, it can be argued that many options were available at the time which makes the time consist of a contingency factor since they at this time had a variety of strategic options available, but which all were contingent on their current positioning. The critical junction for AstraZeneca in ending the preformation phase after the merger can be argued to be the disinvestment of Zeneca's old agrochemical business in 2003, which laid the foundation for a direction towards being a pure player within pharmaceuticals for AstraZeneca.

The years following the divestment of their agrochemical business, several actions were made that can be interpreted to have had a self-reinforcing effect in them such as their acquisition of Medimmune, which further reinforced their path towards becoming a pure pharmaceutical company. The divestment of their food businesses is an example of a spin-off that was made to make the core more focused towards pharmaceuticals which can be seen as a result of their previous actions towards that path. Other examples include the many acquisitions that were made during the time and all targeted enhancing their resources and capabilities within the field of pharmaceutical development. The emergence of more collaborations with other industry actors, universities and the steady increase in R&D spending over revenue (see Appendix 2) , are examples of actions taken that had a self-reinforcing mechanism to them since they build on earlier decisions that format the path towards becoming a pure pharmaceutical company. AstraZeneca did in this period engage in research within several therapeutical areas for which they saw high potential in, but they all had in common that they possessed a large patient group, which would enable them to turn a discovery into a blockbuster drug. It can be argued if they incurred a Lock-in within this period since their decisions reinforced their path and their divestment and high R&D spending made pursuing other paths less attractive. The strong revenue growth during the period can furthermore argue for them reaching a steady state. The thesis believe that this have been the case, but due to the lack of time leading up to 2007, this cannot be asserted although tendencies towards a stabilization are shown in their revenue and growth (see Appendix 8).

It can be argued that AstraZeneca in 2007 experienced an internal shock towards their strategy, which put them in a new preformation phase. This was driven by distinct forces. The first force, was their anticipation of product maturity and loss of patent protection for several of their key products, in the coming seven years, which would significantly affect their revenue, since they at this point made up around 60 percent of their revenue (see Appendix 9). The second was the productivity issues within their pipeline that made them doubt that they would be able to produce products of sufficient quality to make up for the loss of their key products, which can be supported by the lay-off of sales and marketing personal in 2007. They were at this point still active within the healthcare tech business through their subsidiary Astra tech and the possibility to enhance their presence in that business was possible and thus a contingency factor was prevailing. The critical junction for the preformation phase was although reached when

they chose to sell their tech business and hence a new formation phase towards a broad differentiation began once more, since they still targeted a broad base of therapeutical areas although slightly narrower since they highlighted that some were more important.

The pharmaceutical industry did in the years following the financial crisis of 2008 experience an exogenous shock due to the increase in price pressure from buyers. At the same time as this, AstraZeneca experienced another internal shock, highlighted by the lack of productivity in delivering new blockbuster drugs and the annual decrease in revenue growth (see Appendix 8). Their previous broad focus within therapeutical areas had not paid off and the options for how they could come to grips with the issue where many and characterized another preformation phase for the company. Several decisions made during this period such as acquisitions, reorganization of their R&D organization, R&D employee layoffs and the increase in R&D spending showcase the variety in decisions and can be argued to be unstructured since they vastly differ (see Appendix 1). The common factor was, however, that they tried to come to grips with their productivity issue. It can be argued that any of these decisions could have been a critical junction for the company, but since they did not inherit any self-reinforcing mechanism to guide the company to a specific generic strategy, this argues that neither of these decisions were the critical junction in this preformation phase. The thesis instead argues that the critical junction was when AstraZeneca announced their new CEO, Pascal Soriot since this decision put them on a new path by employment of a CEO with a background from a more narrowed company.

Following the introduction of Pascal Soriot, marked according to the thesis, the beginning of AstraZeneca's second formation phase. The company revised its focus to only include three main therapeutical areas, which can be seen as to have self-reinforcing mechanism to it since the decision to assign Pascal Soriot as the CEO, meant bringing in a leader with a narrower focus which laid the foundation for AstraZeneca's generic strategy as described in 5.1.2.2. The thesis further argues that other decisions also had an impact and further strengthened this path, such as the increase in R&D over revenue ratio, (see Appendix 2) their decline of the offer from Pfizer which they stressed was due to their power as an independent company to create innovation, and their creation of an in-house Biotech company. Furthermore, the thesis argues that all these decisions had a self-reinforcing effect to them and reinforced the path chosen by AstraZeneca in 2012. It can also be argued that social norms and values started to emerge around the path, as they are described by Pascal Soriot in his quote from the annual report of 2017:

> *"To be a pure-play, global, science-led biopharmaceutical company that focuses on the discovery, development and commercialization of prescription medicines, primarily for the treatment of unmet medical need in three therapy areas"* (AstraZeneca, 2018)

The fact that social norms and values started to emerge around their chosen path further strengthens the thesis' arguments.

Questions regarding if a Lock-in for AstraZeneca occurred during this period can be raised and especially in 2016, when they for the first time since 2011 returned to revenue growth which prevailed until 2020; if 2017 is neglected, which was due to the loss of patent for CRESTOR® the previous year. The thesis' view is that a Lock-in occurred in 2016, since both their return to revenue growth and earlier high investments can be argued to have made them reluctant to pursue other paths as these became even more unattractive when they achieved revenue growth.

5.2 J&J

5.2.1 J&J Definition of Industry

5.2.1.1 J&J – Industry Definition in the beginning of the 20th century

The industry for which J&J in 1886 started their business within, can be described as the industry for professional and consumer sanitary equipment. In modern terminology, it can be said that they started their business in the area of medical devices and consumer goods, since the sanitary equipment was the medical devices and healthcare consumer goods of that time. They were therefore already from the start involved in two distinct business segments. Nevertheless, these two segments were part of the same industry. Even though it could be argued that these two fields were two separate industries, the forces identified through Porter's Five Forces are mostly similar except for a slight difference in the power of buyers, and therefore throughout the analysis they will be consolidated and treated as one. J&J were hence in the end of the 19th century active within the industry for healthcare products (see Appendix 10 for further industry analysis).

