Role of IT Technologies in fostering Business Transformation – Case study of Philips

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Executive Summary

The term "digital transformation" (DT) has gained popularity, sparking interest across many academic fields and inspiring new lines of inquiry(Hausberg et al., 2019). With the adoption of new technologies helping deliver secure high-quality patient care and drive greater business efficiency, healthcare sector has gained significant benefits from digital transformation. Digital technologies, driven by the exponential rise in computing power, have successfully altered the majority of economic sectors, from finance to entertainment, with one notable exception: healthcare. The increasing advancements in medical equipment and imaging technology serve as evident illustrations of how high-tech medicine is in many aspects. Nevertheless, healthtech companies are still on a learning curve on how to transform their companies digitally, despite billions of dollars being invested in digital health solutions by both startup and established technology companies(Walsh & Rumsfeld, 2017).

This study advances the body of knowledge in the field of digital transformation by identifying the barriers to and enablers of business transformation as well as the role of IT technology as an enabler of business transformation. By creating a theoretical framework for barriers and enablers of business transformation with IT technology as an enabler, it empirically studies Philips to undertake a case study and offers a basis for theory building. On the subject of business transformation, a literature review utilizing the five-step grounded theory methodology was carried out. According to the literature study, this research highlights four primary barriers facing business transformation: organizational, knowledge, financial, and technical. Strategy, people, process, data, and technology are the different categories for business transformation enablers. The theoretical framework for this study is developed using the results of this literature review. A case study is performed on the digital transformation journey of Philips by identifying the IT technologies of the acquired firms that are part of Philip's healthcare transformation portfolio. This research captures the goal of business transformation while identifying the barriers and enablers of business transformation at Philips by conducting inductive qualitative research by interviewing. Analysis of data is carried out by following the steps stated by Miles & Huberman (1994) and using content analysis to analyze the interview data. The results of this study show that At Philips, the organizational barrier has emerged as the most pervasive barrier to business transformation. This study demonstrates that Philips' organizational structure, or the way they are set up, is a significant impediment to business transformation. The matrix organizational structure of Philips makes organizational change challenging. According to researchers, business transformation begins with establishing a strategy and achieving the organization's aim. According to the research, this strategy is misleading, and that any business transformation strategy should be developed by first comprehending customer demands before being in line with the intended outcome of the business transformation. According to this study, people with proper experience and knowledge in the field of business transformation are the key enabler of business transformation. This study supports the resource-based hypothesis, which contends that an organization has a great chance to outperform its rivals when it possesses strategic resources that can provide it an advantage in the market and could even help it generate sizable profits. This research examines three important IT technologies provided by the acquired companies of Philips, namely Tomtec, RDT, and Capsule technologies as resources that can enable business transformation. According to this study, Philips' business transformation was made possible by the IT technologies' significant contributions to the company's sales and revenues following the acquisition of these companies. By integrating these IT resources into other products in their portfolio to facilitate business transformation, Philips can further develop these technologies and achieve their objective of becoming a fully solutions-based firm. However, the findings of this study also suggest that IT technologies have not yet reached their peak value since Philips lacks the competencies and innovation culture to fully utilize these technologies and add value as a result of preexisting limitations.

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Chapter 1. Introduction

The global health industry is undergoing a major digital shift(Burton-Jones et al., 2020). Healthcare organizations are attempting to restructure and reinvent their processes in order to achieve and maintain a constant balance between quality improvement and cost reduction(Gastaldi et al., 2018). To meet patient requests, the future health sector will have to deal with a rising number of chronic illnesses and a scarcity of therapies. COVID-19 recently emphasized the significance of rapid, comprehensive, and accurate electronic Healthcare(e-healthcare) that incorporates many sorts of medical and physiological data to not only treat but also diagnose and cater the need of patients(Alshehri & Muhammad, 2021). The concept of e-healthcare emerged in the early years of the twenty-first century. It is defined as the integrated use of electronic information and communication technology in the healthcare industry for administrative, educational, research, and therapeutic reasons at local sites as well as over vast geographic distances. Healthcare business is quite active, and it incorporates technology into its processes to improve patient quality of life, for example, by speeding up diagnostic procedures and personalizing treatments, as well as to improve efficiency. The adoption of information and communication technology in the healthcare business gave rise to the "electronic health" trend (Solanas et al., 2017). The relevance of efficient healthcare systems has been recognized as a result of a rapidly aging population and a huge increase in the cost of in-hospital treatment has spawned various new research avenues at the crossroads of healthcare, data analytics, wireless communication, embedded systems, and information technology(H. Yin et al., 2018). Digital technologies have successfully altered most areas of the economy, ranging from finance to entertainment, thanks to exponential expansion in processing power, with one notable exception: healthcare. Medicine is unquestionably high-tech in many aspects, with ongoing advancements in medical device and imaging technologies acting as apparent examples. Despite billions of dollars invested in digital health technologies by both start-ups and established technology businesses, the transformation of healthcare delivery continues to lag. Even though corporations like Amazon, Apple, and Google continue to revolutionize our lives, these tech incumbents are still attempting to figure out healthcare(Walsh & Rumsfeld, 2017). While COVID-19 has acted as a catalyst for change, healthcare professionals have long acknowledged the need for digital transformation. This thesis sheds light on the topic of “IT enabled Business Transformation” in the healthcare sector by performing a case study on Philips. The future of digital health, according to Philips, will be a connected and highly accessible network of virtual and in-person care, with real-time and predictive analytics supporting care collaboration across the patient experience. In addition, technology-

enabled workflow optimization can allow healthcare personnel focus on what they do best: providing patient care. Philips can support a change from sick care to actual health care by helping individuals to take better care of their health and well-being with individualized digital health solutions. That's how digital transformation may help support better health outcomes, a better patient and worker experience, and lower healthcare costs when taken collectively (Philips Position Paper, 2020).

1.1. Challenges in DT of Healthcare

Healthcare professionals all throughout the world are up against the same conundrum: how to enhance patient outcomes while keeping costs down. An aging population's demand for chronic disease treatment is growing, as are technological improvements and empowered patients taking responsibility of their health. The construction of a rich health data foundation, as well as the integration of technologies such as Information Technology (IT), Internet of Things (IoT), advanced analytics, Big data, Machine Learning (ML), and Artificial Intelligence (AI), has been identified as a significant component in addressing these difficulties(Gopal et al., 2019). Practitioners define integration as a process of fusing two or more businesses with the goal of optimizing synergies to guarantee that the merger delivers on its expected value. Integrating various, frequently disjointed subsystems into a bigger, more comprehensive system that, ideally, shares data quickly and readily when necessary is known as integration in the area of information technology. In order to combine new or current hardware, software, and other communications, businesses frequently need to create a specialized architecture or structure of applications(DealRoom, 2022). Healthcare is gradually moving outside of clinical settings, to the community and home, and even to on-the-go care, thanks to the recent deployment of breakthrough medical devices. While the integration of devices into hospital treatment in dynamic IT "ecosystems" that replace traditional huge business databases is slow due to complex regulatory frameworks, major industries have grown their presence in the digital health area aimed at personal/non-clinical care(Kostkova, 2015a). The health-care industry must consider the rate at which digital technology is being adopted in various industries. To stay relevant, health-care organizations must undergo considerable transformations. Not only should the digital transformation improve patient care, but it should also help healthcare businesses in their operational processes. (Smagulov & Smagulova,2019).

A concern about the use of IT in healthcare, however, is whether it will result in a huge, transformational improvement in the way our health-care system operates. Managers of organizations at the forefront of revolution of the healthcare industry are already grappling with the fact that implementing IT

technologies in healthcare across the country will necessitate a significant shift in the work of millions of health professionals and tens of thousands of institutions across our $2 trillion health-care system. Faced with this difficulty, the desire to develop will be paramount, the technology itself will be secondary, and patience will be crucial(Blumenthal & Glaser, 2007).

Many health organizations are confronted with a lack of overall perspective when participating in digitalization. Because to the deployment of an integrated hospital information system (HIS) and electronic health records (EHR), several hospitals claim to be "digital". However, being digital isn't enough. Companies must first build a clear vision for how they will meet their consumers' digital demands, then define targets to achieve that vision, and finally begin implementation. Starting with investing in modernizing obsolete systems and concluding with providing real-time responses and resolving security issues, the procedure should be followed. Interoperability issues for digital health systems can arise during the implementation of a digitalization strategy. Integration and interfaces are very difficult and hazardous in this scenario. In a changing digital environment, keeping up with the latest technology and changing rules is critical to optimizing operations and addressing the requirements of patients. Both trends must be addressed in order to protect health care in the twenty-first century(Smagulov & Smagulova,2019).

When it comes to following the argument regarding digital business transformation, one of the most difficult challenges academics encounters is the level of abstraction used to describe the phenomena. Some academics view digital business transformation as an industry-wide phenomenon altering how businesses compete inside and between industries (Bley et al., 2016). Others see it as an organizational phenomenon, representing a transformation process that affects all aspects of a company (Fitzgerald et al., 2013). Although significant challenges exist to realize the benefits, and the possibility of unintended consequences has been acknowledged, there is widespread agreement that the digital transformation of healthcare through broad and deep use of health information technology (HIT) across the health-care ecosystem, in conjunction with other complementary changes, can reduce costs and improve quality(Agarwal et al., 2010)

The vast majority of established organizations' revenues still originate from traditional products and services in healthcare industry, therefore most big old companies' digital revolutions are still in the early stages(Sebastian et al., 2017). Digital transformation can help address contemporary challenges in the healthcare sector, such as empowering a patient-centric approach, enhancing operational efficiency, and supporting workflow processes (Kraus et al., 2021a). There is a need to shift from selling and buying

products to provide customer centric solutions to problems in the healthcare industry. Technology is a key component of digital transformation. However, discarding outmoded processes and legacy technology is frequently given less importance than embracing new technology. It's also about making innovation possible. Not only this but adoption of benefits-focused methods to IS/IT is a "paradigm shift" in perspective and individuals and organizations in the healthcare domain who may face considerable challenges in making this transition(Colin & Hodges, 2010)

Why is it so difficult to create IT systems that allow for a continuous flow of data throughout the healthcare process? Understanding the nature of healthcare procedures is necessary for finding appropriate answers to this question. However, there is a lot of uncertainty in the current literature in this area, which stems from various, inconsistent, and incomplete interpretations on what healthcare processes are. We must distinguish between organizational processes (e.g., processes carried out by companies to deliver healthcare) and the medical treatment process (e.g., diagnostic and therapeutic procedures to be performed for a specific patient) in order to identify the core challenges for IT support as well as the shortcomings of current IT solutions. Because various organizational units often have their own specialized IT applications, application integration is one of the most difficult challenges for IT support of organizational operations(Lenz & Reichert, 2007). Operational excellence in healthcare is linked to the quality of care offered. By improving organizational processes and patient involvement, digital transformation may improve quality of care and increase patient satisfaction. However, in many countries, it is difficult to move beyond the idea and away from the belief that digital health transformation is primarily a technological process in which "people must simply adapt to a new normal."(Rosalia et al., 2021) There is widespread agreement that the digital transformation of healthcare, which includes extensive and deep use of health information technology throughout the healthcare ecosystem, as well as other complementing developments, may lower costs and enhance quality(Bunduchi et al., 2020). Digital transformation projects, on the other hand, are complex, time-consuming, and difficult to implement, and they frequently fail to meet their objectives. Furthermore, the adoption of health information technologies by healthcare institutions is delayed, reducing the potential benefits claimed by research papers(Hermes et al., 2020). While digital transformation has the potential to benefit the healthcare sector in terms of medical care services as well as the overall ecosystem, it may be challenging to implement.

1.2. Opportunities

With the growth of technology for enhancing health and well-being, dozens of digital health initiatives have been done in the world. There is a once-in-a-lifetime opportunity to transform healthcare and empower citizens to take control of their own health. However, successful development, integration, and deployment of new technologies and methodologies necessitate a significant departure from established academic and clinical approaches. We require a new approach to science and health research in order to fully embrace these prospects, transform healthcare, and promote well-being. Only when health and technology are researched together, with the goal of solving real-world problems, will they be able to provide discoveries that have a major influence on clinical and social care delivery, as well as increase individual and population well-being(Kostkova, 2015b). The digital revolution in healthcare creates new market prospects and business models for improving medical treatment and health insurance challenges, such as medical practice, value development, and general issues relating to the aging population(Kraus et al., 2021). The healthcare sector in the pandemic has been overloaded by a sudden increase in number of patients. The pandemic has offered a springboard for certain businesses to seize "transformative opportunities." (Reuschl et al., 2022). The importance of information technology in health care is growing as policymakers strive on technological advancements to make healthcare safer, more inexpensive, and more accessible. In light of this, IT researchers have a variety of important research possibilities to use existing IT study topics and create new ones.

(Agarwal et al., 2010)summarizes the opportunities of IT in healthcare in three areas(See figure 1) i.e. . HIT Design, Implementation, and "Meaningful use", Measurement and quantification of Health IT payoff and impact, and extending the traditional realm of Health IT. This gives an overarching picture of research areas related to IT in healthcare. Researchers enthusiastic about the topic of IT in healthcare can follow one of the areas to carry out their research. In this thesis, the most relevant area is HIT design, implementation, and meaningful use as it involves the development of new technologies that can support patient care, workflow integration, and implementation of the barriers found in the process to meaningful use. The rising digital transformation of healthcare is resulting in a slew of new market segments, generic roles, and revenue streams, as well as a blurring of the lines between healthcare and the IT industry. Others build on digital technologies to deliver novel medical treatments, while some positions rethink existing solutions by digitalizing distribution and services. Simultaneously, other market segments provide whole new digital services to solve problems that existed before to the digital transformation. Emerging startups that reimagine established solutions are either competing with or complementing the offerings of existing healthcare incumbents. In contrast, incumbent technology

corporations face stiff competition from emerging companies delivering new digital services.(Hermes et al., 2020).

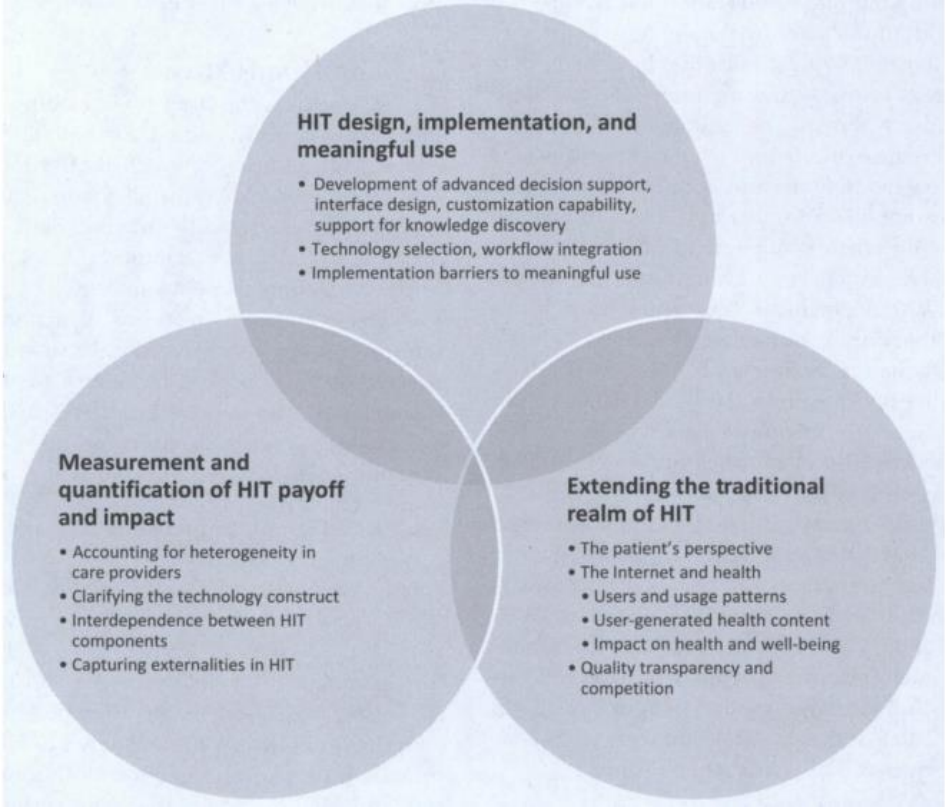

Figure 1 Opportunities of Research in Health IT (Agarwal et al., 2010)

Some sectors, including as travel, banking, and entertainment, have digitized their processes to the point where consumers now anticipate digital service delivery. People are amenable to the use of technology in healthcare, according to multiple surveys, and even anticipate it to be modern and convenient, based on their previous experiences. Emerging disruptive providers, on the other hand, aid change by bringing new opportunities to the market and creating demand for creative care delivery models(Gareth L. Jones et al., 2019). Healthcare organizations are attempting to restructure and reinvent their processes to achieve and maintain a constant balance between quality improvement and cost reduction. Tensions occur as a result of inquisitive and exploitative behaviors, acting as opposing attractors whose successful equilibrium can only be achieved by putting forth concrete and consistent efforts. Recent ambidexterity research advises looking at the methods by which organizations deal with these conflicts over time, either by rearranging their activities within an exploration-exploitation space constrained by an efficiency frontier or by pushing it out to achieve higher performance. From this perspective, the digital transformation that is currently sweeping the healthcare industry presents significant research

prospects. It's also at the center of a debate among policymakers and practitioners because of its potential cost-cutting and quality-improvement implications(Gastaldi et al., 2018). The digital transformation of healthcare delivery is a foregone conclusion as health technology continues to grow at a breakneck pace. However, important concerns remain, such as how and when digital transformation occurs. The path to innovation is difficult, but the opportunity to lead and contribute to a constructive digital revolution of healthcare is exciting(Walsh & Rumsfeld, 2017). The healthcare sector is out of sorts with battling the quadruple aim reducing costs; improving population health, patient experience, and team well-being—and productivity(Arnerz et al., 2020). The Institute for Healthcare Improvement (IHI) established the Triple Aim strategy to improve the efficiency of the healthcare system. The Triple Aim's objectives are to "increase patient care experience, promote population health, and lower per capita health care expenditures," according to IHI. IHI emphasizes that the strategy has just one goal and three different dimensions. Since its conception, this model has done a wonderful job of directing the optimization of health systems, but recently, an additional feature — improved clinical experience — has been adopted by many healthcare professionals, leading to the formation of the Quadruple Aim. The notion is that the three other patient-centric components won't be fully realized without a better clinical experience on the provider side. Healthcare companies attempt to reach this quadruple aim by mergers and acquisitions of technological firms. Mergers and acquisitions are defined as when two organizations freely decide to work together by combining their available resources, liabilities, and cultural values on a roughly equal footing across various enterprises and industries, a merger takes place. Contrarily, acquisitions take place when one company purchases and takes over the operations of another company. Because the outcome is the same—one company gaining control of another—the phrases "mergers" and "acquisitions" are sometimes used interchangeably to describe the business activity (M&A)(Vazirani, 2012). The main reasons that healthcare providers merge is to enhance the delivery of healthcare services and to improve their competitiveness. Also, efficiency and financial reasons are important drivers of merger activity in healthcare. We discover that the driving forces behind mergers are changes in health regulations, particularly the mounting pressure from rivals, insurers, and local governments(Postma & Roos, 2016). A record amount of capital investment has been attracted to the healthcare sector, and mergers and acquisitions are steadily rising. Traditional Med-Tech manufacturers must become digital smart manufacturers in order to transition to a higher value-added market. This trend in development encourages business owners in the Med-Tech industry to think about ways to improve their professional skills, increase their market, and choose their course for the future(Fang et al., 2020).