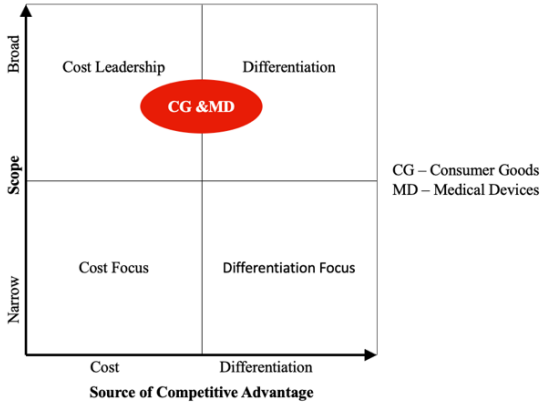
5.2.1.2 J&J – Industry Definition in 2021

The businesses for which J&J were involved in, in 2021, was the businesses for: Consumer Goods, Medical Devices and Pharmaceuticals. These different business segments can be reasoned to lie under the industry for healthcare products, as it was argued that consumer goods and medical devices did, at the end of the 19th century. This is, however, not the case in 2021, since the forces shaping the industries, according to Porter's Five Forces, differ more between the different industries and thus, they should be regarded as different industries (see Appendix 11 for further industry analysis). J&J can therefore be seen in 2021 to be a conglomerate, which is involved in several industries within the healthcare category.

5.2.2 J&J Generic Strategy

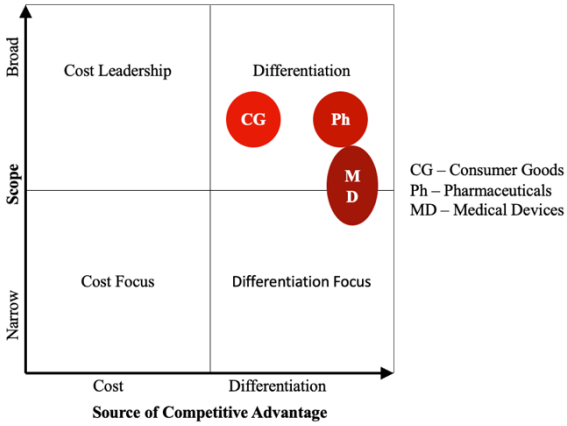
5.2.2.1 J&J – Generic Strategy in the beginning of the 20th century

The generic strategy for J&J in the beginning of the 20th century can, according to Porter's Generic strategies framework, be argued to be a mixture between cost leadership and differentiation and hence they position themselves on the border between these two generic strategies. The reasoning for cost leadership regards their economies of scale, which generates cost benefits and a cost related competitive advantage. The thesis' argumentation that underlies the identification of differentiation strategy, despite it somewhat contradictory nature to the argued cost leadership, is twofold. Firstly, the field that they chose to exploit is of a novel nature. Secondly, the at the time narrow niche that the healthcare related consumer goods and medical devices were. Furthermore, it can be argued that they lean a bit more towards cost leadership than differentiation, due to their initial mission of becoming the first mass producer of sterile equipment.



5.2.2.2 J&J – Generic Strategy in 2021

J&J are differentiated in the consumer goods industry as they focus on well-known brands in the upper price tier that target a broad consumer group. J&J can be distinguished to pursue a broad to narrow differentiation strategy with their subsidiaries within the industry of medical devices. The argument for this is based on their broad base within sterile equipment that both go after more mass-produced items, as well as precise surgical equipment and hence their cross-field strategy. Among their subsidiaries within the pharmaceutical industry, it can be stated that J&J follows a broad differentiation strategy, since they have historically held several blockbuster drugs and not targeted the orphan drugs market. On the conglomerate level, it can be argued that their subsidiaries mostly pursue a broad differentiation strategy if, Porter's Generic strategies framework, is applied.



5.2.3 J&J's Strategic Path towards 2021

J&J's preformation phase can be argued to have been when the three Johnson brothers chose to start their business and selected to do it within sterile equipment. The options at that time can be assumed to have been many, since a lot of other healthcare companies that still are successful today started their businesses during this period as well, but within other product categories. The many existing options at that time is further amplified by the fact that they at the end of the 19th century choose to go into the baby powder industry, which was more consumer goods centered. There were after their launch of their baby powder business still a lot of options available for the entrepreneurial brothers, but a critical junction can be said to have appeared when they choose to launch their BAND-AID® brand in 1920. Marking the end of the company's preformation phase, since the company's path from this point started to lean more towards the healthcare products industry. The events during this period can be said to have possessed a contingency factor since the innovations put forward by the company and lines of products appear to have been random but contingent on their first business decisions.

1920 marked the company emerging on their formation phase as social norms and values around their patient centric business started to emerge through Robert Wood Johnson, writing their Credo in 1943 (see Appendix 5). Decisions during this period can further show to have had a self-reinforcing mechanism to them as in the case with their establishment of Ethicon, and by that, dividing their business into two segments, consumer goods and medical devices. Their acquisition of Janssen Pharmaceuticals in the 1961 is a further example of a self-reinforcing mechanism as they moved into a new line of business, but which lied within their already established norms and values. The acquisitions of Janssen Pharmaceuticals further established them as a conglomerate with a decentralized management approach towards their subsidiaries.

The path that J&J embarked on when the brothers started their business in 1886, started to take shape and it can be argued that a Lock-in for the company's strategy occurred in 1961. The underlying reason for this is because the company has since then not engaged in any other areas of business or industry, and strictly sticked to the three industries that still today are the core of J&J. Nonetheless, they have since 1961 acquired more businesses and included them into their conglomerate, but the industries for which J&J have been active within have been the same. Thus, the decision pattern has since then become deterministic and made other paths become less attractive and, hence, leading to the conclusion of a Lock-in to have occurred in 1961.

Since this Lock-in, there have been several exogenous shocks in the industries which potentially could have affected their Lock-in. However, arguably this is not the case, since they remained faithful to their path which their current CEO exemplifies in his statement in their 2014 annual report by stating that “their broad base is the core strength of the company”. The reason for this, is because the shocks have not affected them on a macrolevel but only on a micro or meso level within either their subsidiaries or their engaged industries, like the increase in price pressure and product recall. Hence, there has not been a shock that has affected them on a macrolevel, and they are therefore still locked in on the path that finished forming in 1961, which also explains their low shift in generic strategy.