1.3. Problem Statement

There is a scarcity in scientific study on digital transformation because the majority of published work is about digitizing information rather than the transformation of an organization or the ability to use digital methods within an organization(Parviainen et al., 2017). Researchers find it challenging to get a sense of the existing body of information about digital business transformation because of the profusion of terminologies and categories. It is difficult for researchers to differentiate between the use of IT technologies in patient treatment processes and implementing IT to strengthen the organizational processes of a healthcare firm. While practitioners are focused on cutting costs and delivering products and services that are customer centric and most importantly safe(Smagulov & Smagulova, 2019). The current status of technology in healthcare industry is based on traditional tools and methods. Practitioners are still using outdated technology to create the cash flows and revenues for the firm, with their current state of the art technologies are still in adoption processes thereby delaying the digital transformation(Borovkov et al., 2021). The literature on resource-based theory suggests that incumbent firms can acquire companies to include their resources as part of their portfolio to gain a competitive advantage over their competitors. (Barney, 1991).

Incumbents in the healthcare sector are finding it cumbersome to move from their traditional approach towards patient care while these new entrants are providing solutions that change the definition of healthcare all together. Healthcare giants like Philips have found a solution to this problem by turning their company's vision and structure of a conglomerate to a one health care firm providing products and services in the healthcare sector by acquiring these emergent companies. Philips faces the problem of utilizing their legacy systems to deliver healthcare solutions and at the same time being on a decade long transformation journey leading to reduced revenues, stock price and recall of products. This means that there exist some barriers that are slowing down the business transformation process. The problem statement identified in this research is how can resources of newly acquired firms can enable business transformation. In the end, the question that stands out for not only Philips but all the incumbents in the healthcare industry is how to utilize the IT technologies of the emergent firms to successfully transform into a healthtech firm.

1.4. Research Objective

The objective of this research is to identify the barriers and enablers to digital transformation at Philips by performing a case study on IT technologies offered by the acquired companies. The use of digital health technologies in health units is becoming more important as digital transformation in healthcare plays an increasingly important role in enhancing healthcare, knowledge transfer, and performance of these firms(Ghaleb et al., 2020). To get a better understanding on the IT technologies as a resource which can enable business transformation, a case study is performed on the Philips by exploring their goal of business transformation. This case study approach will give a perspective of the practitioners in the healthtech industry. Royal Philips had been undergoing a difficult restructuring for past. Following poor financial results in 2013, CEO Frans van Houten set a goal of making the Dutch icon a "high-performing firm" by 2017. The acquisitions of companies of a business-driven IT transformation at Royal Philips, a diversified technology corporation, are examined in this case study. The rapid pace of digital transformation in the healthcare industry has left healthcare providers with no choice but to adapt if they want to stay competitive. Philips plans to fight its competition by acquiring firms and adding them in their portfolio. This research also aims to find out how Philips aims to create value from the acquisitions and learn how the process of digital transformation is carried out by the leader in the healthtech industry. In this way, this thesis will be concluded by shedding light on the perspective of research and practitioners on the topic of IT enabled digital transformation.

1.5. Research Questions

By keeping in mind, the problem statement and objective of the research, the following main research question is identified.

"How can IT technologies enable digital business transformation of Philips in healthcare?"

Leading to the following sub-research questions:

a) What are the barriers and enablers to digital business transformation?
b) Which are various IT technologies used in healthcare to enable digital business transformation?
c) What are the barriers and enablers to digital transformation at Philips?
d) Which are various IT technologies used to enable digital business transformation at Philips?

1.6. Research Approach

An exploratory case study approach is used to gather qualitative data. A case study design is considered as the goal of the study is to answer "how" and "why" questions. In a case study approach, the researcher can't control the behavior of those involved in the study and want to cover contextual conditions because researcher thinks they're relevant to the phenomenon under study, or the boundaries between the phenomenon and the context aren't clear(Yin, 2003). Researchers can use qualitative case study approach to explore complicated phenomena in their surroundings. When used effectively, this methodology can be a useful tool for developing theories, evaluating programs, and developing interventions in health science research(Baxter & Jack, 2008). The qualitative approach provides a realistic context for the researcher to delve into and uncover underlying assumptions, beliefs, and values. The method is less structured, more open-ended, and flexible, allowing participants to express their concerns about subjects that are important to them. Participants in the study are given the opportunity to express their thoughts on the topic under examination without the researcher putting any preconceived notions or judgments on them(Azungah, 2018). The deductive approach and the inductive approach are the two basic approaches to analyzing qualitative data, however each can be handled in a variety of ways. Deductive techniques to data analysis entail adopting a structure or preset framework. In essence, the researcher applies their own structure or hypotheses to the data before analyzing the interview transcripts. In the inductive approach, on the other hand, data is analyzed with little or no predetermined theory, structure, or framework, and the structure of analysis is derived from the data itself. This method is thorough and time-consuming, but it is most appropriate when little or no information regarding the study phenomenon is available. The most popular method for analyzing qualitative data is inductive analysis(Burnard et al., 2008). The phenomenon discussed in this research is digital transformation. The research questions identified from the research objective are analytical in nature as they as how and why questions. To answers this question, the first step in research is perform an extensive literature review on the topic of IT enabled digital transformation in healthcare sector. A literature review article synthesizes earlier studies to enhance the basis of knowledge by providing a complete overview of literature linked to a theme/theory/method(Paul & Criado, 2020). Building on the literature review, a theoretical framework is developed to analyze the qualitative data.

1.7. Data Collection Method

Qualitative research is a type of investigation that aims to describe and clarify human experience as it manifests in people's lives. Researchers that use qualitative methods collect data to support their simplified descriptions. Qualitative data is primarily obtained through the use of spoken or written words rather than numbers. Interviews with participants, observations, documents, and artifacts are all possible data sources. For analytic purposes, the data is frequently translated into written language. Purposive and iterative procedures are required for interview participant selection. Interview data collection necessitates an understanding of the complexities of self-reports as well as the relationship between experience and language expression. Obtaining appropriate breadth and depth in interview data requires practiced skill and patience(Polkinghorne, 2005). To build on the qualitative research, a literature review is necessary. Earlier investigations are rationally synthesized based on the conclusions of prior studies, and the subject advances. As a research approach, literature reviews provide a substantial contribution to the conceptual, methodological, and thematic development of several disciplines. Review papers are critical reviews of previously published works. They include systematic reviews and meta-analytical reviews that look at quantitative impacts, among other things. To evaluate and contrast the findings of past studies in a subject, review papers meticulously collect and synthesize relevant literature. As a result, review papers give readers a current understanding of the research issue, assist in identifying research gaps, and point to future research directions(Paul & Criado, 2020). Apart from the literature review, desk research is performed to gather data. The primary goal of the desk Research is to collect secondary results from professional organizations, business publications (HBR), websites, and internal Philips papers under the supervision of a company supervisor in order to gain a better knowledge of the content from a practical standpoint. Furthermore, a case study is performed on Philips to gather data from secondary sources. Case study research entails more than just looking into a specific person or event. This method can be used to deal with a wide range of circumstances, from simple to complex. It allows the researcher to answer "how" and "why" questions while also taking into account how a phenomenon is influenced by the context in which it occurs. A case study is a wonderful opportunity for a novice researcher to get tremendous insight into a subject. It allows the researcher to collect information from a range of sources and combine it to illuminate the case(Baxter & Jack, 2008). In an era when data is becoming more readily available to academics all over the world, the usefulness of using secondary data for study is becoming more apparent, as is its dubious legitimacy when compared to primary data. When it comes to research, these two sorts of data are a double-edged sword because they can both enhance and detract from a project. In a nutshell, both primary and secondary data have their benefits and drawbacks. As a result, it

is up to the researcher to consider these aspects and choose the best option when doing research. For this research, both types of data are used. Below Fig 2 shows how each research method will be used to answer the research question.

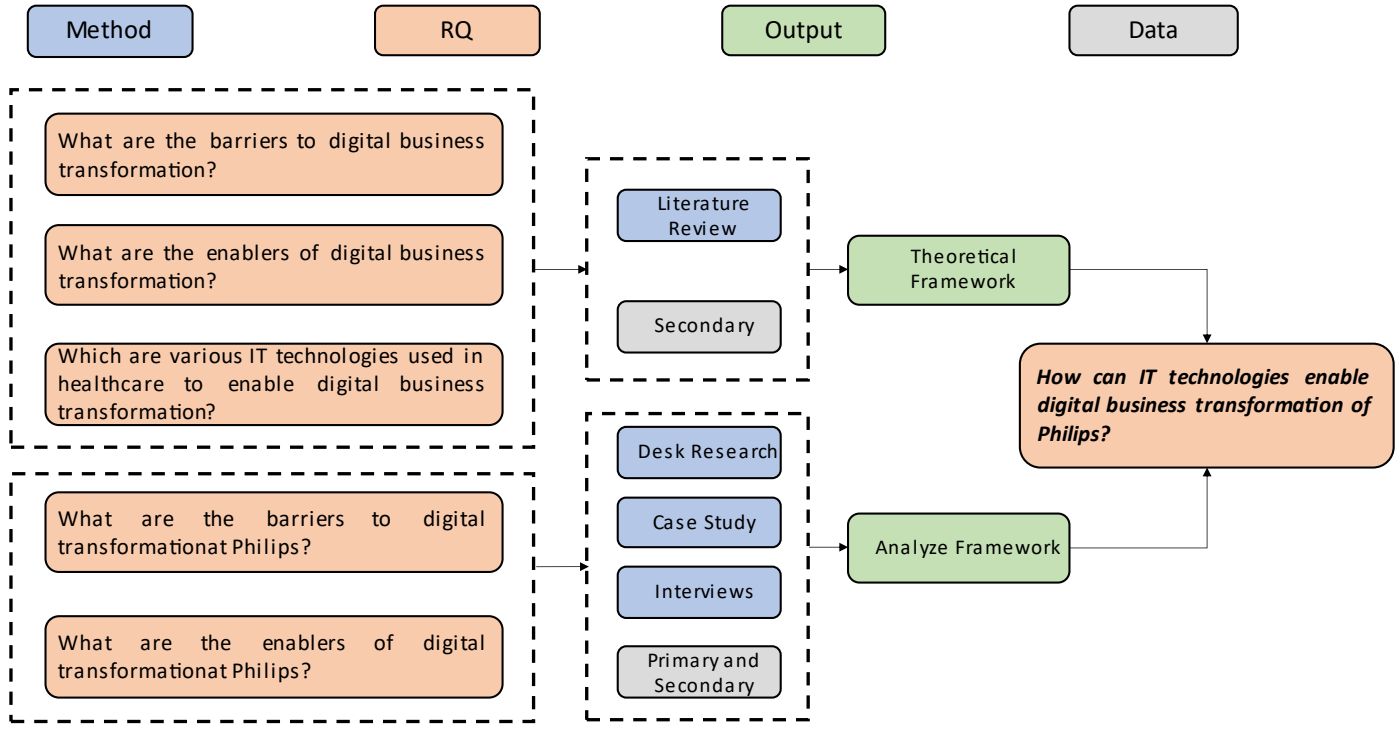

Figure 2 Research Approach

1.8. Research Structure

This thesis is structures in 6 chapters. Each chapter adds value to the research by contributing to the research objective. See below table with number of chapters with details.

Chapter	Description
Introduction	The first chapter contains the introduction to the research theme, the problem statement, the research objective, the research questions and the research approach.
Literature Review	The second chapter contains the results of the literature review on the topic of Health IT, digital transformation, and IT enabled digital transformation. From the literature review, barriers are identified. A theoretical framework is developed to conduct qualitative research.
Methodology	The third chapter show the methodology to create and design the interview process for the case study to gather secondary data.
Case Study	The fourth chapter discusses the acquisitions of Philips and performs a case study to get an in-depth knowledge of the case.
Results	This chapter discusses the results of the research.
Discussions	This chapter reflects on the results of the research and gives recommendations and highlights limitations
Conclusions	This chapter gives the bottom line of the research and provides recommendations for future studies.

Table 1: Research Structure

Chapter 2. Literature review

In this chapter, the theoretical background of the subjects which are related to the topic of this thesis is presented. This is done to provide the reader with a fundamental understanding of the subjects involved in this research and to clarify the definitions of the terms used in this thesis.

In order to gain insight into relevant research on the topic of digital transformation, a review of published articles in journals and conference papers available in two scientific databases Scopus and Web of Science as the most relevant scientific databases for the topic, was conducted. The search in databases was made on the basis of the following search keywords: “Digital transformation”,” Digital Transformation in Healthcare”, “Barries to Digital Transformation”, “Enablers of Digital Transformation”. The selection process started by sorting most cited papers in the area of digital transformation. The screening of research papers was done by reading the abstracts and conclusions of each research papers to identify the relevancy of the research paper with this thesis.

The literature review was conducted using a five-stage grounded theory method given by (Wolfswinkel et al., 2013). Grounded Theory allows the researcher to create a theory-based or concept-centric yet accurate review rather than presenting raw facts, theory testing, or word counts. The authors of grounded theory method suggest researchers to be flexible in their approach to the literature review. Hence for the sake of this research, the following steps are followed to perform the literature review:

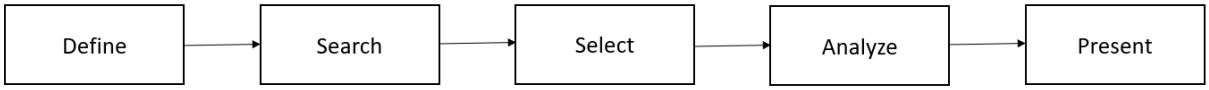

Figure 3 Literature review Process (Wolfswinkel et al., 2013)

Digital transformation is becoming a more common topic of discussion among academics and practitioners in recent years. A short look at Google Trends reveals that interest grew from 1 to 100 in the six years between 2013 and 2019. This is in addition to an increase in the number of articles published, conference panels, and special issues in academic publications. Furthermore, in terms of strategic importance, it is now assumed that digital transformation affects and challenges managers across various industries However, the broad and diverse literature on DT suffers from a lack of consensus on what digital transformation is and what does it entails(Hanelt et al., 2021). The barriers between

industries, competitors, and enterprises are blurring in a period of rising technological disruption, as firms and platforms collaborate to build unique engagement techniques. In order to survive and develop in a constantly changing industry, organizations must abandon legacy thinking and embrace innovation that benefits both channel members and customers(Crittenden et al., 2019). Digital technologies have successfully altered most areas of the economy, from finance to entertainment, thanks to exponential development in processing power, with one notable exception: healthcare. Medicine is unquestionably high-tech in many aspects, with ongoing advancements in medical device and imaging technologies acting as apparent examples. Despite billions of dollars invested in digital health technologies by both start-ups and established technology businesses, the transformation of healthcare delivery systems from legacy systems to implementation of new technology and solutions continues to lag. Even while firms like Amazon, Apple, and Google continue to impact our lives, these tech behemoths are still attempting to figure out role of novel technologies in the healthcare industry(Walsh & Rumsfeld, 2017). To get a deep understanding of the current research on digital transformation in the healthcare industry, this section covers the literature on digital transformation, digital transformation in healthcare industry, and IT in healthcare. To start with the main theme of the research, the below table states various definitions of digital transformation and IT technologies in the healthcare domain.

Section	Definition	Author	Main Findings
Digital Transformation	Digital transformation is the application of emerging digital technologies (such as social media, mobile, analytics, or embedded devices) to enable large business changes (such as improving customer experience, optimizing operations, or developing new business models).	(Fitzgerald et al., 2013)	"Lack of urgency" was the most commonly stated barrier to digital transformation in this paper.
Digital Transformation	A digital transformation strategy is a blueprint that helps businesses manage transitions that occur as a	(C. Matt et al., 2015)	Digital transformations are frequently accompanied by changes in skill sets that are required not only for the transformation but also for

	result of the integration of digital technology, as well as their operations afterward.		ongoing operations after the integration process
Digital Transformation	Digital transformation refers to the changes in a company's business model that digital technologies can bring about, such as new products, organizational structures, or process automation. These shifts may be seen in the increased demand for Internet-based media, which has resulted in the transformation of entire business structures (for example in the music industry).	(Hess et al., 2016)	The goal of the digital transformation journey is to gain the benefits of digitalization, such as increased productivity, cost savings, and innovation. For future corporate success, a clear plan for deploying and using digital technology is essential.
Digital Transformation	Data-driven insights can be used to inspire tactical or strategic business changes, as well as the development of digital business models that allow for new methods to capture value.	(Haffke et al., 2016)	The digitization of sales and communication channels, which give fresh methods to communicate and engage with clients, and the digitization of a firm's goods (products and services), which replace or supplement physical offers, are both examples of digital transformation.
Digital Transformation	The use of digital technologies to enable large company advances, such as improving customer experience or developing new business	(Piccinini et al., 2015)	When coping with emerging difficulties that occur from the merging of the physical and digital worlds, organizational ambidexterity is especially important.

	models, is known as digital transformation.		
Digital Transformation	Digital transformation includes technologies that compete with low-performing existing technologies and exert a pulling effect on processes, structures, and social behavior that can benefit from the technology's value proposition.	(Reuschl et al., 2022)	During the global epidemic, businesses accelerated their digitalization efforts to an emergency level. Organizations had limited time to adjust their structures, operations, and culture to the new environment due to the rapid adoption of digital technologies.
DT and Health IT	Health information technology has been identified as a driver of improved clinical outcomes and a cost-cutting tool.	(Hermes et al., 2020)	To develop and co-create value with a far wider range of partners and players, digital platforms harness and orchestrate a platform-mediated ecosystem.
Health IT	Consumers, providers, payers, insurers, and all other parties with an interest in health and health care use HIT, which comprises of a vast array of technologies for sending and managing health information.	(Blumenthal & Glaser, 2007)	HIT offers characteristics that make it appealing to a wide range of stakeholders in a politically and economically divided health-care system grappling with seemingly insurmountable cost and quality issues.
DT and Health IT	a technology that utilizes a combination of information, computation, communication, and connectivity technologies to improve an entity by causing major changes in its attributes.	(Kraus et al., 2021a)	The digitization of information and the implementation of HIT in traditional HC organizations are the most common aspects of digital transformation in healthcare.

DT and Health IT	Digital transformation is a term used to describe the overall influence that digital technologies have on a domain and how that effect fundamentally affects that domain.	(Faddis, 2018)	To comprehend digital health, one must first understand the various technologies that make something digital. The overarching notion of industry 4.0 encompasses IT, Big data, analytics, cloud computing, mobile technology, and more.
DT and Health IT	Authors define digital transformation as substantial, complex interventions such as whole-of-hospital or multi-site system implementations that result in significant changes in how businesses operate.	(Burton-Jones et al., 2020)	Digital transformation evaluation has been a long-standing activity in both research and practice. Practitioners and researchers can greatly improve evaluation work by working together to expand the outlook on DT.