6. Discussion and Conclusion

6.1 Answer to the Research Question

The thesis has adopted a historical-sociological approach to conceptualize the driving forces within the pharmaceutical industry and its leading actors. Through a qualitative study of historical literature, company information and interviews with industry experts, a nuanced picture of the evolution of the pharma industry has been possible to depict. It has thereafter been analyzed using the Path-Dependency theory in combination with leading strategy frameworks to answer the research question:

How has the strategic positioning of the pharma industry leaders been affected by path-dependent processes?

As described in section 5, both focus companies do show signs of having evolved through path-dependent processes influenced by self-reinforcing frequencies and both internal and external shocks, which Malerba and Orsenigo wrote could be a phenomenon existing within the industry (Malerba & Orsenigo, 2015). Although the focus companies have chosen different strategic positions and evolved differently since their emergence in the end of the 19th century and the beginning of the 20th century respectively, they both showcase a clear pattern of path-dependent processes and Lock-ins as a result of these processes. The answer to the research question is, hence, that the industry leaders' strategic positioning has been affected by path-dependent processes in the sense that it has made them experience Look-ins in their strategic positioning, which has been largely driven by the resources they possess. Furthermore, the prevalence of both internal and external shock, which has affected the focus companies have also impacted these path-dependent processes as it has set them on a new course when they have been forced away from their previous.

6.2 Discussion and Practical Implications

The thesis' analysis concludes that the strategies pursued by the focus companies have been affected by Path-Dependency and been the result of path-dependent processes. The thesis' result could hence be seen as strengthening Malerba's and Orsenigo's statement that Path-Dependency is prevailing within the industry and the companies active within it (Malerba & Orsenigo, 2015). The critique towards the theory should, however, be highlighted, since these events are common within all industries and companies, which have led some scholars to argue that it is not a theory but rather a theoretical artifact. That every case, and hence every company, is their own example which may differ from other cases must also be highlighted. Nevertheless, the thesis like other scholars acknowledges Path-Dependency to be a theory and hence the result of the thesis should therefore be seen as a result that strengthens the statement made by Malerba and Orsenigo. Albite in order to draw a wider industry conclusion, a more comprehensive study involving more companies needs to be conducted.

The importance of Path-Dependency in recent years can, however, be questioned, as it was in the second interview, due to the many internal and external shocks that have in recent years occurred within the industry (Interviewee 2, 2021). This might affect the result of the thesis since it would argue that the possibility of forming a longer chain of path-dependent processes during this period might not have been possible. Hence, it would argue that Path-Dependency was a phenomenon of the past and not in the present.

The thesis' result provides scholars, industry actors and experts active within the industry with an increased insight into a phenomenon, which in the studied cases, contributed to the evolution of the industry. For industry actors it provides a new way of viewing their past and reflect on how it affects them in their current decision processes, which could help them to become better equipped to evaluate their current options independently of their past. For scholars it provides additional knowledge in an earlier unexplored area of research and could hopefully inspire others to further enhance the understanding of the pharma field.

6.3 Limitations with the Thesis

The results of this thesis could be affected by a few limitations which will be addressed in this section. The first identified limitation regards the qualitative nature and the way the interviews were conducted. The latter, since linguistics differences, subjective views or un-honest answers, are all possible to occur in expert interviews. The approach to mitigation of this limitation was to conduct several interviews with different industry experts, nevertheless, increasing the number of interviews could have further reduced the likelihood of the potential consequences of this limitation.

Interviews with senior executives or board members from the focus companies would have been required to gain further depth in the thesis' analysis. This was, however, difficult to achieve, since the sought-after information was and is confidential and, therefore, difficult to obtain.

6.4 Suggestions for further Research

Although the thesis answers the research question, its empirical gathering and analysis could have been improved, as explained in the limitations of the thesis. The research area could further also have been expanded to further investigate, if the same phenomenon can be confirmed to also exist within other industry actors. Furthermore, it would also be interesting to expand the thesis even further, to also include small- and midsized-companies as their evolution may differ from the larger companies (Interviewee 3, 2021).

6.5 Conclusion

The thesis has investigated if Path-Dependency has influenced the strategic positioning among the leading pharma companies, with the conclusion of that it has for the focus companies. However, questions can be raised regarding the existence of the phenomenon in modern times since the pharma field is rapidly changing and the suppliers of innovation when going into the next generation of drugs have shifted. The extent to which Path-Dependency is prevailing within every companies, active within the pharma field, lies outside of the scope of this thesis but is one that the thesis argues should be investigated further. For pharma companies to continue to stay competitive within this constantly changing and demanding field, it is believed to be crucial to know the past and how it affects the present and, in the end, the chosen strategic direction.

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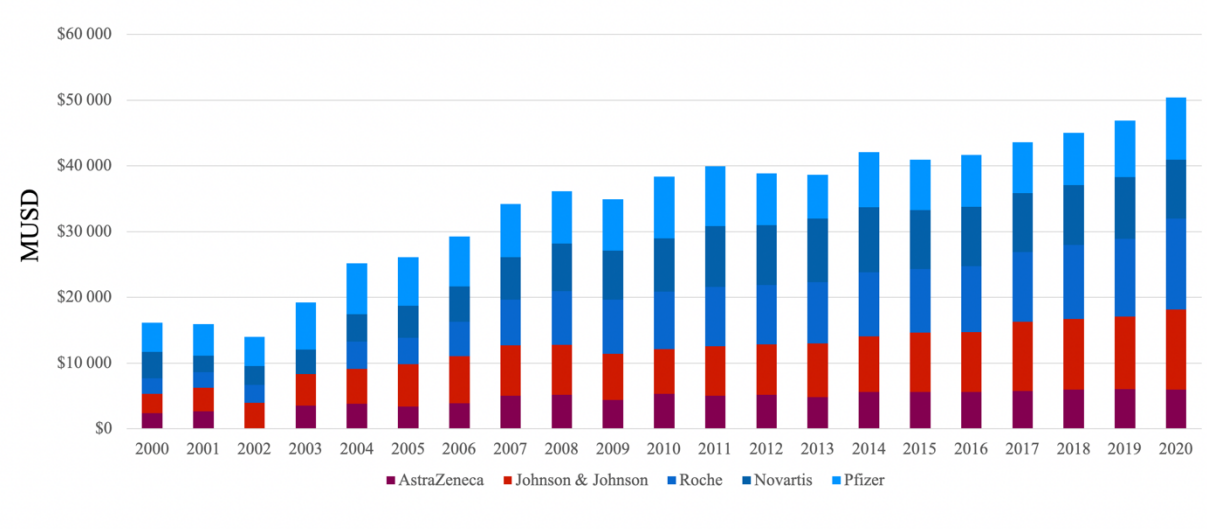
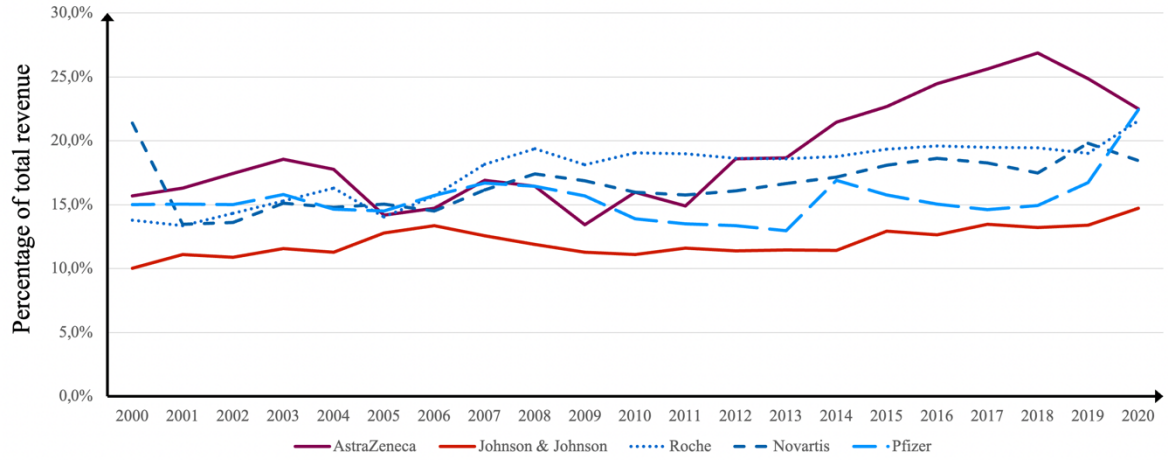
Appendix

Appendix 1 Total R&D for Five Major Players within the Pharma Field



(AstraZeneca, 2002; AstraZeneca, 2004; AstraZeneca, 2005; AstraZeneca, 2006; AstraZeneca, 2007; AstraZeneca, 2008; AstraZeneca, 2009; AstraZeneca, 2010; AstraZeneca, 2011; AstraZeneca, 2012; AstraZeneca, 2013; AstraZeneca, 2014; AstraZeneca, 2015; AstraZeneca, 2016; AstraZeneca, 2017; AstraZeneca, 2018; AstraZeneca, 2019; AstraZeneca, 2020; AstraZeneca, 2021; Johnson & Johnson, 2001; Johnson & Johnson, 2002; Johnson & Johnson, 2003; Johnson & Johnson, 2004; Johnson & Johnson, 2005; Johnson & Johnson, 2006; Johnson & Johnson, 2007; Johnson & Johnson, 2008; Johnson & Johnson, 2009; Johnson & Johnson, 2010; Johnson & Johnson, 2011; Johnson & Johnson, 2012; Johnson & Johnson, 2013; Johnson & Johnson, 2014; Johnson & Johnson, 2015; Johnson & Johnson, 2016; Johnson & Johnson, 2017; Johnson & Johnson, 2018; Johnson & Johnson, 2019; Johnson & Johnson, 2020; Johnson & Johnson, 2021; Novartis, 2002; Novartis, 2003; Novartis, 2004; Novartis, 2005; Novartis, 2006; Novartis, 2007; Novartis, 2008; Novartis, 2009; Novartis, 2010; Novartis, 2011; Novartis, 2012; Novartis, 2013; Novartis, 2014; Novartis, 2015; Novartis, 2016; Novartis, 2017; Novartis, 2018; Novartis, 2019; Novartis, 2020; Novartis, 2021; Pfizer, 2001; Pfizer, 2002; Pfizer, 2003; Pfizer, 2004; Pfizer, 2005; Pfizer, 2006; Pfizer, 2007; Pfizer, 2008; Pfizer, 2009; Pfizer, 2010; Pfizer, 2011; Pfizer, 2012; Pfizer, 2013; Pfizer, 2014; Pfizer, 2015; Pfizer, 2016; Pfizer, 2017; Pfizer, 2018; Pfizer, 2019; Pfizer, 2020; Pfizer, 2021; Roche, 2001; Roche, 2001; Roche, 2002; Roche, 2003; Roche, 2004; Roche, 2005; Roche, 2006; Roche, 2007; Roche, 2008; Roche, 2009; Roche, 2010; Roche, 2011; Roche, 2012; Roche, 2013; Roche, 2014; Roche, 2015; Roche, 2016; Roche, 2017; Roche, 2018; Roche, 2019; Roche, 2020; Roche, 2021)