Table 2: Digital Transformation Literature Review

The phenomenon of digital business transformation focuses on the fundamentals of digital business transformation, which may be broken down into two research areas: business processes and organizational consequences. The focus of this phenomenon is on how digital transformation affects the business ecosystem. Digital technologies have an impact on not just product, business process, and sales transformation, but also entire business models(Hess et al., 2016). The literature on business processes of digital transformation has a well-established field devoted to strategies. For transformation, simply experimenting with and using digital technology is insufficient since digital strategies must also be developed(Sebastian et al., 2017). According to several academics, DT necessitates the alignment of a company's various strategies to a digital business strategy that combines both business and IT strategy.(C. Matt et al., 2015). Other authors argue that a stand-alone DT strategy is necessary(Hess et al., 2016). In response to this, Lanzolla and Anderson (2008) suggest that companies must prepare for digital interactions, digital distribution, and ubiquitous digital reach while dealing with continuous DT. As a result, increased digital interaction is required, given that consumers now have more opportunities to generate and interact with content at any time. Furthermore, open content development technologies

are becoming more widely available, lowering the barriers to content distribution. Because content can be transmitted through a variety of open-access digital communication methods, controlling digital distribution is critical. Similarly, maximizing digital reach necessitates the creation of networks based on shared interests rather than geographical proximity(Lanzolla & Anderson, 2008). Gray et al. (2013) make another key addition in this area, explaining how IT is utilized to evoke new value for the organization and ecosystem through value chains, value shops, and value networks to create a competitive edge, based on a case study from the healthcare industry. The authors explain how the digitally activated customer enables obtaining strategic value through center-edge DT in consumer-centric industries. The transition from the enterprise's core (e.g., the supply chain) to the enterprise's edge (e.g., customers with digital connections) necessitates IT deployment and organizational transformation(Gray et al., 2013). In the following decade, IT and digital technologies will play a strategic role in company and, as a result, will be exploited to gain a competitive edge. Companies that are unable to create and implement DT strategies and new digital business models quickly enough will struggle to stay up with the new digital reality and compete. Customer interaction and digitized solutions are two digital strategies for DT. The customer engagement strategy is based on the idea of fostering customer loyalty and trust through unique and individualized experiences, such as providing opportunities for contact(Sebastian et al., 2017). With the digital solutions strategy, a company's value proposition is reformed by merging a combination of products, services, and data to obtain a competitive edge. The plan aims to anticipate client wants using the existing capabilities afforded by digital technologies. To begin, a corporation must examine current trends in order to determine which stance to take on the impact of digitalization on change. Second, the current status is assessed in terms of desired positioning and digitalization impact. The authors suggest outlining actual steps to bridge the gap between the existing status and the intended position of the organization as a third phase. The fourth step is to put the initiatives into action and validate them with technical assistance(Parviainen et al., 2017).

Other studies address DT with contributions from the field of business models. Digital business models are defined by (Remane et al., 2017)as those that rely on digital platforms and emerge when digital technologies create fundamental changes in value generation. Value propositions, interfaces, service platforms, as well as an organizing and revenue model, are all components of digital business models. Companies must rethink their consumer value proposition and what they provide clients in the digital age(Berman, 2012). Business models are studied from many angles in several areas in research on digital transformation, and so fulfill a range of aims and meanings. A business model might be a multi-dimensional notion that has been shown in studies as a statement, description, representation,

architecture, conceptual tool or model, structural template, method, framework, pattern, or set. Consumer behavior is changing, and this has the ability to disrupt business structures. The authors suggest assessing how the sharing economy affects customer value propositions and how to restructure value propositions and business models to be more commercially—and service-oriented as a result of the current economic trend(F. Li, 2020).

(Kraus et al., 2022) provides a framework for digital transformation that can be interpreted as the work that takes an internal viewpoint, i.e. a resource-based approach, as well as an outward perspective, i.e. one of structural change and a change in the way value is/can be created as a result, drives research on digital transformation in business and management. Existing research on the former has focused on the role of strategy, dynamic capabilities, and the use of big data in successfully tackling digital transformation in businesses. (C. Matt et al., 2015) defines business transformation as a blueprint that helps businesses manage transitions that occur as a result of the integration of digital technology, as well as their operations afterward. While (Fitzgerald et al., 2013) defines it as an application of emerging digital technologies to enable large business. On the other hand, (Hess et al., 2016) describes business transformation as changes in the business model of a company. Figure 2 gives a step-by-step approach for practitioners of how to implement IT enabled digital transformation according to Venkatraman (1994).

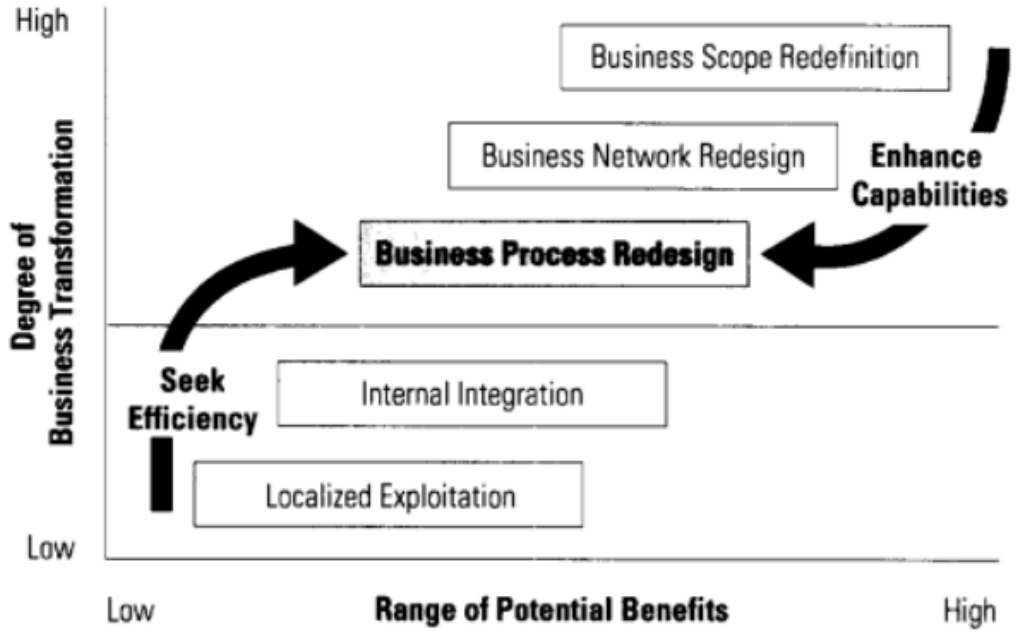

Figure 4 Five levels of IT-Enabled Business Transformation (Venkatraman, 1994)

Level One: Localized Exploitation - The basic level for using IT functionality within a firm is the first. Localized exploitation is a word used to describe how, in many circumstances, choices to deploy isolated systems (such as forming Microsoft teams or setting up OneDrive to store data) are decentralized to the appropriate functional and operational management. Managers usually start and install these systems in response to operational issues or challenges. This level is best described as the deployment of typical IT applications with minimum business process changes. This underutilizes IT's potential capabilities and fails to give companies with as many benefits as it could if the corporation had endeavored to adapt business processes to take advantage of technical capabilities.

Level Two: Internal Integration - The second level is a natural continuation of the first, indicating a more methodical effort to harness IT capabilities across the entire business process. Technical interconnection like dealing with the interconnectivity and interoperability of diverse systems and applications across a shared IT platforms and business process interdependence are two types of integration at this level like dealing with the interdependence of organizational roles and responsibilities across distinct functional lines. Neither type is sufficient on its own.

Level Three: Business Process Redesign - The third level represents a strong belief that IT functionality benefits are not completely realized when it is imposed on existing business processes, no matter how well integrated they are. This is because today's corporate processes follow a set of organizational concepts developed in response to the industrial revolution. The broad principles underpin organizational notions such as centralization vs. decentralization, range of control, line vs. staff, functional specialization, authority-responsibility balance, and administrative procedures for coordination and control. Although these notions remain true, IT functionality has the potential to drastically modify some of the "basic principles" of business process reform. Professionals and academics agree that the new organizational logic should be based on current and developing IT and IS capabilities. If the processes are not extended outside the target organizational boundaries to explore alternatives for revamping interactions with the other organizations that participate in eventually delivering value to the customer, the benefits of business process redesign are restricted.

Level Four: Business Network Redesign: So far, the three levels have been discussing IT-enabled business change within a single firm. These levels presume that the focus organization's border is fixed or given, either implicitly or explicitly. Even when external businesses — such as suppliers, customers, and other intermediaries — are interconnected, the allocation of business activity across the different organizations remains unchanged. This level, on the other hand, symbolizes the effective deployment of

IT capabilities to redesign the nature of trade among various participants in a corporate network.(Venkatraman, 1994) believes that the true value of information technology for any company is not in refining internal operations (efficiency gains), but in reconfiguring partnerships across expanded business networks to utilize a greater range of talents that will result in superior products and services. Any methodical endeavor to reposition a company has obvious ramifications for the company's business scope - the transformation's fifth stage.

Level Five: Business Scope Redefinition - "What business(es) are we in – and why?" is a common starting point for strategy analysis. The fifth stage of transformation directly tackles the topic, but with a key difference: "What role, if any, does IT play in influencing the scope and logic of business interactions inside the expanded business network?" Newer strategy concepts such as joint ventures, alliances and partnerships, and virtual business networks with a marked emphasis toward a more flexible and fluid corporate scope are replacing older concepts such as economies of scale (within the hierarchy), product-line extension through vertical integration, and mergers and acquisitions that led to increased emphasis on vertical integration. This level focuses on the information technology's enabling role in this trend. Building on the theory of (Venkatraman, 1994) I propose a theoretical framework that describes my research on business transformation of health-tech firms and the role of IT platforms in it.

2.1. Barries in Digital Transformation

Digital transformation is affecting large parts of our society and businesses of all kinds, including healthcare, medicine, agriculture, manufacturing, retail, and so on, enabling new types of innovation, creativity, and business models. Given their past, incumbents will confront obstacles and barriers while looking for and executing business model innovation for digital transformation. They are frequently compelled to cope with conflicts and trade-offs between old and new business models. Several taxonomies and catalogues of digital transformation hurdles have been developed, many of which are based on substantial literature assessments. This section answers the sub research question a. on barriers to business transformation.

In the scope of this research, a barrier is defined to as an obstacle to access(Lammers et al., 2019). When anything hinders or makes it difficult for certain scenarios to occur, it is referred to as a barrier. It is a natural creation or structure that obstructs people from acting or achieving certain aims(Cambridge Dictionary, 2019). Barriers are frequently ranked in order of importance or greatest difficulty to overcome. Barriers are a phenomenon that prevents the occurrence of certain situations. The table

below identifies the literature containing barriers to digital transformation. This research categories the barriers to digital transformation as organizational, knowledge, technological/capabilities and financial to simplify the search process.

Author	Title of the Paper	Type of Barrier identified
(Kutnjak, 2021a)	Covid-19 Accelerates Digital Transformation in Industries: Challenges, Issues, Barriers and Problems in Transformation	Knowledge, technological, organizational,
(Gudergan & Mugge, 2017)	The gap between the practice and theory of Digital Transformation	Organizational, technological
(Ofosu-Ampong, 2021)	Determinants, Barriers and Strategies of Digital Transformation Adoption in a Developing Country Covid-19 era	Finance, Organizational
(Lammers et al., 2019)	Towards a Novel Framework of Barriers and Drivers for Digital Transformation in Industrial Supply Chains; Towards a Novel Framework of Barriers and Drivers for Digital Transformation in Industrial Supply Chains	Technological, organizational, knowledge
(Borovkov et al., 2021)	Key barriers of digital transformation of the high-technology manufacturing: An evaluation method	Technological, knowledge
(Poncette et al., 2019)	How to Overcome Barriers for the Implementation of New Information Technologies in Intensive Care Medicine	Technological, organizational
(Kutnjak & Pihir, 2019)	Challenges, Issues, Barriers and Problems in Digital Transformation-Systematic Literature Review	Financial, knowledge, Organizational, technological
(Vey et al., 2017)	Learning & Development in Times of Digital Transformation: Facilitating a Culture of Change and Innovation	Organizational, knowledge
(Kane et al., 2015a)	Strategy, not Technology, Drives Digital Transformation	Organizational
(Verhoef et al., 2021)	Digital transformation: A multidisciplinary reflection and research agenda	Technological, organizational

(Jones et al., 2021)	Past, present, and future barriers to digital transformation in manufacturing: A review	Financial, knowledge, Organizational, technological
(Pflaum & Gölzer, 2018a)	The IoT and Digital Transformation: Toward the Data-Driven Enterprise	Organizational, technological
(Brink & Packmohr, 2022)	Identifying Barriers to Digital Transformation and Measuring Their Impact - A Mixed-Method Study	Organizational, technological
(Kulkov et al., 2021)	Identifying institutional barriers when implementing new technologies in the healthcare industry	Organizational
(Lluch, 2011)	Healthcare professionals' organizational barriers to health information technologies-A literature review	Knowledge, technological
(Christodoulakis et al., 2017)	Barriers to Adoption of Information Technology in Healthcare	Technological, financial
(Tchao et al., 2011)	Barriers in Adoption of Health Information Technology in Developing Societies	Technological, financial

Table 3: Barries Literature Review

2.1.1.1. Organizational

According to the Cambridge Dictionary's definition, an organization is "a collection of people who work together in an organized way for a shared objective. Organizations are ambiguous, complex, full of surprises, and deceptive phenomenon. The interaction between various people, groups, and organizational departments may have diverse cultures, environments, and goals. Since communication is rarely honest or transparent, or occurs at the wrong time, the organizational barriers may prove to be the biggest barrier for digital transformation. (Kutnjak & Pihir, 2019) includes indifference and mistrust in general as a barrier to digital transformation in an organization. A company's innovation culture and the climate that promotes open communication are key factors in addressing the adjustments required to accomplish digital transformation. When introducing new technologies, an unsupportive organizational culture may act as a barrier. Since the strategy is directly tied to the organizational structure and procedures, strategic factors have been considered while listing barriers to digital transformation. The effective development of digital transformation processes is frequently viewed as being hampered by weak innovation strategies. The degree to which new technologies are compatible with companies' particular processes, practices, and value systems, on the other hand, plays a key effect in the adoption

of new technologies.(Lammers et al., 2019). Apart from these, organizational barriers also include cultural barriers as differences in culture lead to different ways of working(Kutnjak & Pihir, 2019).

The phenomenon of the digital transformation and the pressure it puts on organizations to adapt are described by (Vey et al., 2017). (Vey et al., 2017) identify the following four reasons why the organization has not yet completely acknowledged and integrated the impact of digitization: Lack of creativity and strategy is present, along with rising unpredictability, lack of agility and inadequate support for innovation, a lack of relevant capabilities and inadequate innovation culture, as well as new roles and areas for learning and development. The shortage of time within the organization is yet another recurring organizational barrier that has been raised in the literature. This may be due to a shortage of time allocated to certain tasks like planning or more general time restraints for innovation endeavors(Lammers et al., 2019).

It may be more difficult to communicate inside an organization with more levels of hierarchy, and it may also be more difficult to accomplish goals or make changes within the organization. Making an organizational shift is challenging; it takes place when there is a change from the present state to the preferred future state. In order for incumbents to adapt and remain competitive, new technology can be considered as a vital driver. Employee resistance to organizational changes may be a tricky matter. The management of a change program must thoroughly anticipate and diagnose any potential employee resistance to the change process. Hence, the organizational barriers include change management also. It is necessary for leaders to lead their organizations through the DT process(Brink & Packmohr, 2022). Almost all of literature indicates that poor leadership skills can lead a company nowhere let alone a digital transformation.

In order to successfully implement any data analytics plan, the journey towards digital health transformation necessitates the integration of numerous aspects inside an organization. Without this, the implementation will fail, and the potential advantages won't be realized. It is common to underestimate the complexity of these relationships needed for any given data analytics solution to be implemented successfully.

2.1.1.2. Knowledge

The lack of skills and knowledge is another persistent barrier in the literature. Companies struggle to recruit employees with the necessary skills, both inside and externally. Due to the lack of data scientists and other IT professionals in the organization, the staff is insufficient to execute digital innovation. On the other side, there are times when the market is lacking in certain skills and abilities, or when the

complexity introduced by new technologies necessitates learning new ones. Since there is fierce competition for IT expertise, it might be challenging to find skilled employees (Lammers et al., 2019).Some researchers classify knowledge barriers in digital transformation as a challenge rather than barriers as defining new knowledge and skills and implementing a successful digital transformation begs to possess skills, which is a challenge for most people(Kutnjak & Pihir, 2019). Some organizations still struggle to address the difficulties of digital transformation even with a clear strategy that takes the rapid development of digitization into account and an agile approach to realize and foster innovation. The necessary new processes cannot be carried out if leaders and personnel lack the necessary competencies. When we talk about competences, we're talking about a collection of abilities. Without capable personnel who genuinely comprehend the significance and complexity of digitization, an organizational transformation cannot succeed(Vey et al., 2017). In the study conducted by (Brink & Packmohr, 2022), knowledge, education and strategic understanding are barriers independent to the size of the firm. The study identified that the lack of IT knowledge as a key barrier to digital transformation. Apart from this, lack of technological knowledge, lack of process knowledge, lack of training was also identified as barriers in the study (Brink & Packmohr, 2022). (Kutnjak, 2021b) also stresses that improving knowledge and skills of employees is the need of the hour if the company wants to undergo a successful business transformation. Researchers identify that knowledge barriers are the result of insufficient training opportunities for employees on new technologies. Employees seldom come forward and show enthusiasm for learning new things. This trend has to change. A clear will to learn new things lacks in the employees, which also acts as a knowledge barrier. This is categorized in behavioral barriers to digital transformation by (Gleiss & Lewandowski, 2020)

2.1.1.3. Technological

Although technology is most commonly thought of as a digital transformation enabler, some academics have highlighted another aspect of technology as a digital transformation barrier. Many academics emphasized the problems with outdated technology infrastructure, monolithic legacy systems, and rigid "tailor-made" software, as well as their lack of integration(Tsiavos & Kitsios, 2022). One of the most common technological barriers identified in the literature is the lack of IT infrastructure. The companies attempting digital transformation require a justified set of IT infrastructure to reach their desired company goal(Lammers et al., 2019). Some researchers also use the word capabilities for technologies. Technology capability has been defined as the firm's potential to design and develop new processes, products, and upgrade knowledge and skills about the physical environment in a distinctive way, and

then transform the knowledge into instructions and designs for effectively producing desired performance(Wang et al., 2006). (Borovkov et al., 2021) includes limited capabilities of the enterprise IT infrastructure as a barrier. This is because a radical modernization including complete replacement of IT infrastructure is required for digital transformation. When companies decide to change their goals and business models by adopting new technologies, integrating digital technologies with existing IT systems in the company is also a barrier for most of the players in the game. In some cases, partial modernization is required that is, a transition to a new software products or IT solutions. In the healthcare sector, this is a crucial barrier as the definition of providing healthcare is changing as we move towards a digital age. Incumbents providing healthcare services are seeking IT technologies that help them serve their customers, in this case, patients in more comfortable way. This does not only means treating patients but also undergoing a holistic development in terms of data collection, record keeping, and automation of business processes. Another technological barrier identified is companies still using technologies with low levels of automation in their business, operating and manufacturing processes by clinging to their legacy technologies because they still work(Borovkov et al., 2021). On the contrary some researchers argue that major barriers to digital transformation were a lack of a successful plan and technology disruption—the notion that new technology replaces older technology. Because of this, while many organizational leaders are concerned regarding technology, the strategy of how to implement what technology and when is another major barrier to successful transformation(Borangiu et al., 2019). Apart from the these, some other technological barriers present in the literature are software defined networks, resource and product virtualization, integration, communication, and control technologies(Jones et al., 2021).