Appendix 2 Industry R&D over Revenue



(AstraZeneca, 2002; AstraZeneca, 2004; AstraZeneca, 2005; AstraZeneca, 2006; AstraZeneca, 2007; AstraZeneca, 2008; AstraZeneca, 2009; AstraZeneca, 2010; AstraZeneca, 2011; AstraZeneca, 2012; AstraZeneca, 2013; AstraZeneca, 2014; AstraZeneca, 2015; AstraZeneca, 2016; AstraZeneca, 2017; AstraZeneca, 2018; AstraZeneca, 2019; AstraZeneca, 2020; AstraZeneca, 2021; Johnson & Johnson, 2001; Johnson & Johnson, 2002; Johnson & Johnson, 2003; Johnson & Johnson, 2004; Johnson & Johnson, 2005; Johnson & Johnson, 2006; Johnson & Johnson, 2007; Johnson & Johnson, 2008; Johnson & Johnson, 2009; Johnson & Johnson, 2010; Johnson & Johnson, 2011; Johnson & Johnson, 2012; Johnson & Johnson, 2013; Johnson & Johnson, 2014; Johnson & Johnson, 2015; Johnson & Johnson, 2016; Johnson & Johnson, 2017; Johnson & Johnson, 2018; Johnson & Johnson, 2019; Johnson & Johnson, 2020; Johnson & Johnson, 2021; Novartis, 2002; Novartis, 2003; Novartis, 2004; Novartis, 2005; Novartis, 2006; Novartis, 2007; Novartis, 2008; Novartis, 2009; Novartis, 2010; Novartis, 2011; Novartis, 2012; Novartis, 2013; Novartis, 2014; Novartis, 2015; Novartis, 2016; Novartis, 2017; Novartis, 2018; Novartis, 2019; Novartis, 2020; Novartis, 2021; Pfizer, 2001; Pfizer, 2002; Pfizer, 2003; Pfizer, 2004; Pfizer, 2005; Pfizer, 2006; Pfizer, 2007; Pfizer, 2008; Pfizer, 2009; Pfizer, 2010; Pfizer, 2011; Pfizer, 2012; Pfizer, 2013; Pfizer, 2014; Pfizer, 2015; Pfizer, 2016; Pfizer, 2017; Pfizer, 2018; Pfizer, 2019; Pfizer, 2020; Pfizer, 2021; Roche, 2001; Roche, 2001; Roche, 2002; Roche, 2003; Roche, 2004; Roche, 2005; Roche, 2006; Roche, 2007; Roche, 2008; Roche, 2009; Roche, 2010; Roche, 2011; Roche, 2012; Roche, 2013; Roche, 2014; Roche, 2015; Roche, 2016; Roche, 2017; Roche, 2018; Roche, 2019; Roche, 2020; Roche, 2021)

Appendix 3 The Lifecycle of a Prescriptive Drug

The lifecycle of a drug may differ in regard to the time it takes to develop it, and it depends on the type of drug that you aim to produce (complexity of the process), the ability to gain a fast approval and the resources that are contributed by the company to the development of it. It can, however, be divided into three main phases: the development phase, sales under the protection of patent phase and sales after the patent have expired phase. All different phases and subphases will be gone through in detail below (AstraZeneca, 2021).

Development phase (0-15 years)

Discovery of the compound

A new molecular entity is discovery either internally or externally through acquisitions or academia and you seek patent protection for that molecular entity, process of extracting it or both (AstraZeneca, 2021).

Pre-clinical studies

Conduct laboratory trials and animal studies to establish a picture of how the molecule might affect the human body as well as the proper dose of the compound to get the desired effect. The end goal is to understand if it is safe for humans and what potential side effects it might poses (AstraZeneca, 2021).

Phase 1 trials

Start to test it on humans and the trials uses healthy humans if it is a first-generation drug or patients if it is a second or third generation drug. The aim is to establish a solid knowledge regarding the absorption of the compound in the human body, the potential side effects and proper dosage of the drug (AstraZeneca, 2021).

Phase 2 trials

Start to test the compound on a small to medium-sized group of patients with the aim of understanding the effectiveness of the drug, potential side effects and proper dosage of the drug. The company would also start to plan the phase 3 trials and plan for regulatory submission after the completion of that trial (AstraZeneca, 2021).

Phase 3 trials

Start to test the compound on a larger group of patients to establish the benefits of the drug, effectiveness as well as potential side effects, which are required to have established in the regulatory submission. It is also common to start marketing the product to physicians in preparation for a potential regulatory approval (AstraZeneca, 2021).

Regulatory submission

Seek regulatory approval to be granted permission to manufacture the compound on a larger scale, market it and sell it. It is required that the company in their submissions provide data that support the safety and effectiveness of the drug, and in some cases can the regulatory authorities demand more data to be collected by the company in order for them to grant the approval. Different countries and unions are regulated by different authorities, for example EMA in the European Union and FDA in the US. The company hence need to submit for regulatory approval in each of these regions separately and be granted permission to in them individually to sell the compound there (AstraZeneca, 2021).

Sales under the protection of patent phase (5-15 years)

Launch of drug

Once regulatory approval has been granted, in one market the company may start to market and sell their compound in that market. The drug starts being used by patients after it has been prescribed by a physician and the company is in this phase required to monitor the usage to spot potential undiscovered side effects and update the product information thereafter (AstraZeneca, 2021).

Post-launch research and development

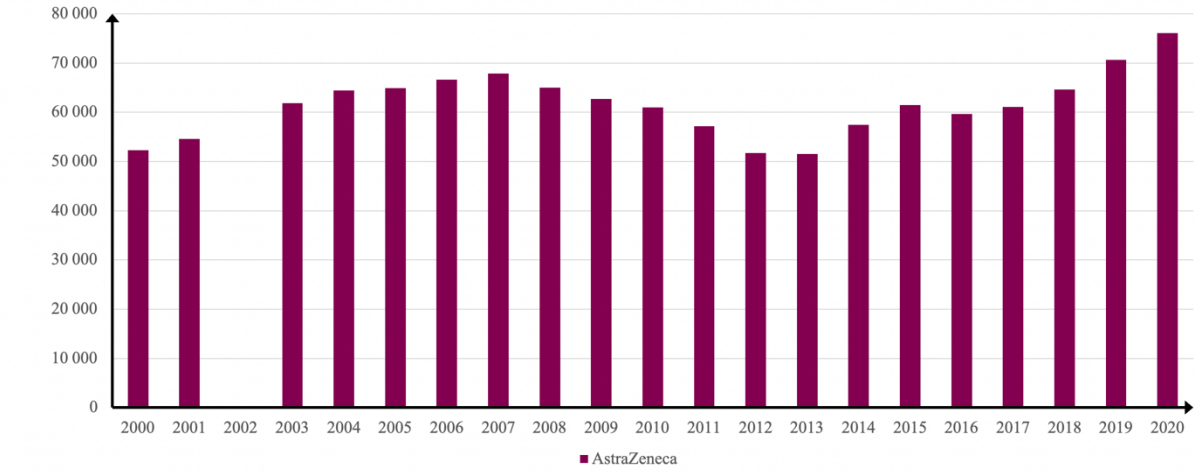
Start to manage the drug in accordance with the concept of LCM with the aim of expanding the area which the compound may be used. This in return require in some cases additional clinical trials in order to assure the effectiveness of drug against that disease (AstraZeneca, 2021).

Sales after the patent have expired phase (20+ years)

Introduction of Generics

The length of the patent protection differs among countries and unions but are on average 20 years. After the patent protection have expired and with it the company’s market exclusivity, the introduction of generics will occur which result in an increased competition in the market and result in the need to defend the products brand (AstraZeneca, 2021).

Appendix 4 Total Number of Employees in AstraZeneca



(AstraZeneca, 2002; AstraZeneca, 2004; AstraZeneca, 2005; AstraZeneca, 2006; AstraZeneca, 2007; AstraZeneca, 2008; AstraZeneca, 2009; AstraZeneca, 2010; AstraZeneca, 2011; AstraZeneca, 2012; AstraZeneca, 2013; AstraZeneca, 2014; AstraZeneca, 2015; AstraZeneca, 2016; AstraZeneca, 2017; AstraZeneca, 2018; AstraZeneca, 2019; AstraZeneca, 2020; AstraZeneca, 2021)

Appendix 5 J&J's Credo

We believe our first responsibility is to the patients, doctors and nurses, to mothers and fathers and all others who use our products and services. In meeting their needs everything we do must be of high quality. We must constantly strive to provide value, reduce our costs and maintain reasonable prices. Customers' orders must be serviced promptly and accurately. Our business partners must have an opportunity to make a fair profit.

We are responsible to our employees who work with us throughout the world. We must provide an inclusive work environment where each person must be considered as an individual. We must respect their diversity and dignity and recognize their merit. They must have a sense of security, fulfillment and purpose in their jobs. Compensation must be fair and adequate and working conditions clean, orderly and safe. We must support the health and well-being of our employees and help them fulfill their family and other personal responsibilities. Employees must feel free to make suggestions and complaints. There must be equal opportunity for employment, development and advancement for those qualified. We must provide highly capable leaders and their actions must be just and ethical.

We are responsible to the communities in which we live and work and to the world community as well. We must help people be healthier by supporting better access and care in more places around the world. We must be good citizens — support good works and charities, better health and education, and bear our fair share of taxes. We must maintain in good order the property we are privileged to use, protecting the environment and natural resources.

Our final responsibility is to our stockholders. Business must make a sound profit. We must experiment with new ideas. Research must be carried on, innovative programs developed, investments made for the future and mistakes paid for. New equipment must be purchased, new facilities provided and new products launched. Reserves must be created to provide for adverse times. When we operate according to these principles, the stockholders should realize a fair return.

(Johnson, 1943)

Appendix 6 AstraZeneca Industry Definition 1999

Industry force:	Threat of new Entry	Bargaining power of buyers	Threat of substitute products	Bargaining power of suppliers	Rivalry among competitors
Industry:					
Pharmaceutical Products	Low to medium since the capabilities and resources for launching and distributing products were very expensive to obtain. This led to difficulties for smaller actors to commerzialize their own products and, hence, enter the market. It was also easier for a large pharmaceutical company to acquire a smaller company to further improve their existing supply chains of innovations.	Medium to since the buyers were primarily institutional but which had not yet started to enforce as strong of a price pressure, as they would later do.	Low to medium since the patent creates a provisional monopoly for the patent holder and the prevailance of generics and parallel import, at this point in time, was low.	Low to medium since they are many and the pharmaceutical companies in comparison are large. Furthermore, the supplies for the first generation of drugs was bought in bulk.	High since there are many actors in the market and a low concentration. The industry is also very attractive due to the potential of high profits during the patent lifetime.

(Interviewee 1, 2021; Interviewee 1, 2021; Interviewee 2, 2021; Interviewee 3, 2021; Malerba & Orsenigo, 2015)

Appendix 7 AstraZeneca Industry Definition 2021

Industry force:	Threat of new Entry	Bargaining power of buyers	Threat of substitute products	Bargaining power of suppliers	Rivalry among competitors
Industry:					
Pharmaceuticals	Medium to high since the power of the low- and midsized companies have increased since they are better able to go to market on their own as they have increased their collaborations with other similar companies. The industry still requires high capital, but as PE firms have increased their investments, this has low effect.	High since most countries have started to demand lower prices and the public debate has taken form. The affordable healthcare Act is an example of this. The value pricing models instituted by some countries is further an example of the shift in power and shows the effect that it has.	Medium to high since the prevalence of generics and parallel import are greater. During the lifetime of the patent, the patent holder still holds market exclusivity, but as marketing time has gone down due to longer development. Generics today enter the market quicker after the first launch.	Low to medium since they are many and the pharmaceutical companies in comparison are large.	High since there are many actors in the market and a low concentration. The industry is also very attractive due to the potential of high profits during the patent lifetime.

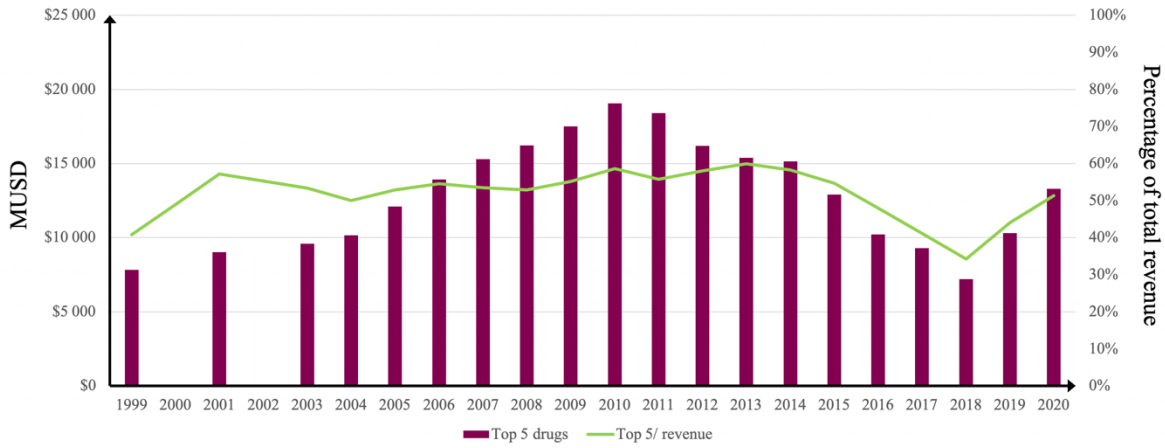
(Interviewee 1, 2021; Interviewee 2, 2021; Interviewee 3, 2021; Deilotte Centre for Health Solutions, 2019)

Appendix 8 AstraZeneca Revenue Streams

*AstraZeneca's annual report for the years 2000 and 2002 are not included due to difficulties in obtaining them.