2.1.1.4. Financial

Financial concerns are some of the most prevalent barriers to digital transformation in the literature. The high cost of system modifications falls under this category and is the most frequently mentioned barrier(Hjalmarsson et al., 2014). Generally speaking, this refers to the high expenses associated with innovation and investment, but it also includes high costs associated with the use of digital tools, the setup of equipment, and execution(Peansupap & Walker, 2005). All of these things point to the reality that businesses believe the expenses of using digital technology are too high. Lack of funding, whether internal or external, is another typical barrier that businesses encounter (meta-level). The term "lack of internal funding" refers to a limited budget for digital innovation, which also covers team development

and research and development. On the other side, a lack of external finance involves a lack of both venture capital and state subsidies and aid. As a result, the accessibility of outside financing, including government assistance, has been cited as an enabler(Pflaum & Gölzer, 2018). Finally, the return on investment is a different financial category. Cost-benefit evaluations can act as a barrier to create in some circumstances, and these uncertainties are brought on by the dearth of established business cases supporting the investment. In other instances, the issue is unrelated to the ambiguity surrounding the ROI. However, the demand for an immediate return or short-term economic and financial policies provides a barrier. Digital infrastructures need significant financial resources with long-term returns and comprehensive business process reform. They are also often huge and difficult to control as organizations that fall under the purview of digital transformation have significant financial needs that must be met. (Kutnjak & Pihir, 2019). Investments are needed for IT advances, not just for the infrastructure, but also for the growth of implementation-related knowledge and skills. They will receive the necessary tools for implementation success as well as inspiration to invest in their professional growth and job security. Financial challenges with digital innovations range from verification problems to unaccounted-for public funds. Researchers claim that the lack of evidence of a return on investment puts healthcare providers at risk and prevents innovators from entering the market. Uncertain refundability of digital innovations is a critical problem related to this barrier. The lack of public funding and governmental financial support for digital breakthroughs has been noted as an issue by researchers. Costs are a barrier since they can be prohibitive in the form of high implementation costs and can be challenging to forecast when it comes to total lifecycle costs. Additionally, there are generally not enough (external) financial incentives to introduce and exploit digital advances in healthcare(Gleiss & Lewandowski, 2020).

2.2. Enablers of Digital Transformation

This subsection identifies enablers of digital transformation in the given literature and answers the sub research question a. on enablers of business transformation. Cambridge dictionary defines and enabler as “something or someone that makes it possible for a particular thing to happen or be done”. For example, Information technology is an enabler, but not the whole solution. This research dives into the literature available on enablers of digital transformation and attempts to categorize these enablers by ranking them to the highest impact. The below table captures various authors and articles that discuss the enablers of digital transformation.

Author	Title of the Paper	Type of Enabler identified
(AlNuaimi et al., 2022)	Mastering digital transformation: The nexus between leadership, agility, and digital strategy	Strategy, People
(Schwertner, 2017)	Digital transformation of business	Strategy, technology, processes, data
(Lorentzen, 2021)	Digital transformation as distributed leadership: Firing the change agent	People
(Spoladore & Pessot, 2022)	An evaluation of agile Ontology Engineering Methodologies for the digital transformation of companies	Process
(Cavalcanti et al., 2022a)	Drivers of digital transformation adoption: A weight and meta-analysis	People
(E. Weber et al., 2022)	How to take employees on the digital transformation journey: An experimental study on complementary leadership behaviors in managing organizational change	People
(Guinan et al., 2019)	Creating an innovative digital project team: Levers to enable digital transformation	People
(Schwarzmüller et al., 2018)	How Does the Digital Transformation Affect Organizations? Key Themes of Change in Work Design and Leadership	People
(Saleem Ayaz & Shaukat, 2021)	Use of Agile Methodologies in Digital Transformation	Process
(Imran et al., 2021)	Digital Transformation of Industrial Organizations: Toward an Integrated Framework	People
(Schallmo et al., 2017)	Digital transformation of business models-best practice, enablers, and roadmap	Technology, Data
(Kostakis & Kargas, 2021)	Big-data management: A driver for digital transformation?	Data

(H. Li et al., 2021)	Organizational mindfulness towards digital transformation as a prerequisite of information processing capability to achieve market agility	People, Technology
(Wu et al., 2021)	Unraveling the capabilities that enable digital transformation: A data-driven methodology and the case of artificial intelligence	Technology
(Sanchis et al., 2020)	Low-code as enabler of digital transformation in manufacturing industry	Technology
(Chaˆlons & Dufft, 2017)	The Role of IT as an Enabler of Digital Transformation	Technology
(Verina & Titko, 2019)	Digital transformation: conceptual framework	Strategy, technology, data, people, process
(Konopik et al., 2022)	Mastering the digital transformation through organizational capabilities: A conceptual framework	Strategy, technology, data, people, process
(Kane et al., 2015a)	Strategy, not Technology, Drives Digital Transformation	Strategy

Table 4: Enablers Literature Review

2.2.1. Strategy

Many researchers argue that it is not technology but strategy that drives digital transformation(C. Matt et al., 2015) (Hess et al., 2016). Others go out on a limb and say that IT does not matter at all in early-stage companies, and they fall in the trap of focusing on technology rather than strategy. On the other side, digital technologies are more clearly being employed to meet strategic goals in maturing companies(Kane et al., 2015). As large organizations undergo transformation, the emphasis switches from purely company management to a stronger long-term strategic vision that enables organizations to define their place in the value network. Organizations can increase their resilience by participating in robust ecosystems that are defined by strategy as business areas are vulnerable to rapid and constant changes as a result of the digital transformation(Konopik et al., 2022). Although digital transformation presents potential for today's businesses, it is a complex process that many academics and practitioners find difficult to understand since it requires technology, a clear vision, and a comprehensive digital strategy to carry out the required steps. In other words, digital transformation necessitates focused

organizational restructuring and has an impact on the performance-adjusting measures. The key to success in digital transformation has been creating a digital strategy that incorporates corporate and business plans(AlNuaimi et al., 2022).

2.2.2. Process

A company's strategy and processes go hand in hand. If the strategy sets a goal for a company, processes are the one responsible for the execution of goal. Digitalization of business process has an impact on how digital transformation is structured. It can either be positive or a negative impact depending on the change that the organization is going through(Henriette et al., 2016). The operational processes are important in integrating organizations who aim to transform digitally as great knowledge about processes can benefit innovation incrementally and the ability to interconnect processes between the organization can enable transformation(Konopik et al., 2022).

2.2.3. People

Contrary to popular belief, people are the most important enabler of digital transformation because, even though technology advance quickly, what counts most is whether or not people are using them. Further research on how rapidly individuals adopt disruptive technology is necessary because companies frequently require more time and flexibility to change than individuals do(Cavalcanti et al., 2022b).

Initiatives for digital transformation tend to fail. However, research have not systematically evaluated the impact of leaders on organizational change, particularly with regard to organizations. Research highlights leadership as a cornerstone to transformation success.

2.2.4. Technology

Digital technologies significantly trigger digital transformation. Digital technologies come in a wide range of types, from deep learning and AI to IT and big data analytics. Despite their differences, they all have a few key characteristics in common that make them general-purpose technologies, including the ability to be reprogrammed, homogenized data, pervasiveness, self-referentiality, layered architectures, and automation of data generation from a variety of sources, including sensors and machine learning algorithms. Organizations are always under pressure to adapt their business models, products, services, and processes as a result of the quick spread of digital technologies. Although studies on digital technologies concur that the digital era has, beyond comparison, led to technology-enabled transformation, new technology always entails change(Wu et al., 2021).

2.2.5. Data

(Schallmo et al., 2017) mentions digital data as one of the enablers of digital transformation. Digital data is defined as collection, processing, and analysis of digital data to facilitate and enhance forecasts and decision-making(Schallmo et al., 2017). To handle the growing amounts of data and modify the storage techniques across organizational units, the transforming mechanism must have data capabilities. Data capabilities are particularly crucial for providing data-driven insights to all other business areas. Organizational transformation requires the existence of capabilities for data management, data interpretation, data analysis, and data security(Konopik et al., 2022). Businesses must understand the underlying worth and advantages of data in the age of big data.

To assure viability and achieve a competitive advantage in uncertain circumstances, they must adapt their strategies in order to get the full spectrum of information and knowledge from processing massive volumes of data, such as big data(Kostakis & Kargas, 2021). Making wise use of this increasing data volume is essential because it forms the basis for process optimization, operational and strategic decision-making, and company innovations, as well as the personalized enhancement of the customer experience. Businesses must be able to assemble and store this volume of data from various sources centrally, analyze it in real time, and make it available for a range of applications(Chalons & Dufft, 2017). Nowadays, IT systems at hospitals should focus mainly on data management, including data collection, data sharing, data presentation, preserving security and privacy while providing the data infrastructure required to leverage data analytics for both managerial, clinical and medical purposes. It is precisely the availability of high quality, relevant and shareable data, one of the factors digital healthcare transformations and consequently IT systems have become the core of the ongoing paradigm shift in healthcare.

2.3. IT Technologies in Healthcare

The delivery of healthcare is changing from being primarily focused on hospitals to being more virtual and distributed, utilizing the newest technologies in areas such as information technology, artificial intelligence, deep learning, data analytics, and home healthcare thereby leading to fundamental changes that will affect the healthcare sector in the future. A seamless continuum of care will be used to deliver healthcare, moving away from the clinic-centered point-of-care approach and putting more of an emphasis on early detection and prevention(Wehde, 2019). The processes of disease diagnosis, treatment, and prevention are all part of the complicated healthcare system. More than any other force, technology is the engine of healthcare. Healthcare technology advances quickly from cutting edge to mainstream. Some of these technologies will alter healthcare delivery and completely alter how we think about health and illness. Even if new healthcare technology won't solve

all of the industry's issues, they can help with management, practice, and decision-making process in the healthcare sector(Sadiku et al., 2019). This section sheds light on various technologies in e-Healthcare to answer the sub research question b on which are various IT technologies used in healthcare to enable digital business transformation.

2.3.1. Remote patient monitoring

Remote care that is digitally enabled is becoming more and more prevalent. A growing corpus of research indicates that telemedicine-delivered treatment can sometimes produce better results than traditional face-to-face care in terms of safety and effectiveness(Kaye et al., 2020). Researchers identify remote patient monitoring as an archetype of digital transformation(Binci et al., 2021). As the world evolves toward remote monitoring, real-time, and quick disease identification, remote healthcare is an expanding research area. Remote patient Monitoring has advanced to use wearable technology and implantable gadgets, such as sensors built into cellphones and applications. A digital transformation network was recently established by the American College of Cardiology to enable digital navigation and remote patient monitoring for many cardiovascular conditions(Atreja et al., 2019). There are various subcategories of remote healthcare (such as telehealth and mobile health), all of which refer to using technology to monitor patients outside of a hospital setting. the ability to continuously monitor patients, the ability to prevent illness worsening and premature deaths, the ability to obtain more accurate readings while allowing patients to go about their daily lives as usual, the improvement of healthcare service efficiency through the use of communication technology, emergency medical care, and service for the elderly are all benefits of remote patient monitoring. Systems for remote patient monitoring are made to collect various physiological data from patients. The most frequent measurements include blood pressure, body/skin temperature, electrocardiogram (ECG), electroencephalogram (EEG), heart rate, respiration rate, oxygen volume in blood or pulse oximetry, signals from the neurological system, and blood glucose level. In addition to these, the patient's weight, activity level, and sleep patterns are also recorded(Malasinghe et al., 2019). Telemonitory or remote monitoring is A cutting-edge tactic to promote health and enhance patient management and care Clinical feedback is provided by digitally transmitting disease-related and physiological data on the patient from their home to a medical facility by phone, internet, or videoconferencing. It enables early illness decompensation diagnosis, allowing for early interventions and a decrease in mortality and hospitalizations, as well as patient education, enhancing self-management. Since technology has experienced so many changes, telemedicine is now widely used. Intelligent sensors, wearable or handheld devices, cell phones with Internet access, and implanted monitoring devices are all commonplace in today's world. The significant number of telemonitoring-related articles over the previous ten years demonstrates the growing significance of technology in healthcare(de Farias et al., 2020).

2.3.2. Electronic Health Records

Similar to other industries, healthcare has seen significant benefits from digital transformation, with the adoption of new technologies helping to deliver secure, high-quality patient care and drive greater business efficiency. Electronic Health records is among the digital services that have been integrated into the extensive IT systems of many healthcare organizations(Haggerty, 2017). The digitalization of medical records, which are today referred to as electronic health records, was the first information technology wave to affect the art and science of healing in medicine. Combining information from various sources, including electronic health records, has the potential to revolutionize medical practice by enhancing healthcare delivery, efficiency, and quality while lowering costs(Burgos, 2013). Electronic health record is a patient's paper chart gets converted to digital form. EHRs are patient-centered, real-time records that securely and promptly make information accessible to authorized users. An EHR system is designed to go beyond the typical clinical data collected in a provider's office and can be inclusive of a broader view of a patient's care, even though it does contain the medical and treatment histories of patients. An essential component of health IT, electronic health records (EHRs) can include a patient's medical history, diagnoses, prescriptions, treatment plans, dates of immunizations, allergies, radiological pictures, and results of lab and test work. It can automate and improve healthcare providers workflow while granting providers access to evidence-based tools for decision-making regarding a patient's treatment. One of the fundamental characteristics of an EHR is the ability of authorized clinicians to create and manage health information in a digital format that can be shared with other physicians across multiple health care organizations. EHRs incorporate data from all doctors involved in a patient's care since they are designed to communicate information with other health care providers and organizations, such as laboratories, specialists, medical imaging facilities, pharmacies, emergency facilities, and school and workplace clinics(HealthIT.gov, 2021). Authors identify some challenges including the standardization of how electronic health records are integrated into the workflow of medical practices, the development of capacity through the optimal use of champions, and the coordinated funding of the digital transformation transition and sustainability but also find advantages that are anticipated include improved support for medical decisions at all points in the patient journey, patient empowerment through virtual dossiers containing clinically significant information, increased vendor potential for implementing cutting-edge tools to support continuity of care, and a faster pace of evidence-based research(Katehakis & Kouroubali, 2022). Senior managers, clinical leads, information technology teams, and project management teams must completely address important operational and strategic concerns if an EMR is to be implemented across the whole hospital. By using high tech computational techniques that enable extensive data collection, EHRs may improve the acquisition of new knowledge through the automated and methodical analysis of unstructured data(Burgos, 2013). In order to ensure that the electronic health records is fully adopted and used to its full potential by clinician users in an ongoing digital transformation of care, using an issues checklist may help prevent any one issue from being accidentally overlooked or underemphasized during the planning and implementation stages(Scott et al., 2019).

2.3.3. Digital Platforms

Existing health tech companies have introduced digital platforms to increase their competitive edge over newcomers and preserve profitability to stay up with the current digital transformation(Pundziene et al., 2022). The digital infrastructure that offers a standard set of design and governance guidelines to support interactions between numerous users is referred to as a "digital platform." Typically, the way users access markets and consume goods and services is changed by digital platforms(Gawer, 2014). The optimal and most affordable answer to all the nagging issues with health care delivery is provided by digital platforms and the technology associated to digital health. They motivate people to alter their health-related behaviors and ways of living. People can communicate with healthcare practitioners and access "medical" and "health information" thanks to digital platforms and websites. Through these digital platforms, service providers may track, gauge, and visualize the human body, and consumers can exchange private information and first-hand accounts(Rasul & Kakti, 2021). Although, Healthcare organizations are urged to shift their focus from supplying one product to one sort of consumer toward providing digital healthcare services to several parties working in the ecosystem as they build a digital healthcare platform business(Vlckova & Thakur-Weigold, 2020). This is difficult to do, though, as healthcare companies face particular difficulties, for example, they must develop new digital platform innovation capabilities while also sustaining their current product innovation practices. They must also shift their attention from internal to external resources in order to create a network of partners and complementors and seek out network effects(Tronvoll et al., 2020). Healthcare organizations need to be aware that the digital platform business does not simply match the dynamic capabilities of the core business. Building a special set of dynamic skills can help Healthcare technology incumbents take advantage of the digital healthcare platform market and increase their edge over competitors(Pundziene et al., 2022).

2.3.4. Telemedicine

One of the industries with the fastest global growth is healthcare. The demand for collaboration between healthcare sectors and all stakeholders, both within the healthcare ecosystem and in related businesses, has expanded due to the ever-growing importance of technology, patient care, regulatory compliance, and digital transformation. Telemedicine has been shown to offer high-quality, reasonably priced, and primarily adaptable healthcare services(Abugabah et al., 2020). Telemedicine is as an affordable way to make specialist skills and healthcare services available to patients who live in rural areas and socially isolated groups and has shown potential for digital transformation in healthcare (Quévat & Heinze, 2020). In rural, sparsely populated areas with a lack of medical workers, telemedicine technology makes it easier to manage health services and give urgent medical support. It also improves access to care and quality while being economically efficient. Because it provides for much better

access and quality, using contemporary techniques in the area of information and communication technology is particularly relevant for emergency medical care(Sayganov et al., 2020). Healthcare is being revolutionized by telemedicine in almost every professional and technical activity. In this new environment, medical care is transitioning from the physician-centered model, where the doctor is the only party responsible for defining a medical problem and its care, to a new model of shared responsibilities, where consumers make health-related decisions alone or in groups with the help of a variety of practitioners, informational sources, and decision-support tools(Rodrigues, 2000). Telemedicine services have the potential to lower service supply costs while also improving people's quality of life. They constitute a significant but understudied class of complex services that involve a wide range of actors participating in networks of service value. These complicated services are characterized by lengthy service delivery durations and often combine information technology (IT) services with non-IT services that are extremely person oriented. It is especially challenging to develop profitable and long-lasting business models in such a setting, which are essential for the broad delivery of telemedicine services(Peters et al., 2015).

2.4. Theoretical Framework

As the significance of theory-driven thinking and acting is emphasized in relation to the choice of a topic, the development of research questions, the conceptualization of the literature review, the design approach, and the analysis plan for the dissertation study, the theoretical framework is one of the most crucial aspects of the research process. The theoretical framework serves as the thesis's overall "blueprint" for investigation. It gives the framework for defining your philosophical, epistemological, methodological, and analytical approaches to the dissertation as a whole, as well as the foundation on which to develop and support your study(Grant & Osanloo, 2014). The aim of this research is to identify the barriers and enablers to digital transformation and the role of IT technologies in business transformation process in the healthcare sector. This theoretical framework is built on resource-based theory which suggests that a corporation is best positioned for long-term success if it has access to resources that are valued, uncommon, challenging to duplicate, and non-substitutable. These strategic assets can serve as the cornerstone for the growth of business capabilities that, over time, may result in improved performance. To bundle, manage, and otherwise use resources in a way that adds value to customers and gives an advantage over rivals, capabilities are required(Wernerfelt, 1984). Resources are anything a corporation controls to understand and put into practice tactics intended to increase efficiency and effectiveness. In resource base theory, resources include assets, business processes, capabilities, the firm's attributes, knowledge, information, etc(Barney, 1991).