(AstraZeneca, 2002; AstraZeneca, 2004; AstraZeneca, 2005; AstraZeneca, 2006; AstraZeneca, 2007; AstraZeneca, 2008; AstraZeneca, 2009; AstraZeneca, 2010; AstraZeneca, 2011; AstraZeneca, 2012; AstraZeneca, 2013; AstraZeneca, 2014; AstraZeneca, 2015; AstraZeneca, 2016; AstraZeneca, 2017; AstraZeneca, 2018; AstraZeneca, 2019; AstraZeneca, 2020; AstraZeneca, 2021)

Appendix 9 AstraZeneca Top Selling Drugs and Ratio to Revenue



(AstraZeneca, 2002; AstraZeneca, 2004; AstraZeneca, 2005; AstraZeneca, 2006; AstraZeneca, 2007; AstraZeneca, 2008; AstraZeneca, 2009; AstraZeneca, 2010; AstraZeneca, 2011; AstraZeneca, 2012; AstraZeneca, 2013; AstraZeneca, 2014; AstraZeneca, 2015; AstraZeneca, 2016; AstraZeneca, 2017; AstraZeneca, 2018; AstraZeneca, 2019; AstraZeneca, 2020; AstraZeneca, 2021)

Appendix 10 J&J Industry Definition in the Beginning of the 20th Century

Industry force:	Threat of new Entry	Bargaining power of buyers	Threat of substitute products	Bargaining power of suppliers	Rivalry among competitors
Industry:					
Consumer goods	Low since they were pioneers within the industry of mass produced medical products and the requirements for other to enter were high due to the technology advantage.	Low since the number of customers were large and the average volume purchased per customer can be assumed to have been low as every household only needed one. Furthermore, can the price sensitivity be assumed to be low due to the high need of the products at that point in time.	Low since Johnson & Johnson were pioneers within the field and could through their mass production offer lower prices in comparison to their competitors.	Low since the suppliers were many and not particularly large due the vast amount of cotton farms in the southern parts of the US. The power of Johnson & Johnson can also in comparison to the suppliers be seen as large, due to their scale which gave them further power over their suppliers.	Low since they were pioneers, and the concentration, hence, can be seen as low. The industry can however be assumed to in the coming years grow signifiantly, which would affect the force . However, since the pioneers had a strong advantage, it is seen as to have minimal effect.
Medical Devices	Low since they were pioneers within the industry of mass produced medical products and the requirements for other to enter were high due to the technology advantage.	Neither low nor high since they have the power of being pioneers within mass production of this type of equipment and hence, they are able to offer the best price. However, the force is not low because the number of customers are fewer and their quantity is higher per purchase due to the buyers mostly being insitutional.	Low since Johnson & Johnson were pioneers within the field and could through their mass production offer lower prices in comparison to their competitors.	Low since the suppliers were many and not particularly large due the vast amount of cotton farms in the southern parts of the US. The power of Johnson & Johnson can also in comparison to the suppliers be seen as large, due to their scale which gave them further power over their suppliers.	Low since they were pioneers, and the concentration, hence, can be seen as low. The industry can however be assumed to in the coming years grow signifiantly, which would affect the force . However, since the pioneers had a strong advantage, it is seen as to have minimal effect.
Healthcare Products	Low since they were pioneers within the industry of mass-produced medical products and the requirements for other to enter were high due to the technology advantage. The first mover advantage in this period can further be assumed because of marketing in this period, to have been high.	Neither low nor high since it is a mix of customers, ranging from those with some bargaining power (professionals) and those with low (consumers). Therefore it can be assumed that the force had only a small affect on them.	Low since Johnson & Johnson were pioneers within the field of mass produced sterile medical equipment and in their product categories within the consumer goods segment. They could furthermore offer low prices due to their scale advantageous due to their mass production approach.	Low since the suppliers were many and not very large, which would not give them any bargaining power over a larger company like Johnson & Johnson.	Low since they were pioneers, and the concentration hence can be seen as low. The industry can however be assumed to in the coming years grow, which would affect the force but since the pioneers had strong advantage, it is seen as to have minimal effect.

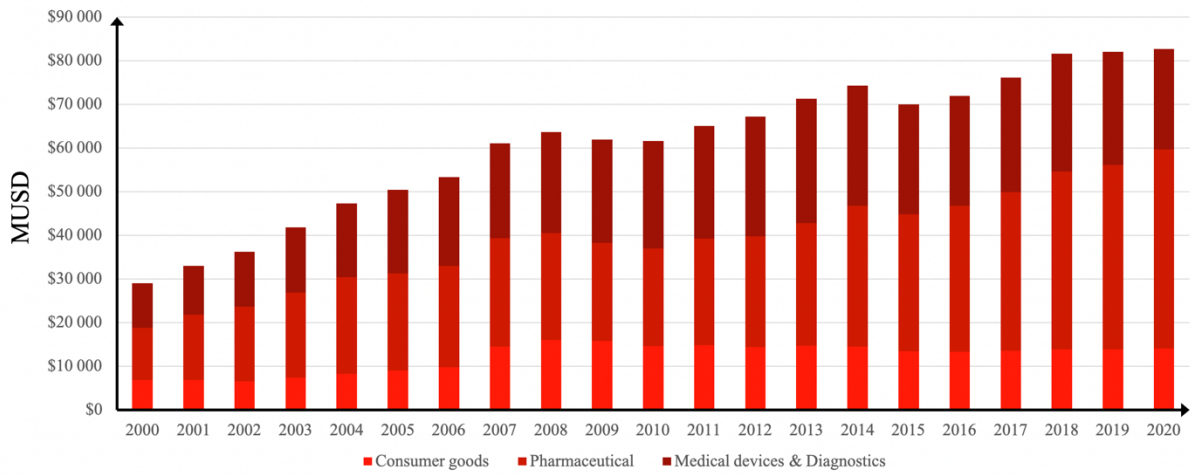
(Pharmaphorum, 2021; DeMelo, 2018; Hanson, 1979; Church, 2000; Robinson & Fornell, 1985; Interviewee 2, 2021; Malerba & Orsenigo, 2015)