It is necessary to point out the purpose of each word in research while creating a theoretical framework. In this case, IT technologies are the resources acquired by the company which have been

identified as the independent variable. This is because IT is a form of technology. This technology is facilitating a phenomenon that is business transformation. Hence, digital business transformation is taken as the dependent variable. This theoretical framework provides a roadmap to this research by portraying the relationship between the independent variables and the dependent variable.

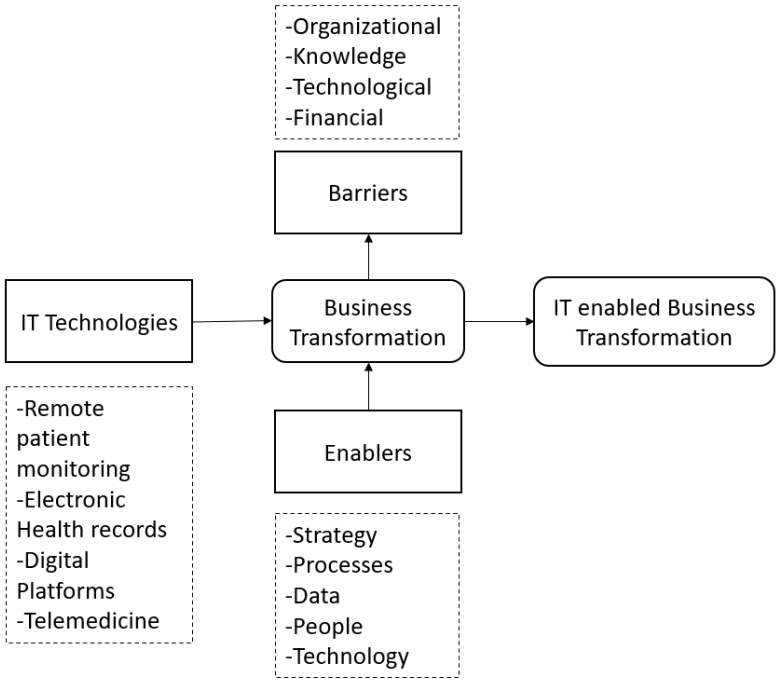

Figure 5 Theoretical Framework

The IT technologies identified in section 2.3 gives an overarching idea of IT technologies that can help companies digital transform. The IT technologies include remote patient monitoring, electronic health records, digital platforms and telemedicine. For the purpose of case study, these technologies are used as reference to approach the acquisitions made by Philips offering similar technologies that are part of Philip's digital transformation portfolio. The literature has also identified several barriers that hinder business transformation of companies. As these barriers are affecting the phenomenon, barriers of digital transformation are taken as moderating variables. In the Figure 5, the arrows points from business transformation to barriers as barriers have a negative impact on the phenomenon. While another moderating variable is also established as enablers which points to the business transformation, which by definition has a positive impact on the phenomenon. The literature review has helped to identify various barriers and enablers which are listed in the theoretical framework. The main barriers identified are organizational, knowledge, financial, and technological. On the other hand, the enablers that help accelerate the phenomenon of business transformation are strategy, process, data, people and tools.

Chapter 3. Methodology

Researchers contend that the real applicability of a research method arises from the nature of the social phenomena to be investigated. The choice of which approach to use depends on the nature of the research problem(Morgan & Smircich, 1980). This research question in this study discusses the phenomenon of digital transformation in the healthcare sector using IT technology as the enabler of the phenomenon. The research questions are designed to ask “how” and “what” questions. To answer these questions, (Hartley, 2015) suggests case studies are ideal for examining novel processes, unsophisticated behavior, or both. According to(Yin, 2003), a case study involves asking "how" about a current collection of occurrences over which the researcher has little to no control. The goal of using a case study is to learn as much as you can about a person, event, or process in-depth. Yin (2003) proposes that the phrase relates to an event, an entity, an individual, or even a unit of study when defining what a case is. It is an empirical investigation that examines a current occurrence in the context of actual life using a variety of sources of evidence. Consequently, the method is especially helpful for explaining the how and why of a current collection of events. Researchers have also claimed that some information types can be challenging or even impossible to handle using methods other than qualitative approaches like the case study(Leonard-Barton, 1990). The ability to view the process holistically is one of the benefits of case study research, according to (Gummesson, 2000). The detailed observations entailed in the case study method enable us to study many different aspects, examine them in relation to one another, view the process within its total environment, and also use the researcher’s capacity for ”verstehen”.

In order to "give an examination of the context and processes which illuminate the theoretical issues being addressed," case study research, according to (Hartley, 2015), "consists of a careful investigation, typically with data collected over a period of time, of occurrences, within their context." A case study is not meant to be an organization-wide analysis. Instead, it aims to concentrate on a certain problem, characteristic, or analytical unit. Case study methodology was selected in order to comprehend and analyze the procedures of training activities in firms. One can comprehend the intricate real-life actions where numerous sources of evidence were utilized thanks to this methodology. It is especially useful to use case studies to examine an area of interest in depth(Baharein & Noor, 2008).

Some have criticized case studies for lacking scientific rigor and reproducibility and for failing to address generalizability difficulties. The case study does have certain advantages, though. Since numerous sources of evidence were used, it, for instance, helps the researcher to have a comprehensive understanding of a particular phenomenon or sequence of events and can present a complete picture.

Another benefit is that case studies are effective at capturing the emergent and immanent characteristics of organizational life as well as the ebb and flow of activity, particularly in situations where change is occurring quickly. Case studies also allow for generalizations because several cases can produce results that can be replicated in some way(Johnson, 1994). There are three different kinds of case study research, according to(Yin, 2003): exploratory, descriptive, and explanatory. Case studies are sometimes just used for exploratory purposes by researchers in business-related fields.

The research methodology as explained by (Collins & Hussey, 2013)in their book; defines the overall approach to the research, beginning with the theoretical framework, moving to the data collection and its analysis. An interpretivist paradigm has been chosen for this study based on the research question and the nature of the problem. Positivism and interpretivism are the two research paradigms that predominate in the social sciences(Collins & Hussey, 2013). A positivist seeks to gain knowledge by identifying the facts and causes behind the social phenomena and does not account for the subjective view of the participant or actor, in contrast to an interpretivist who seeks knowledge based on the participant's or actor's own perspective while attempting to understand the underlying social phenomena.

Since the effects of barriers and enablers to the Digital Transformation on businesses had not received much attention in the literature, the study started by looking at relevant articles and journals. Not only this but the phenomenon of business transformation is a novel concept and academia is still researching the concept. In this case, this research uses an exploratory research approach. Exploratory research is the process of looking into a problem that hasn't been properly examined or addressed before. Exploratory research is typically done to gain a deeper knowledge of the issue at hand, but it typically doesn't produce a definitive answer. When attempting to become familiar with an existing phenomenon and gain fresh insight into it in order to define a more specific problem, researchers undertake exploratory research. It starts with a broad concept, and the research's findings are then used to identify issues that are pertinent to the study's topic. Exploratory research is essential to this study and can bring valuable and perceptive information to it. Exploratory research gives the researcher the freedom to use their imagination to learn as much as possible about a subject. This research will also involve an outside audience, so this is a perfect chance for the researcher to learn what approaches are effective and which ones are not. Thirdly, it facilitates a clearer grasp of the goals that should guide a researcher during the course of a project. Anyone performing research from outside sources will benefit from keeping this information in mind. The exploratory research method changes depending on whether new information or insights are discovered. The results of this research, which are also known as interpretative research

or grounded theory method, answer what, how, and why questions. As the concept of digital transformation is new, an exploratory approach to this study will open doors for researchers by thinking in a creative way to approach the phenomenon.

A descriptive exploratory qualitative study is conducted after the study in order to further the information and take into account the results. By posing fresh queries and viewing the findings from a fresh perspective, the interviews will aid in the pursuit of novel insights. This will support the theory and help to clarify the challenges that businesses today are having with digital transformation.

This study is regarded as a knowledge-seeking investigation in which the gaps that have been found are filled in order to generate new knowledge and close the knowledge gaps that exist in the fields of current research on the digital transformation.

This study has been organized and created in accordance with the research objectives, after recognizing the nature of the issue and examining the literature. This is accomplished by returning to the Chapter 1 research question and objectives.

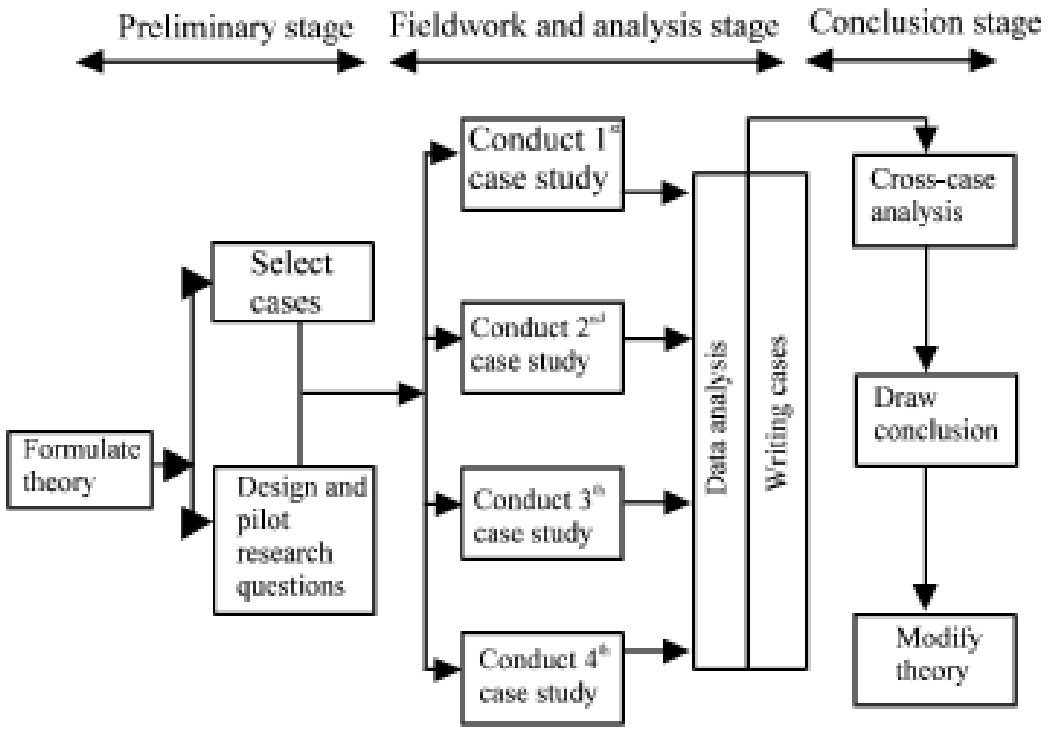

Figure 6 Stages of Case Study approach (Baharein & Noor, 2008)

In this research, a descriptive case study approach is used. An intervention or phenomena and the surrounding circumstances are described in this type of case study. In this case, the phenomenon being digital transformation in the real-life context of health-care industry. I used a descriptive case study

approach in my research, recording observations made in four different businesses. the full case studies research study method as shown in Fig 7.

3.1. Design of Interviews

In order to follow the explorative nature of the research, interviews are chosen as a measurement tool. Given the objective of this research, a semi-structured interviews are conducted by deriving questions from the elements of the theoretical framework. In semi-structured interviews, the questions are pre-planned before to the interview, but the interviewer uses open-ended questions to offer the interviewee the opportunity to expound and explain specific concerns. This kind is suitable for researchers who have a general understanding of their subject so they can pose queries. However, they do not favor using a structured style because it can limit the variety and depth of the responses (Bryman, 2008). It has therefore been advised that these open-ended questions be piloted beforehand (Dörnyei, 2007). The benefit of interviews is that they typically produce a lot of data in a short amount of time. In addition, because the interviewer can actively watch this, there is a lower danger of questions being skipped in interviews than questionnaires. However, processing, analyzing, and generalizing interviews takes significantly more time. The interviewer also needs to be adept at active listening since they must focus on the meaning and content of what is being said. The interviewee's tone of voice and hand gestures might give the information they share in the interview a completely different connotation (Velde et al., 2004). The interviewer also has the opportunity to ask follow-up questions based on responses from the interviewee.

To get high-quality qualitative data, a reliable interview protocol is essential. Through the preceding delimitation of the issues to be addressed, it facilitates the interview process involving multiple groups of people in a methodical, consistent, and thorough manner. Additionally, by ensuring thorough information is gathered within the allotted time, an interview protocol improves the effectiveness of the interview process. The researchers can better comprehend the respondents' experiences and pinpoint key components that are pertinent to the topic by using rich qualitative data(Yeong et al., 2018). Before being regarded as a reliable tool, the interviewing instruments must pass reliability and validity testing. The quality of the study findings is the most crucial indicator of validity and reliability in qualitative studies(Golafshani, 2003). To check the validity of the research, researcher can ask himself a simple question is “whether the intended object of measurement actually is measured.” Although some researchers argue that in qualitative research, there is nothing to measure as it looks for a certain quality

which is typical for a phenomenon or makes the phenomenon different from others. Hence, to check the validity in the qualitative research, the question would be “if the observation made visible is covered by some quality in the concept eventually created as a result of the study”(Eneroth, 1984).

The question of "how to formally verify validity in qualitative research" is one that Skyes (1991) attempts to address by drawing a contrast between a study's results' generalizability and its data validity. If you have "excellent data," the validity of the data is primarily determined by the study's objectives. Qualitative research is well prepared for this aspect of the validity problem. The contact between the researcher and the respondents creates conditions that increase the likelihood of obtaining good data—that is, data that provides the information required in accordance with the aim. This implies that a statement's intended meaning may be managed and that problems can be explained and approached from several perspectives. Less significant concerns can be shortened, while more significant ones can be thoroughly discussed. It can be argued that quantitative methods trade information quality for standardization(Skyes, 1991). The solution to the question of how to generate good validity in qualitative research is actually quite simple. One is interested in knowing another person's reality based on a certain problem area in order to better grasp a social phenomenon. This indicates that if the informant is a member of the problem area and is given the chance to talk freely in accordance with his or her own knowledge frameworks, the explanation of the phenomenon is valid. Therefore, by employing the method of non-forcing interviews with well-chosen informants, validity is attained(Stenbacka, 2001). For this research, a strict interview protocol is followed by carefully choosing the interviewees to attain high validity.

In case of qualitative research of exploratory nature researching about a phenomenon like business transformation with little information, it is easy to test the face validity of the research. Face validity is significant since it is an easy method for evaluating a test's or a technique's overall validity. It's a rather simple, fast, and straightforward technique to begin determining whether a new metric seems useful at first glance. Any reviewer of your measure who believes it appears to be measuring what it should think it has good face validity. Someone assessing your measure might be perplexed about what you're measuring and your rationale if it has low face validity. Your measure must be clearly relevant for what it is assessing, appropriate for the participants, and sufficient for its goal in order to have face validity. The face validity of this research can be determined by asking if the respondents of the research understood the questions. Construct validity plays a crucial role in research design as it is the degree to which the research instrument genuinely measures what it is intended to assess. As mentioned before, the research instrument is semi-structured interviews. This research aims to get a deeper understanding of various barriers and enablers to business transformation at Philips and the role of IT technologies in healthcare industries as one the enablers to business transformation.

To ensure the construct validity of this research the interview questions are designed for the interviewee to comment on each element of the theoretical framework. The questions asked in the interviews relate to each block of the theoretical framework, and also the relationship between the blocks. The construct that needs to be validated from the theoretical framework is business transformation, which is identified as the dependent variable. The independent variables that affect the dependent variables are barriers, enablers and IT technologies. Interviewees are asked what and how questions in a semi-structured manner to gain insight on the relationship between dependent and independent variables.

In parallel with construct validity, in qualitative research content validity is also necessary to take into account while measuring the validity of research. Examining a test's content validity determines whether it is representative of the construct in its whole. A test, survey, or measuring method's content must include all pertinent aspects of the thing it seeks to measure in order to yield reliable findings. The measurement's validity is harmed if some components are absent (or if unnecessary components are added). Pointing towards the theoretical framework, all factors in the framework are accounted for in the semi-structure interview questions and are directed towards respondents who contribute towards implementing business transformation as part of their day job. This sample is representative of a bigger group of all the employees of Philips who are part of the business transformation department and work with IT technologies in the medical sector.

To ensure the validity of the research, the questions are divided into three themes related to IT enabled business transformation, enablers and barriers. See below the questionnaire for interview related to each theme.

Questions based on IT enabled digital transformation:

1. How do you define business transformation?
2. What is the goal of business transformation
3. In which direction do you think Philips's business transformation is heading?
4. What is IT technology does your company offer to Philips?
5. How will the IT technology enable core business at Philips?
6. How are the IT technologies of your company facilitating the business transformation at Philips?

Questions based on enablers:

1. What are the enablers of digital transformation?
2. Can you rank the following enablers in the order of highest (1) impact to lowest (5) impact on implementing digital transformation?
    a) Strategy
    b) Process

c) Data
d) Technology
e) People

Can you give reasoning for your ranking of each enablers?

3. How is your company's IT strategy aligning with Philip's business transformation into a healthcare company?
4. Are your business processes standardized? If yes, how do you standardize your business processes?

Questions based on barriers:

1. What are the barriers in implementing digital transformation?
2. Can you categorize these barriers?
3. Can you rank the following barriers in the order of highest (1) impact to lowest (4) impact on implementing digital transformation?
    a) Organizational
    b) Knowledge
    c) Finance
    d) Technological

    Can you give reasoning for your ranking of each barriers?
4. How can you overcome these barriers?

To ensure the reliability of the interviews, an interview protocol has been developed. This makes the measurement systematic and not coincidental. The reliability of the measurement instrument is defined in terms of repeatability; if you repeat a measurement on the same object, you should get the same results (Velde et al., 2004). The interview protocol involved sending the consent form to the interviewee. This consent form included the title of the research, the objective of the research, theoretical framework and explanation, and the interview questions. In this way, proper consent of the respondents is obtained and also an idea of the research is presented to the interviewees. Once the interview is started, interviewees are asked for their consent to record the interviews and take notes while the interview is conducted. These audio recordings are converted into transcripts which are used as raw data for data analysis. To make the data analysis highly reliable, a content analysis approach is used where the transcripts of the interviews are coded which is further discussed in section of Data Analysis.

3.2. Unit of analysis

It is crucial to interview a diverse range of participants while conducting interviews as part of this type of explorative investigation. The interviews were therefore chosen based on their role and history within the Philips organization, as well as their experience and particular field of employment. Experts from different businesses inside Philips have been chosen for the interviews in order to ensure a good diversity of candidates. The snowball method was applied to expand the pool of interview applicants. The snowball strategy involves current study participants finding new study participants from their social networks. Creating an interview procedure is a good method to ensure the reliability of the research. The measurement must be methodical, not random. Repeating a measurement on the same object should yield the same results, which is essentially how reliability of an instrument is characterized (Velde et al., 2004).