Appendix 11 J&J Industry Definition 2021

Industry force:	Threat of new Entry	Bargaining power of buyers	Threat of substitute products	Bargaining power of suppliers	Rivalry among competitors
Industry:					
Consumer goods	Medium to high since the current trend show that more companies are join the industry. This in combination with the trend that consumers, to a larger extend than before, prefer the smaller niche brands over the large already established brands further stress the power of this force.	Low to medium, since the consumer today is more value for money centric and because they through the digital landscape more easily can compare prices from both different manufacturer and retailers. Furthermore, the growing low-cost retailers, is also a force that affects the purchasing power of buyers.	High, since the availability of substitutes through private label and other manufactures' products are higher. The strong established brands still hold benefits due to their estblishment but the ease of chnaging is lower and hence the force is regarded as high.	Medium, since the suppliers are more concentrated than they used to be and hence can assert greater negotiating power over the buyers. The larger consumer goods companies are still larger in comparison to the suppliers but as uncertainty increases the power of good suppliers do as well.	High since the competition in the industry has increased which has resulted in cost cutting measures to try and improve profitability in the industry.
Medical Devices	Medium to high since the power of the low- and midsized companies have increased since they are better able to go to market on their own as they have increased their collaborations with other similar companies. The industry still requires high capital, but as PE firms have increased their investments, this has low effect.	High since the buyers are mostly institutional and politic efforts have been made during the last 20 years to try and cut cost which was only amplified by the 2008's financial crisis.	Medium since the substitute products, in comparison to for pharmaceuticals, are lower since it requires more knowledge from a manafacturer to be able to copy a device than a first generation pharmaceutical. This is further enhanced by a higher brand loyalty as described by Dr. Nord.	Medium to high, since the dependence on highly technical suppliers have increased as the collaborations in the development stage of the supllies have increased. The companies require more specialized supplies which gives the suppliers of these materials an advantage over the manufacturers. Furthermore, supply chain disruption in recent years from suppliers oversea, have also contributed and made the power of suppliers even	Medium to high since the industry has the artifacts to enable high profits but at the same time has not grown much in recent years, which is seen by Johnson & Johnsons revenue stream seen in appendix 14.
Pharmaceuticals	Medium to high since the power of the low- and midsized companies have increased since they are better able to go to market on their own as they have increased their collaborations with other similar companies. The industry still requires high capital, but as PE firms have increased their investments, this has low effect.	High since most countries have started to demand lower prices and the public debate has taken form. The affordable healthcare Act is an example of this. The value pricing models instituted by some countries is further an example of the shift in power and shows the effect that it has.	Medium to high since the prevalence of generics and parallel import are greater. During the lifetime of the patent, the patent holder still holds market exclusivity, but as marketing time has gone down due to longer development. Generics today enter the market quicker after the first launch.	Low to medium since they are many and the pharmaceutical companies in comparison are large.	High since there are many actors in the market and a low concentration. The industry is also very attractive due to the potential of high profits during the patent lifetime.
Healthcare Products	Not applicable due to large shifts among the forces between the three above analyzed industries.	Not applicable due to large shifts among the forces between the three above analyzed industries.	Not applicable due to large shifts among the forces between the three above analyzed industries.	Not applicable due to large shifts among the forces between the three above analyzed industries.	Not applicable due to large shifts among the forces between the three above analyzed industries.

(McKinsey & Company, 2016/2017; Iyer, 2015; McKinsey & Company, 2010; Deloitte, 2021; Interviewee 3, 2021; Interviewee 2, 2021; Interviewee 1, 2021; Malerba & Orsenigo, 2015)

Appendix 12 J&J Revenue Streams



(Johnson & Johnson, 2001; Johnson & Johnson, 2002; Johnson & Johnson, 2003; Johnson & Johnson, 2004; Johnson & Johnson, 2005; Johnson & Johnson, 2006; Johnson & Johnson, 2007; Johnson & Johnson, 2008; Johnson & Johnson, 2009; Johnson & Johnson, 2010; Johnson & Johnson, 2011; Johnson & Johnson, 2012; Johnson & Johnson, 2013; Johnson & Johnson, 2014; Johnson & Johnson, 2015; Johnson & Johnson, 2016; Johnson & Johnson, 2017; Johnson & Johnson, 2018; Johnson & Johnson, 2019; Johnson & Johnson, 2020; Johnson & Johnson, 2021)

Appendix 13 Interview Guide

Introduction:

- Interview is opened – Inform about the thesis and how their answers will be handled.

The Pharma industry:

- Can you describe the Pharma industry and which mechanism have been imported in its evolution?
- How do the different actors interact with each other in the industry?
- What were the main reasons for the mergers in the beginning of the 21st century?
- What were the reason or reasons for the increase in collaborations in the beginning of the 21st century?
- What were the reasons for the larger cost reduction programs around 2010?
- Do you believe that there have been any major exogenous shocks in the industry and what have been the direct consequence of this shock in regard to their choice in strategy?
- Why do the bigger companies within the industry, struggle to produce innovation in compression to the small- and medium-sized companies?
- How do you think the Corona pandemic will affect the industry in the years to come?

The Pharma Companies chosen strategies:

- Which strategies do you believe prevail within the industry?
    - When did companies who have adopted these strategies done so?
    - What did you believe made them choose their chosen strategy?
    - Do you believe that anyone of these strategies is more suitable in today's industry and if so, why?
- How strong would you say the historic culture is within these companies, are they still affected by their 20th century heritage?
- Would you say that the Pharma companies, are affected by their past?

Final words

- Inform about what will happen next and thank them for their time