Philips executives who are implementing transformation projects and thereby necessitating some level of organizational change provided the data for this study and act as the unit of analysis. The unit of analysis is divided into two categories, one who are part of the business transformation department and act as leaders in the respective case chosen of the company for this study. While the other group belongs to IT and R&D experts who work in the companies selected for the case study for this research.

The interviews began with a discussion of the definition of digital transformation and moved on to a discussion of the Philips respondents' perceptions of barriers and facilitators. The objective was to record and analyze the many constraints and openings that respondents believed were essential to Philips' transformation ambitions. The theoretical framework that was previously developed through the literature review served as an overview and guide.

Sr. No.	Designation	Department	Date and Time of Interview
Interviewee 1	IT BP M&A and Divestments	Group IT-PIO-M&A and Divestments	29-07-2022 10:00 am
Interviewee 2	E2E Transformation Leader	Business Transformation E2E Transformation	01-07-2022 09:30
Interviewee 3	E2E Project Mgt & Project Manager	Business Transformation E2E Transformation	01-07-2022 13:30

Interviewee 4	Contingent Worker IT	Group IT GIS Work	04-07-2022 10:00
Interviewee 5	Head of Business Transformation IGT Clus	Group Business Transformation	11-07-2022 11:00
Interviewee 6	Informatics R&D Lead	PD US R&D NPI Excellence	13-07-2022 09:30
Interviewee 7	IT Business Partner – M&A and Divestment	Group IT PIO-M&A and Divestments	13-07-2022 11:00
Interviewee 8	Global Change Management Practice Leader	Business Transformation PBS Transformation	13-07-2022 16:30
Interviewee 9	IT Director	Mergers and Acquisitions at Philips	13-07-2022 17:30
Interviewee 10	Business Development Lead	Commercial Integration, Philips Connected Care	19-07-2022 11:00
Interviewee 11	Head of Business Transformation	Royal Philips	12-08-2022 10:30

Table 5: Unit of Analysis

3.3. Data Analysis

This study uses (Miles & Huberman, 1994) description of a widely used general procedure for analyzing qualitative data to help conduct your analysis in a systematic manner that can be explained in a dissertation or thesis. This method is useful because it is not dependent on a specific method of data collection. Their recommendations are based on a thorough review of the literature, a poll of researchers who use qualitative inquiry techniques, and an analysis of the instances and exhibits the respondents offered that demonstrated how they utilized their approaches. They came to the conclusion that there are three simultaneous processes involved in qualitative data analysis that are analyzing the data, reducing and displaying the data, developing findings, and confirming the accuracy of those conclusions. Figure 8 demonstrates how these aspects overlap and how they occur both during the data gathering time and subsequently. Indeed, when the researcher selects the theoretical framework, research

questions, and participants or instances, some data reduction may occur prior to the data collection phase.

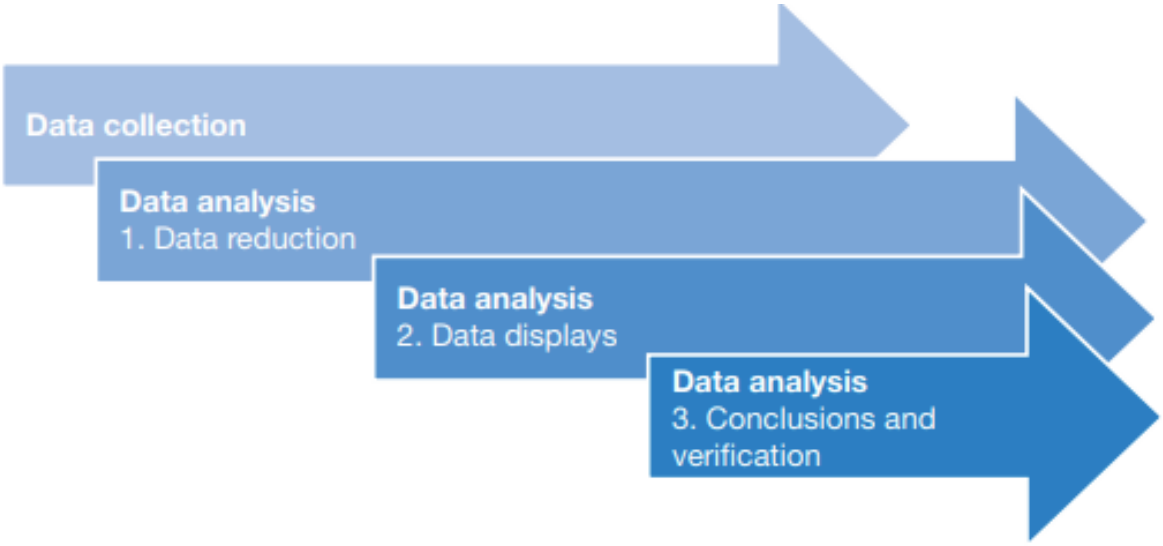

Figure 7 Overlapping stages in qualitative data analysis(Miles & Huberman, 1994)

Depending on the nature of this study, a content analysis approach is used to analyze the results of the case study and interviews. The foundation of content analysis is the idea that texts are rich sources of data that have the power to reveal important details about certain events. Among order to find similarities and differences, patterns, and relationships in groups of related categories of text—both explicitly and implicitly—it is necessary to consider both the participant and the context(Kondracki et al., 2002). In an attempt to discover similarities and differences, patterns, and relationships in groups of related categories of text—both explicitly and implicitly—it is necessary to take into account both the participant and the context. Due to the method's adaptability and ability to be used in both qualitative and quantitative investigations, it is regarded as high yield in the field of educational research. Although it's crucial to remember that content analysis can be used to analyze both visual and aural artifacts, for the sake of this research, the method will mostly concentrate on the usage of content analysis to examine textual or transcribed content(Kleinheksel et al., 2020). Manifest content analysis can also be done through qualitative research, which favors the researcher's interpretation of a participant's experience. However, the application's goal is to represent a dynamic reality that is inextricably linked to the researcher's personal experiences. Although qualitative content analysis can be carried out regardless of whether knowledge is believed to be innate, acquired, or socially constructed, the goal of qualitative manifest content analysis is to go beyond simply counting words and examine language in greater depth in order to group large amounts of text into categories that reflect a shared meaning(Weber, 1990). The

unit of currency in content analysis is the code. In order to organize and comprehend their data, researchers utilize codes. Researchers can use the coding process to categorize and interpret enormous amounts of material for use in their educational practice. Codes are symbolically used to assign a summative or significant feature to several units of meaning found in the text. They are brief, descriptive labels. A researcher must first immerse themselves in the material to generate codes. This usually happens when a researcher transcribes recorded data or performs many readings of a document. This method makes it possible for the researcher to become familiar with the scope of the data, which inspires early thoughts or structures that might be present in it(Saldaña, 2013). Using theoretical frameworks or concepts found in the literature, codes might be generated beforehand when researching a phenomenon that has already been explained using an existing framework. During the analytical process, codes may appear if there is no framework to use. However, if the prior codes do not adequately represent the researcher's area of interest, emergent codes can also be produced as addenda to codes that were defined before the study begins(Kleinheksel et al., 2020). These codes are used to derive themes of research for a thematic content analysis. A theme is defined as something that captures a significant aspect of the data in connection to the research topic and denotes a certain degree of patterning or significance within the data set(Clarke et al., 2013). Deriving from the theoretical framework mentioned in section 2.4, the codes are distributed in three categories which are also codes, “business transformation”, “barriers”, and “enablers”. Each category contains codes relevant to the category which can answer the respective research questions. Business transformation category contains codes “IT technologies”, “goals”, “definition”, and “direction”. The category barriers include codes named as “organizational”, “knowledge”, “financial”, and “technological”. The enablers category includes codes called “strategy”, “people”, “process”, “data”, and “technology”. Three themes are identified for the purpose of content analysis. The theme “accelerators of Business transformation” is defines the enablers while theme “hinderance to business transformation” defines barriers and the theme “IT enabled business transformation” captures IT technologies and business transformation. The data collected from the interviews is converted into text transcripts and is analyzed using codes mentioned above and presented in the results section. The figure below gives a visual representation of the content analysis methodology used with codes, categories, and themes.

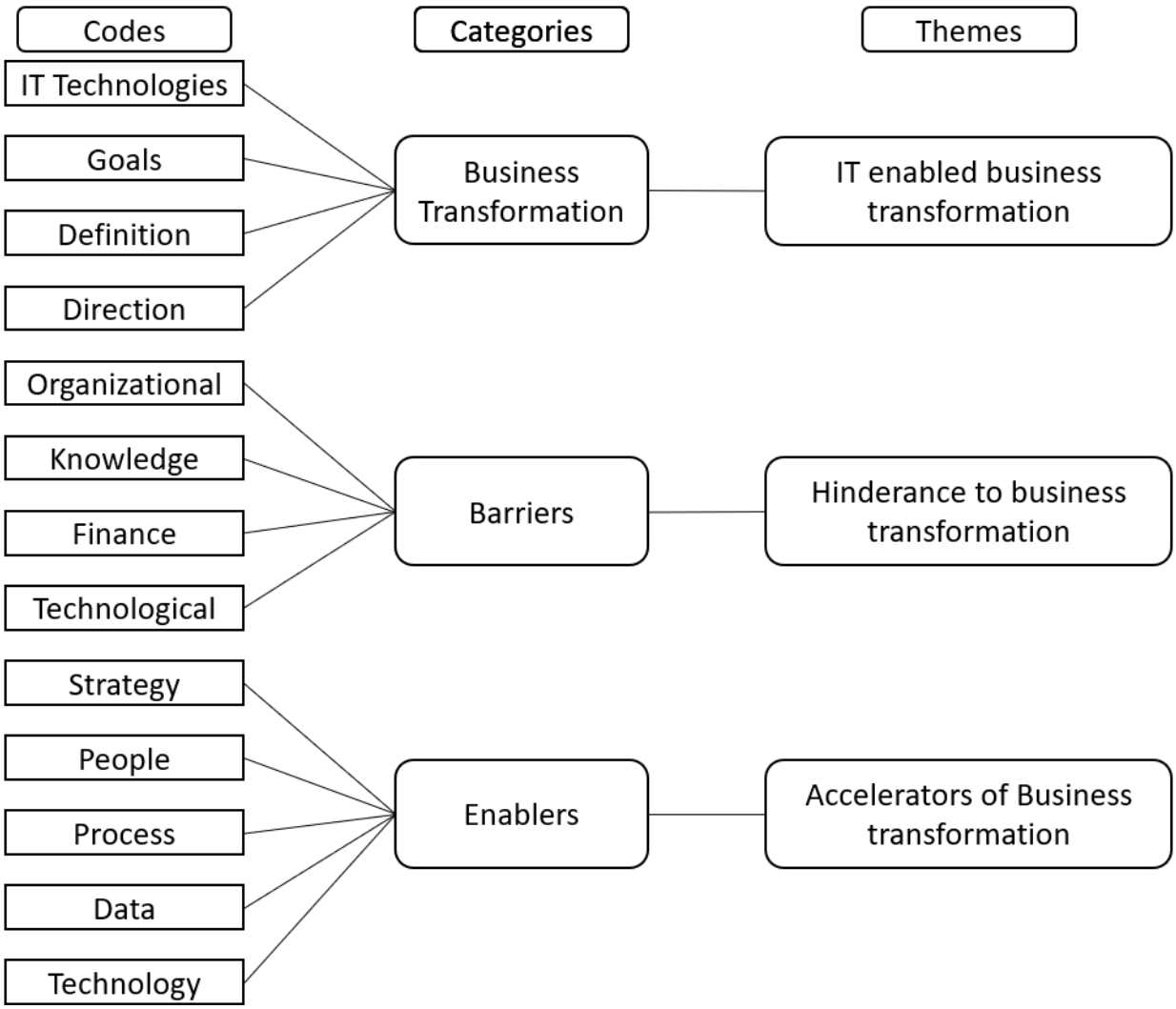

Figure 8 Content Analysis

Chapter 4. Case Study

This chapter gives information on how Philips is organized, what are their standardized processes and information on various business models. It is important to state how Philips carries out its processes as a company. This section sheds light on the history of business transformation, various business models used by Philips in their way or working and its business clusters where the acquired companies are placed after the integration. It is crucial to understand these concepts before the interviews are conducted as they provide a knowledge base to conduct the interview process. This chapter also discusses three acquired companies and their IT technologies offered to Philips which add value to Philip's business transformation portfolio.

4.1. History of Transformation

Royal Philips had been undergoing a challenging transformation for the past years. Frans van Houten, who became CEO of Philips in 2011, described the company's predicament as a "burning platform." He sought to turn the Dutch icon into a "high-performing corporation" by 2017 after years of poor financial performance. Philips had amassed a diverse product range and a global footprint over the course of its 120-year history. Philips was selling shavers in China and MRI scanners in the United States, as well as providing the lamps that illuminated the Eiffel Tower.

Philips was run as a conglomerate of numerous enterprises, which encouraged innovation and entrepreneurship. However, it had resulted in considerable differences in how different portions of Philips operated. Philips had over 80 business models, each of which relied on distinct business processes and over 10,000 IT systems in total, suffocating Philips with high costs and long lead times, according to management. Philips was seeking for a method to capitalize on its culture of technology-based innovation and its ability to serve a wide range of local markets in a variety of industries, while avoiding the inefficiencies that come with multi-national corporations. In other words, Philips needed to be able to minimize the complexity that prevented it from using global scale while also harnessing the complexity that allowed it to differentiate itself from competitors locally. Management recognized that this would necessitate "trying to reimagine the operating model of a diversified high-tech firm, including a fundamental reform of Philips' approach to products and processes, how employees collaborated, and the whole IT landscape." Philips looked for regionally relevant innovations and integrated solutions in terms of products. The company sought to shift to global standards in terms of processes.

4.2. Business Processes: Standardizing Globally

Philips did not want its businesses to design their own processes, even though they wanted to create products that were relevant to local markets. The goal was to standardize business operations throughout the world. The complexity of Philips, on the other hand, made standardization difficult. Selling an integrated healthcare solution to hospitals was clearly not the same as selling an electric toothbrush. Rather of implementing a single worldwide procedure, Philips sought to standardize processes across four distinct business models. This section discusses various business models that are used by every employee not only in their way of working but also in enrooted in their mentality. In a corporation as diversified as Philips, where considerable degrees of flexibility to develop procedures locally had traditionally been permitted, the company needed to persuade people that standardization was both achievable and desirable. While it was critical to identify operations that required differentiation, Philips also needed to ensure that all non-differentiating processes were standardized and followed industry best practices(Mocker & van Heck, 2015).

4.2.1. Philips Business System:

As Philips drives the transformation to become a leading health technology solutions provider to patients and customers, the strategy dictates how all parts of the company should work together to deliver solutions based on a deep understanding of the needs of customers and patients ensuring unbeatable customer experience, patient safety and quality as well as achieving profitable growth. To execute on the strategic direction, Philips needs to transform to a faster, simpler and customer-focused solutions company.

Figure 9 Philips Business System

Hence, Philips is on their transformation journey moving from products to solutions. This journey is enabled by Philips Business System (PBS). PBS is the operation model of Philips that defines and standardizes the work they do with constantly evolving by making necessary shifts to continuously deliver the Philips strategy. The road to long-term value generation for consumers and shareholders is defined by strategy. People can collaborate and respond quickly with clear governance, roles, and duties. Lean and agile working is enabled by standard processes, systems, and practices. Philip values and develops individuals and teams, rewarding them for long-term accomplishments, while its culture establishes standards for behavior, quality, and honesty. Philips achieves their objectives through strict performance management and continual improvement(Philips, 2022).

4.2.2. Philips Excellence Process Framework (PEPF):

All process compliance standards and controls (Quality, Sustainability, and Health & Safety) required in a medically regulated environment are covered by the PEPF processes when they are implemented through management systems. The PEPF makes sure that Philips constantly follow accepted industry standards throughout their businesses, markets, and functions, differentiating only when necessary to uphold the specified value proposition or business model or to adhere to legal requirements. The modes of operation are described by Philip's processes and systems.

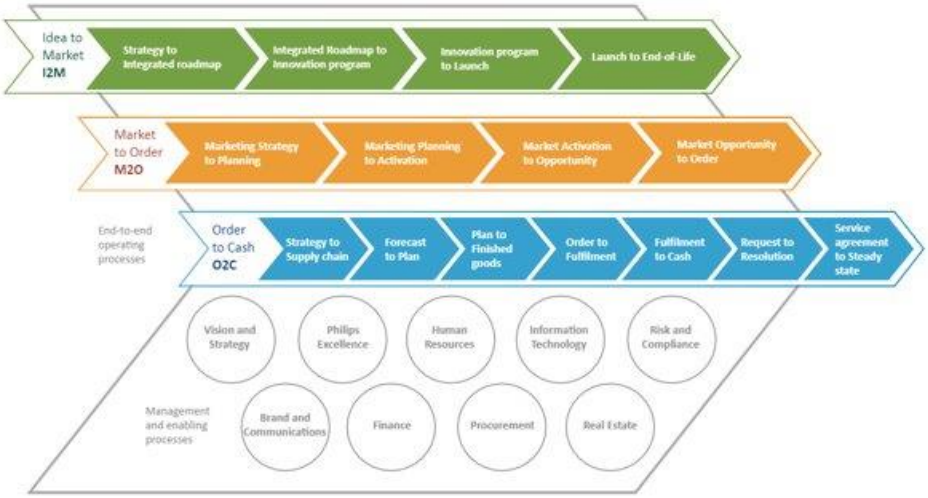

Figure 10 Philips Excellence Process Framework

Together, they specify the full value chain for Philip's customers. The entire customer value chain is made up of these three key process domains: Idea to market contains Product Life Cycle Management that standardizes the change and configuration management processes used throughout Philips' numerous design, manufacturing, and servicing stages of their products and systems. Market to Order deals with how Philips set prices and quotes in their

systems and solutions, market and sell them using our eCommerce system, and improve our digital (2.0) talents while Order to Cash is responsible for how Philips can strengthen its capacity for planning and forecasting across the whole supply chain. The acquisitions made by Philips have to be onboarded on the above process framework after the integration. Which means that the R&D and innovation will be moved to Idea to Market. All the sales, marketing and commercial activities will follow the Market to order strategies. And finally, supply chain, warehouses, factories will be migrated to order to cash. While onboarding a newly acquired company on PEPF, it is important to define roles and responsibilities of the employees belonging to the acquired company which are now part of Philips. So the respective employees also find themselves in a new working environment with new strategy and processes.

4.2.3. Philips Integrated Landscape (PIL):

Philips integrated Landscape facilitates data sharing and transaction processes between the Philips business, their suppliers, customers, associates, regulatory agencies, connected devices and systems as well as software used by their customers. Predictive analytics, artificial intelligence, and machine learning are used to enable quicker and more accurate decision-making, while federated data management and unified identity management are used. It streamlines and automates corporate processes and platforms around the needs of people. The purpose of PIL is to integrate the acquisition on the enterprise IT software. These IT solutions help the employees of Philips to undergo their daily business processes. It is important for new acquisitions bought by Philips to onboard the PIL landscape as part of their standardization goal.

Figure 11 Philips Integrated Landscape

4.3. Philips Business Clusters

Philip's mission is to promote people's health and well-being through meaningful innovation in everything they do. As a leading health technology firm, Philips believes that innovation can enhance people's health and healthcare outcomes by making care more accessible, personal, connected, and sustainable when viewed through the lens of consumer demands. In real words, by 2025, Philips wants to improve the lives of 2 billion people every year, including 300 million in underserved communities, with the numbers growing to 2.5 billion and 400 million by 2030. Mergers and acquisitions constitute a pillar of the strategy to achieve this goal. Philips has executed more than 30 acquisitions throughout the years and continues to improve its market position. The following is a list of previous acquisitions:

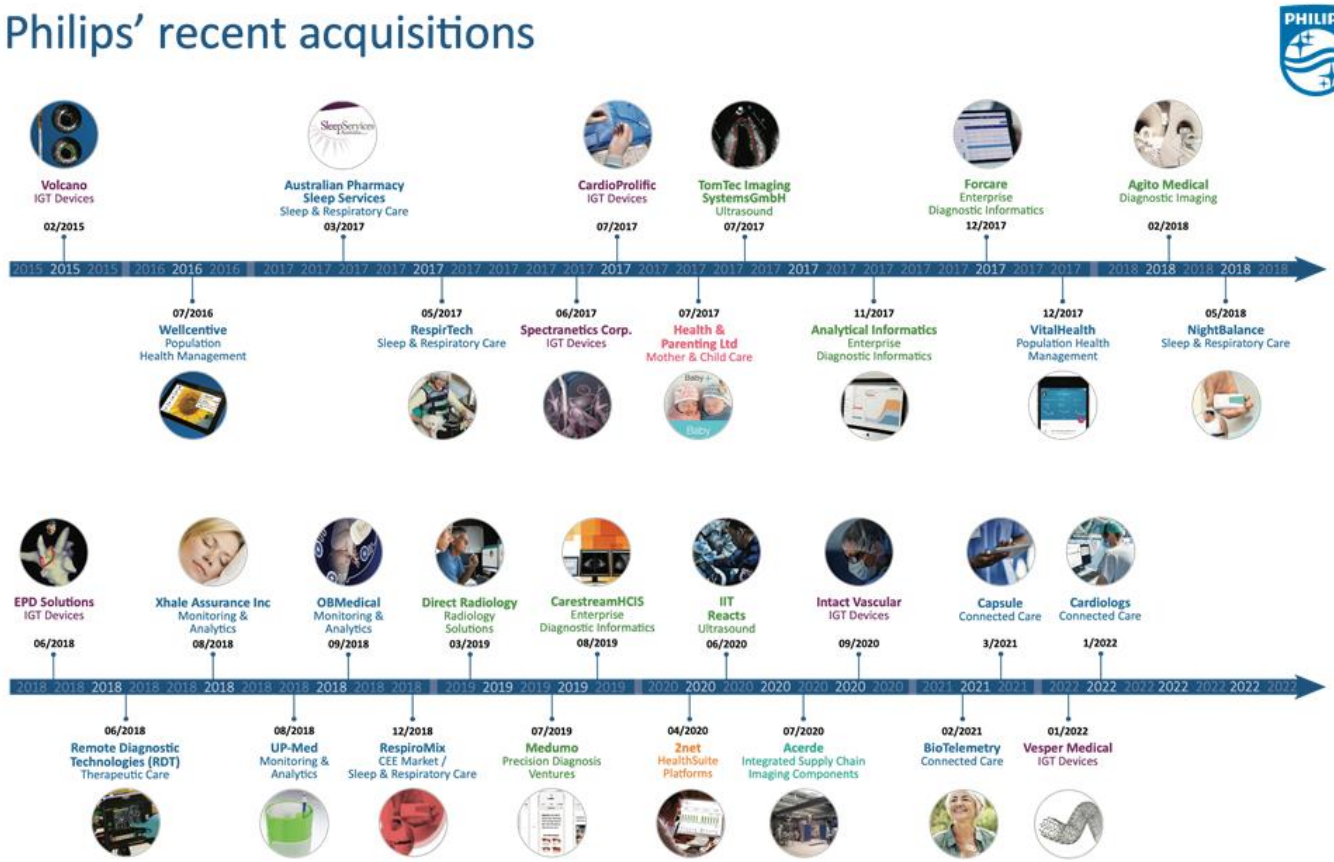

Figure 12 Business Clusters

Philips is organized into Business Clusters (which can be further broken into Businesses and Business Categories) and Market Groups (which can be further subdivided into zones/markets, districts/countries,

and channels), as well as functions and common services. Precision Diagnosis, Image-Guided Therapy, and Connected Care are the three business clusters where businesses are grouped.

The primary goal of the Business Clusters is to provide the market with high-quality products, software, systems, services, and solutions. To accomplish this, Philips groups strategically linked firms together. Across all relevant Businesses in the Cluster, the Business Clusters are responsible for integrated (solutions) marketing strategy, clinical strategy, portfolio management, solutions and innovation roadmaps including platform adoption, modularization, configurability, and other cross-Philips topics like software integration. Businesses are responsible for developing high-quality value propositions, managing their lifecycles accordingly, and releasing them onto the market in accordance with legal obligations. In the end, they are in charge of the crucial firm profit-and-loss account (P&L). Businesses are separated into Business Categories when appropriate. Each Business Category is in charge of overseeing its own innovation initiatives while utilizing resources that are pooled at the Business level (Philips Internal Document, 2022). The goal of Philips is to become a market leader in health tech landscape and the pillars to this initiative are the strategical acquisitions made by Philips. This thesis shed light on three such acquisitions whose IT technologies have proven to be pivotal in Philip's business transformation strategy. The below subsections give a brief description of these acquisitions to answer the sub research question d) on IT technologies used to enable digital business transformation at Philips.

4.3.1. Tomtec

Company Profile:

TomTec Imaging Systems is a provider of intelligent image analysis software, especially for diagnostic ultrasound. TomTec Imaging Systems GmbH, a German company with its headquarters in Munich, has held a creative leadership position in the field of diagnostic medical imaging applications and Cardio PACS systems for more than 20 years. The business keeps close working connections with numerous esteemed institutions of higher learning and equipment producers all around the world. TomTec's product line includes a wide array of 2D and 3D/4D technologies for multimodality imaging data presentation, processing, reporting, and archiving. Obstetrics, gynaecology, radiology, and cardiovascular imaging are all professions that can benefit from TomTec's solutions.

TomTec and Philips have grown steadily since 2017 when they joined the Philips family. The EPIQ CVx and other Philips ultrasound systems now support a large number of TOMTEC applications. Customers of Philips can now take advantage of a fluid process that begins with the ultrasound equipment and continues, with flexibility, to the reporting room. Through shared diagnostic tools, standard workflows,

and user interface design, the strong partnership offers consistency. The ability of TOMTEC software to evaluate picture data from all ultrasound manufacturers ensures that every customer may take advantage of the newest advancements, which is perhaps the most significant way in which TOMTEC ARENA retains its vendor-agnostic edge off-cart.

Technology:

For many years, TOMTEC has been at the forefront of automation in diagnostic ultrasound. In the echo lab, automation is the key to reproducibility, and TOMTEC has created clever algorithms and AI-based data analytics that eliminate user-variability. The outcome of these efforts is TOMTEC-ARENA1 2020, which was recently released. Structures within the heart, such the Mitral Valve and endocardium, can be identified, modeled, and dynamically tracked in a matter of seconds with the inclusion of AI-based data analytics and automation, all with a minimum of user intervention. The time-consuming chore of manual measurements, such as left ventricular biplane volumes, is no longer placed upon the doctor. This results in significant time savings and greater productivity. Our software, which makes use of artificial intelligence, is capable of performing numerous important echo measures on its own, from GLS to Ejection Fraction. According to TOMTEC's CMO, Gregor Malischnig, this automation produces repeatable and user-independent outcomes, which increase diagnostic confidence and quality. Philips' strengths in ultrasound image quality, 3D imaging, and transducer technology are greatly complemented by TOMTEC's clinical applications, workflow solutions, and R&D skills. In cardiology, radiology, and OB/GYN, TOMTEC provides multi-modality and vendor-neutral diagnosis and analytic solutions. More than 20,000 doctors and 600 hospitals globally treat patients every day using their software.

4.3.2. Capsule

Company Profile:

Capsule is the world's largest provider of medical device integration (MDI) and healthcare information solutions. In the company's objective to help doctors streamline workflows and get meaningful information, Capsule expanded its competencies to provide unique clinical surveillance and patient monitoring technology. Capsule extracts the most value from livestreaming medical device data by evaluating and synthesizing it across many sensors and devices attached to the patient in order to provide insight-driven, proactive care. Capsule is the de facto standard for medical device integration, with over 2,700 hospital sites and 20 million patients connected annually, and is pushing the boundaries of system interoperability, patient monitoring, and clinical surveillance. Capsule bends and grows to provide the resources and capabilities that power healthcare innovation and make proactive care a reality through a

centralized Medical Device Information Platform strategy. Hospitals have long benefited from the world's largest device driver library, the capacity to simply extend and replace medical devices, and the security and quality data provided by proven verification and validation processes with device makers, with a client retention rate of 99 percent. Capsule's solutions adapt to their customers' changing needs and give trustworthy data for therapeutic usage. Capsule developed patient monitoring and clinical surveillance solutions in response to healthcare professionals' desire for more linked monitoring and analytics. Capsule Vitals Plus, an integrally connected system with a best-in-class user interface, enhanced patient context, device alternatives, and an upgradeable pathway from existing monitors, has been re-imagined. Capsule Surveillance absorbs live-streaming data – from a variety of sources, including Vitals Plus – and analyses it to provide caregivers with clinically relevant insights and alarms(CapsuleTech.com, 2020). The acquisition of Capsule Technology, Inc., a leader in data technologies and medical device integration for hospitals and healthcare organizations, by Philips was announced on January 19, 2021. The acquisition will increase Philips' patient care management capabilities for all care settings and become a part of its Connected Care segment.

Technology:

The Medical Device Information Platform (MDIP) unifies data access and decision support by combining and streamlining integration, monitoring, and surveillance into a single, unified system. Continuous platform capability and service expansion will aid medical technology innovation by improving patient safety, staff satisfaction, and clinical outcomes. Expanding the use of medical data is critical to changing the way treatment is delivered. Despite the abundance of clinical data, only a small amount is ever shared between systems, and the data usually only travels as far as a hospital's electronic medical record system (EMR). Consider how much more valuable data could be if it were freed from its source, combined with data from other sources, evaluated for correlations, and then shared with systems and applications capable of specialized analysis and usage. Capsule Medical Device Integration collects data from connected devices, normalizes and standardizes it to make it appear source-independent, and then formats and transmits it to recipient systems. Data standardization is uncommon across the range of medical device models and manufacturers. As a result, Capsule Medical Device Integration normalizes all device data, including waveforms, and adapts the output to the receiving systems' format needs. Capule contextualizes data by bringing together complementing, relatable data from many connected devices and information systems to spark deeper understanding, in addition to normalizing it.

The context-rich device data is accepted by receiving systems for a number of applications, including decision assistance, alarm management, documentation, research, and reporting. Capsule, which has been installed in over 3,000 healthcare facilities in nearly 50 countries, assists healthcare providers in exploiting medical device data. Their systems are adaptable, scalable, and secure, ensuring maximum data security. Capsule Medical Device Integration is capable of working with a wide number of device kinds, manufacturers, models, and software versions. Capsule Medical Device Integration, which supports intelligent, connected devices and opens up new possibilities in the delivery of health care services, provides real-time dashboard and summary views of connected devices via connectivity management applications such as Capsule Command Console, Vitals Stream, and Chart Xpress.

4.3.3. Remote Diagnostic Technologies

Company Profile:

Remote Diagnostic Technologies (RDT) is a medical device firm dedicated to the design, production, sales, marketing, and global distribution of remote monitoring and resuscitation solutions for pre-hospital and critical care services. RD is, situated in Hampshire and established in 1997, caters to a global clientele. Their Basingstoke headquarters house all of our internal capabilities, including R&D, engineering, production, software development, and regulatory. They are a trustworthy partner for clients in time-sensitive situations, including sizable, sophisticated, and demanding military and government clients. Their company has tripled in size over the past four years, doubled over the past two years, and had 60 percent growth last year. The company has generated 70 top-notch engineering and other roles in the last 12 months, all of which are situated in the UK(Life Sciences Europe, 2020). On June 13, 2018, Philips revealed that it had acquired Remote Diagnostic Technologies (RDT), a major innovator of cutting-edge pre-hospital technologies that offer monitoring, cardiac treatment, and data management and is situated in the UK. Philips' Therapeutic Care division will benefit from RDT's portfolio of comprehensive connected emergency care solutions, which will also help Philips maintain its dominant position in the EUR 1.4 billion resuscitation and emergency care market. RDT will also increase Philips' capacity for innovation, promote the digital transformation of healthcare, and open up new markets(Philips, 2018).

Technology:

Over 20 years ago, Remote Diagnostic Technologies set out to solve a real problem: how to safely monitor patients in remote areas and communicate medical data in real time to reliable support or the next level of care. By paying close attention to the demands of the prehospital sector, RDT has succeeded in achieving this for both medical and non-medical expertise. The first step in this process involved

providing non-medical specialists, such crew, with telemedicine-enabled monitors (Tempus IC) on board commercial airplanes, including those operated by Etihad, Emirates, BMI, and Virgin Atlantic. These monitors connected them to medical professionals on the ground. After that, the application of this technology spread to Business Aviation, Fortune 100 companies, major corporations, fleets of heads of state, luxury yachts, and shipyards. The following stage of the trip involved increasing monitoring capacity and improving the technology's architecture to satisfy the demands of medical professionals working in the most challenging conditions. The UK MOD chose the Tempus Pro in 2016 to replace seven different vital signs monitors with a single device. NATO military worldwide are also utilizing this technology. The amazing technical capabilities are blended into a monitor that is unlike anything else on the market in terms of size, weight, connectivity, and ease of use. The Tempus ALS will represent the next phase of their development, building on the success of the Tempus Pro. With this, a professional defibrillator will be added to our sophisticated monitoring platform, acting as a fully integrated monitor/defibrillator. This propels their development into the EMS and critical care sector for civilians, where they offer a novel method of monitoring and defibrillation. Remote Diagnostic Technologies is a shining example of the strong entrepreneurial spirit present in the UK, having grown from modest beginnings to become the industry leader in the design and production of ground-breaking prehospital vital signs monitors. They continue to be quick and adaptable today while still being a truly global business that serves a worldwide market propelled by innovation that is customer focused(Life Sciences Europe, 2020).

Chapter 5. Results

Theoretically, everyone concurs that adopting digital transformation is the best course of action for businesses across all industries, not only the healthcare sector. However, in reality, this is difficult because it calls for not only committed employees but also capable management and leadership. The following section discuss the results of empirical research conducted at Philips using the methodology mentioned in the previous chapter.

5.1. Empirical Results

A case study was conducted on the acquisitions of Philips to denote various technologies used by acquired companies that contribute to the Philip's transformation portfolio to become a leader in healthcare delivery. To get an in depth understanding of the case, the employees working in these acquisitions were interviewed from the IT departments and the business transformation departments. This section discusses the findings of the interviews conducted. This section shows a word map that was obtained from the transcripts of the interviews using Atlas TI software. This word map shows the most mentioned words used by all the respondents in the interviews and gives an overview of the keywords used by the respondents which are pivotal for this research.

Figure 13 Word Map

The results section is organized in a way to elucidate the results from each interview. Following the research objective, this section contains three types of results that are obtained from the interviews that are, the definition of business transformation at Philips, the goal of business transformation at Philips and also the findings to answer the third and fourth research questions on barriers and enablers to digital transformation at Philips including riveting quotes given by the interviewees on various themes of this research. Finally, this section lays out the ranking of barriers and enablers according to the respondents. As mentioned in section 3.2, to map down the results of the interviews using codes of themes IT enabled business transformation, hinderance to business transformation, and accelerators of business transformation through the method of content analysis.

5.2. IT enabled Business Transformation

When it comes to the definition of business transformation, there is a difference in opinions of people working in the leadership roles who are leading the business transformation, and people who are implementing the digital transformation that is, carrying out the transformation process. For instance, Interviewee 2 defines business transformation as a process to meet the demands of the customers, and the companies undergo business transformation because the customer demands have changed. Interviewee 3 agrees with the fact that business transformation starts at customer demands, and it is a journey that organization undergoes to stay relevant and updated in the current market at micro and macro-economic level. Interviewee 10 also states that for Philips, business transformation is a journey which is very internally focused. Although, the definition of business transformation according to Interviewee 2 can vary in terms of product transformation, marketing strategy transformation, or process transformation. To add to this point, interviewee 4 defines business transformation as adaption to the market according to current demands and the changes the organization undertakes to meet this demand by simplifying processes. It is interesting to note that Interviewee 4 focuses on the processes that need changes in a company while Interviewees 2 and 3 focus on the strategy of the company while defining business transformation, but the starting point of both is customer demands. Interviewee 5 also agrees to the fact that serving customers in an innovative way which was not done in the past can be called business transformation. But interviewee 5 adds that this can be done by changing the technologies and capabilities in the organization. Pointing towards the main research question, Interviewee 5 confirms that IT technologies are crucial and enable digital transformation at Philips. But to enable these technologies, Philips should adopt new capabilities in terms of process, strategy, and infrastructure.

Interviewee 5 claims that Philips need not come up with new capabilities but can strengthen their existing capabilities.

On the contrary to the view of interviewees 2,3,4 and 5, Interviewee 6 proclaims business transformation for him is fostering of systems by putting an emphasis on software development to achieve end-to-end workflow. Interviewee 6 has a technical viewpoint of business transformation as he is responsible for development of software that Philips will sell to their customers. Interviewee 6 is only concerned with how the Tomtec's IT technology will be used in the solutions portfolio of Philips and has little knowledge on the strategy of business transformation. Hence, according to Interviewee 6, IT technology offered by Tomtec can enable businesses transformation by connecting the pieces between the processes of product and solution delivery. Interviewee 10 explains that this can be achieved by selling subscriptions to their customers rather than only products. So instead of a one-time transaction, the subscription that comes with Tomtec's IT technologies can be turned into a solution or a service by creating a client-vendor relationship. Interviewee 8 takes a tangential approach to business transformation by the impact it has on the people. The people mentioned in this context are not only the employees of the acquired firm but also the employees of Philips, because in the people whose roles are changed, and it is people who develop new processes. Even though interviewee 9 mentions business transformation includes changing of organization and processes, he has the similar opinion that the impact of business transformation is mostly felt by the people. On this note, Interviewee 3 goes ahead and quotes "Business transformation at Philips is a people's transformation."

There is a common vision amongst the interviewees on the goal of business transformation. All the interviewees mention that the main goal of business transformation at Philips is to transform from a product-based company to a solutions-based company in the healthcare sector. But what varies in the answers of the interviewees is why Philips set this goal. Interviewee 2 stresses that Philips aims to become a market leader in the healthcare sector and the only way to achieve this is by meeting the customer demands. While Interviewee 3 takes an organizational standpoint on the goal of business transformation by pointing out the goal of business transformation is to centralize the business processes under one function, and this function can orchestrate the business transformation journey of Philips. Interview 3 and interviewee 4 have a common opinion that the goal of business transformation at Philips is to harmonize and ease the way Philips delivers their products, services and solutions to their customers. While other interviewees are show enthusiasm on the goal of business transformation, Interviewee 4 gives a practical answer to the question of goal of business transformation at Philips. Interviewee 4

indicates that the goal of business transformation is to reduce costs, generate revenue, enhance customer experience and provide support to hospitals with IT technologies which are not only easy to use, but also efficient in their application. Interviewee 9 also agrees with this that the main goal of business transformation is actually generating revenue, which is true for almost all the companies in the market. Interviewee 11 says that the goal of Philips is to meet their customer demands and points out that the Philips's customers are trying to achieve with the quadruple aim, that is better patient experience, better employee experience, better outcomes at lower costs. What Interviewee 11 explains with this is that Philips's goal is to understand their customer's need to transform and align with that goal.

Apart from this, interviewee 4 also points out a very important goal, rather a challenge for Philips that other interviewees fail to observe is the regulatory goal. Philips is in the healthcare business, where people's lives are at stake at times. Hence the quality of the products and services that Philips is offering to their customers should be exceptional in all aspects. Interviewee 9 agrees with this point by saying there is a completely different quality level when it comes to selling medical devices as compared to selling televisions and says that Philips are not yet capable to deliver the quality demanded for medical devices and are still in the learning phase. Interviewee 4 extends this point that even though the quality of products and services is good, but what is lacking at Philips is the quality in the manufacturing and production processes of these products and services. The reason behind this could be, in the past Philips has been in the business of domestic appliances, lighting, electronics, etc. whereas now design and manufacturing of healthcare products is a different ballgame altogether as it involves laws and regulations of not only one country but worldwide regulatory bodies that need to be followed before the product is delivered to the customer. The answer to solve all the regulatory issues at Philips is their Quality Management System (QMS). Interviewee 1 exclaims that it is a big effort to comply with the regulatory aspects as Philip's QMS that it is quite complex, and Philips is trying to simplify it. But the fact remains that the main regulatory bodies including FDA in America, EMA in Europe and NMPA in China impose their own regulations on the same product offered by Philips which makes it difficult to follow one QMS throughout the organization.

Philips have found themselves between a rock and a hard place. On one hand, Philips is on a huge business transformation journey to meet their customer demands by providing them top quality products, but on the other hand have a duty towards their stakeholders to perform well on their financial statements by generating revenue and lower the costs. On this point, interviewee 7 quotes "Transforming

and performing don't go well together, you need the same people to do both". Interviewee 7 gives an instance of a mishap that cost Philips because of quality issues in their product. Philips Respironics issued a voluntary recall notification in June 2021 after learning that the foam in CPAP, BiPAP, and Mechanical Ventilator devices may pose a health risk (U.S. only). Philips provided tools and services that help provide support throughout this process since it understood the significant impact this recall has had on patients, business customers, and physicians. By December 2022, Philips hopes to have finished the repair and replacement program for the vast majority of registered patients. The impact of this recall has been felt by each and every employee in Philips as the recall had a snowballing effect on the company. To maintain the bottom line of their balance sheet, Philips had to go through a lot of budget cuts, organizational restructuring, loss of human resources, and by extension, has caused a delay in reaching the goal of business transformation.

5.3. Hinderance to Business Transformation

As mentioned in section 2, a barrier is defined to as an obstacle to access, a circumstance or obstacle that keeps people or things apart or prevents communication or progress(Lammers et al., 2019). This section answers the sub research question c. on barriers to business transformation at Philips. While discussing the barriers to business transformation at Philips, interviewees have varied opinions to specific barriers. But there is a clear pattern observed in their responses as the different barriers mentioned in the interviews can be categorized as organizational, financial, knowledge and technological according to the theoretical framework in section 2.4.

Starting with the organizational barriers, what all interviewees agree on is that Philips has a very diverse product portfolio which is a huge barrier to business transformation. Interviewee 2 opens the discussion related to this with mentioning that Philips is still transitioning from being a conglomerate to an operating company. In the past years, Philips has divested lighting and domestic appliances as they don't want to compete in that market or industries anymore. After divesting these segments, Philips has opted an operating model which follows a top-down strategy. What this means is, that there is one company wide strategy, which is followed by all business clusters as mentioned in section 4.3. Interviewee 2 brings up the Philips Business clusters and the way they are organized as a barrier because these business clusters are quite different in nature. They are different in the way the cluster operates, with different customer segments who have different customer demands, and a wide range of products and services that are not related in many ways to one another. This creates a problem that there is too much to choose from which makes the priority setting for each business cluster as a critical barrier for

business transformation. Interviewee 8 looks at this barrier from an employee's perspective. According to Interviewee 8, Philips has a large transformation portfolio, and individually these transformations would make sense, but in case of Philips, all of them are implemented at the same time. Hence, some of the employees are impacted by seven, eight even nine transformation initiatives simultaneously. Interviewee 8 states that this is not realistic for the employees to adopt new ways of working and highlights a risk that the message of the transformation initiative is not landed as planned. Adding to this, interviewee 8 also stresses that already employees at Philips have a tough day job and adopting new ways of working for the digital transformation of this size can be farfetched. This is in line with Interviewee 2's perspective that the digital transformation initiatives are not successful because employees fail to adopt the new ways of working.

As far as the organizational structure of Philips is concerned, Interviewee 4 and 11 agree that there are a lot of different departments or clusters who act as silos which are a barrier at the moment at Philips. These silos or clusters have their own goal, and they try to work towards that and tend to forget the common goal of business transformation. What is observed in the interviews and in the company is that the business clusters are aware of their own goal but are not aware of the common goal of business transformation. Employees are always focused on the goal of the project they are working on at that moment but fail to understand how the project goal is aligning with the overall goal of business transformation. Interviewee 4 says that it is surprising to observe that in some cases, people are unaware of the project goal as well and only focus on the target date to meet the deadlines. Adding to the specific organizational barrier observed in Philips, Interviewee 4 says there is a miscommunication between leadership and the employees while implementing digital transformation. For instance, in case of training sessions of digital transformation the leadership assumes that they have clearly communicated the knowledge but from the employee's perspective the message is not well received or misunderstood. Interviewee 5 supports the point of Interviewee 4 stating that the most important barrier to digital transformation is not listening to the people who do the actual work. The leaders who are implementing business transformation underestimate the complexity of what people do in their daily work with various technologies and tools so they assume a simple solution will fit for all the transformations. Quoting Interviewee 5 "If it is very difficult to undergo a business transformation which is set in a top-down ivory tower style" proves that the way Philip is organized is currently acting as a barrier to business transformation.

As mentioned in section 3.2, the interviewees were chosen from the business transformation department and employees in the acquired companies who are part of Philip's business clusters having

technical knowledge about the IT technologies. Interviewee 6, who is the R&D head of Tomtec, highlights an organizational barrier from the point of view of the business clusters. He mentions that the businesses in Philips don't have a clear ownership of products and raises the question that why one business should do all the work, perform well, and take care of business requirements while other business do not contribute and is worried on how this can be incentivized. The interviewee expresses his concern about the prioritization of resources allocated by the central authority at Philips because each business presents their needs and requirements to this body. According to interviewee 6, there is a bottle neck here while allocation of resources towards various business clusters and how fast the resources are allocated. The opinion of interviewee 6 proves the point of interviewee 4 who says that most businesses are concerned about their own goals and performance. It is interesting to see the two sides of the same coin as both in their position are correct. Interviewee 8 also accepts that ownership is a barrier for business transformation but takes a standpoint of ownership from the leader's perspective. While interviewee 6 focuses on owning of products, components, and services, Interviewee 8 looks at the digital transformation initiatives which include these products, components, and services from the point of view of leaders who are implementing each digital transformation initiative. Interviewee 8 wants the leaders to take ownership of only one transformation initiative rather than multiple and dictate which transformation initiative should be undertaken and which should not be as it is not going to be successful. The reason for failed transformation initiatives according to interviewee 8 is unrealistic planning. By unrealistic planning, interviewee 8 means that leaders only focus on deploying these transformation initiatives rather than adopting new ways of working and begs the leaders to ask the question "what do we actually need to adopt new ways of working?" Deploying the transformation initiatives is only half work done, while adoption on new ways of working by the employees is where the actual value comes from, which is not taken into account by the leaders. Interviewee 8 takes one step further and answers this question by saying that new ways of working can be adopted by changing current business processes, changing the organizational structure, or using new tools or technologies in their way of working.

The theoretical framework derived from the literature highlights knowledge as a one of the barriers to business transformation. After conducting the interviews for this research, it is observed that knowledge barrier is the second highest impacting barrier to digital transformation. Some of the interviewees have an opinion that the lack of knowledgeable people at Philips is a barrier at the moment. Interviewee 1 mentions that resourcing of knowledgeable people is one of the key barriers to digital transformation. This can be because of digital transformation is a novel concept. There are a lot of

companies undergoing digital transformation, but nobody has a blueprint to follow a procedure while implementing it. Interviewee 2 adds to this point by saying that the availability of knowledgeable resources is a key barrier. As mentioned in the above paragraph, Philips is undergoing several transformations simultaneously, but these transformations are led by a limited number of people who know the end-to-end implications of the transformation. This brings an interesting point of view on how one barrier, that is organizational structure gives birth to another barrier, that is lack of knowledgeable resources. Interview 3 concurs that knowledge barrier if not the top but is one of the key barriers to business transformation as hiring knowledgeable resources often takes a back seat or forgotten because the company focuses more on technologies, tools and products rather than people with technical skills to use these technologies or tools. Interviewee 5 puts lack of competencies, which can be put in the category of knowledge barriers. A competency is defined as the ability to do something successfully or efficiently. He backs this point by saying that most people working on business transformation are project managers who are lacking the competency to transfer knowledge to the users, that is people who are impacted by the digital transformation. So, relating to knowledge barrier, it is observed that people lack competencies to train the people, who agrees with interviewee 4's point of view that the main message is not conveyed in the training sessions regarding business transformation which can act as a knowledge barrier.

Financial barrier has proven to be controversial given the state of the company and has received the most conflicting opinions. While asking to rank the barriers from highest to lowest impact on digital transformation, interviewee 3 quotes "The answer to this question will change depending on who you ask, an IT guy will say technological barriers are most prevalent while a Finance guy will say financial barriers are the highest impacting in any company." As interviewee 3 is from business transformation department, according to him financial barriers have little impact on business transformation. Contradicting interviewee 3's quote, Interviewee 4, who has an IT background expresses his concern regarding the financial health of the company by saying without finance the company cannot hire the people, the projects are cancelled, or only part of the project is funded and finally there is a loss of employee leading to knowledge loss. In line with interviewee 4's opinion, Interviewee 6 also identifies financial barrier as a key barrier to digital transformation. What is interesting to note here is that both interviewees 4 and 6 come from a technical background whose projects need to be funded to create value. Interviewee 1 acknowledges the fact that finance does has an impact on the business transformation of the company by pointing towards the setbacks like the recall of products. The SRC recall as already mentioned has had a major impact on the company, even though is a sensitive issue,

this should be considered as it is acting as a barrier to business transformation. Meanwhile, the rest of the group who are part of the business transformation department including interviewees 2 and 3 say that for Philips, finance is not a barrier at all. Interview 5, who is a leader of various transformation initiatives strongly believes that Philips does not have a financial problem, and even if there are any financial problems arising, Philips will fix it. Interviewee 7 provides with a diplomatic answer when asked about the financial barriers. He ranks finance as the lowest impacting barrier by saying that it depends on if the company is performing well or not, and if not, Philips has the capacity to fix it but also agrees that money is quite important. Rest of the interviewees have a common opinion that financial barrier exists but is not a critical issue for Philips.

Lastly, as far as the technological barrier is concerned, the interviewees who are part of the business transformation department concur that most technologies are acquired through various acquisitions in Philips. What acts as a barrier at Philips is the capabilities of Philips to optimize these technologies to generate highest value. Interview 3 comments on this that Philips is still in the learning process of utilizing the technologies bought by the company as discussed in section 4.4. Currently, these technologies are creating value based on their previous business models. Hence, as part of the goal of business transformation, it is necessary to come up with new capabilities that can utilize these technologies optimally. Interviewee 10 mentions the importance of tools in business transformation. She says that what employees and customers need proper tooling that can enhance and ease the use of technologies in their daily work. Interviewee 5 is quite clear in his opinion regarding technological barriers that they do not exist at Philips. If Philips wants to inculcate any technology in their processes, they will just acquire it which gives an idea of how leaders plan their business transformation journey with respect to the technologies they plan to add to their portfolio. The below table lists specific barriers related to each category of theme hinderance to business transformation with quotes related to each barrier.

Hinderance to Business Transformation	Barriers	Quotes from Interviewees
Organizational	• Organizational Structure • Miscommunication • Priority setting • Unrealistic Planning	"To overcome barriers there must be clear communication between business, markets and the IT teams" "There is no one fit for all" "The first aim to have the best Plan A as a health tech company because we are dealing with patients" "Change management is key"
Knowledge	• Lack of knowledgeable people in the field of business transformation • Lack of technical knowledge • Inadequate training methods	"Our ambition is often than larger than our ability to execute" "We need to be smarter on things we can pick up and do" "Business transformation is people focused and not technology focused"
Finance	• Recalls • Reduction of costs and budget • Cancelling of projects	"Transforming and performing don't go well together, you need the same people to do both" "Plan slowly act quickly"
Technology	• Improper IT tooling • Complicated IT infrastructure	"The enterprise IT is the IT that costs money, and the product IT is the IT that makes money for the company." "You can do business transformation with a technology which is ten years old as long as it fits the process and strategy".

	"The value of the IT technology is defined by the value that is created by the users(customers). The IT technology is worthless if users cannot use it"

Table 6: Barriers of Business Transformation at Philips

5.4. Accelerators of Business Transformation

As mentioned earlier in section 2, an enabler is a person or thing that enables something, or makes it possible. This section answers the sub research question c. on enabler to business transformation at Philips by referring to the theoretical framework in Section 2.4 the enablers can be categorized as strategy, people, process, data, and technology. Interviewee 3 and interviewee 11 confirms that the enablers identified in the theoretical framework are matching the actual case at Philips.

Respondents in their interview are aligned with the Philip's strategy, but what is interesting to note here is there is only one strategy mapped out which is mentioned in the PBS, and the strategies of individual business clusters is a subset of the strategy mentioned in the PBS. All the respondents point towards the PBS and explain that the strategies of different businesses and transformation initiatives are derived from the PBS. Interviewee 9 claims that strategy is the most important factor while undergoing a transformation. Interviewee 2 has an interesting take on the approach towards strategy, he says that multiple types of innovations are needed to realize the company's strategy, but two in particular stand out: the organization must create commercial assets that customers want and have the ability to scale, promote, and sell in a compliant manner. Philips will need to develop a whole new set of business capabilities for this. These capabilities combine the core enablers of corporate transformation—process, data, technology, and people competencies. Different business models must be built throughout all firm domains, including sales, marketing, R&D, and supply chain, in order to satisfy customer expectations in a systematic manner. An enabler in a is good on its own, but to achieve a successful business transformation an end-to-end approach is required utilizing all the above enablers. While interviewee 2 describes the approach towards strategy, interviewee 5 wants the employees to align on the strategy by saying that everybody in the company has to understand why they are transforming and how does it support the future of Philips and customers.

Interviewees 7, 9, and 10 have a common view that strategy is the most crucial enabler that can accelerate the business transformation at Philips. Interviewee 11 says that the overall strategy of

business transformation for Philips is the same, but the strategy for each clusters is different and claims that it aligns with the overall strategy. The only interviewee who did not have strong opinion on the strategy of business transformation at Philips was interviewee 5. The reason behind this can be, as he is part of the R&D department, the overall strategy of business transformation is not part of his day-to-day activities, and he might not be aware of the business transformation strategy at all. This shows that there is a gap between the business transformation department and the businesses inside Philips that the businesses are reluctant towards the business transformation strategy and only focus on meeting targets and generating revenue. When it comes to who should formulate the strategy and direct the business transformation, there is a difference of opinion between the employees and the leaders of business transformation department. On one hand, Interviewee 3, who is a project manager in the business transformation department says that the strategy should always come top-down, that is from upper management to lower management. But on the other hand, Interviewee 5 who is a leader of business transformation initiatives says that the top-down strategy at Philips does not work, which is identified as a barrier identified in the previous section.

While discussing People as an enabler for business transformation, there is a clear pattern observed between the respondents. Employees working in the business transformation department agree in unison that people are the key enablers of business transformation. This can be because employees in business transformation department have to guide the employees in Philips towards new ways of working that aligns with the goal of the company. Interviewee 2 supports this claim by commenting to invest in your people because they are the company's greatest asset. Any firm undergoing change must invest in its employees. It is critical that everyone in the organization understands how their work affects the broader business goal and how it advances Philips' vision. Clear understanding, education, and communication are needed in all sectors to do this, and this makes a huge impact. By understanding how their work will contribute to the overarching strategy and aim, employees may prioritize their job with an entrepreneurial perspective. Interviewee 3 says that most of the firms that are undergoing a transformation focus on processes and technologies, and most often forget about the people who are going to adopt these processes and says that people are the most important link between processes and technologies. Not only this but the people undergoing the transformation should be trained and be ready for the incoming transformation. Interviewee 4 agrees with interviewee 3 that people can enable businesses transformation with the right education and experience so that they can adopt the new ways of working. He also adds that most transformation initiatives fail because the people

who are impacted by the transformation are not well trained or educated to adopt new ways of working. Interviewee 5 concurs with this and says that when it comes to the success of transformation by quoting "Business transformation is people focused and not technology focused. The value of the IT technology is defined by the value that is created by the users(customers). The IT technology is worthless if users cannot use it".

Philips is on a mission to standardize their processes throughout the organization. This includes from design and innovation to manufacturing to logistics and end user support. It is important to identify processes as an enabler as it is how major business processes are carried out. Given the status quo of the business transformation and processes, interviewee 5 claims that process is part of the transformation, and tools should not be separated from the processes, it can be a pitfall to separate the two. He suggests that one way to approach business transformation is by standardizing not only processes but also the tools used in the processes. Interviewee 1 confidently says that introduction of Philips Integrated landscape(PIL) gives a clear direction for the Philip's employees on how they can standardize their tools and processes. But where interviewee 1 finds a gap is that not all the business clusters fit on one process or one application stack or one quality management system and hence foresees that there will be some divergence from PIL to achieve standardization. In the interviews conducted, respondents agree that process is an enabler for business transformation, but fear that the current processes mentioned in Philip's business system are enabling business transformation or not. Interviewee 5 comments on this point saying that Philips has many businesses who sell different products which poses as a barrier in itself for the company to standardize processes. Be that as it may, interviewee 5 confirms that in end the goal is standardization of processes and Philips is still on a learning curve with this.

Interview 2 gives a new perspective on overcoming the barriers mentioned in the theoretical framework is by working in an agile way. The whole industry has adopted the agile ways of working and yet Philips is sticking to their legacy processes. It must be acknowledged that Philips is a humongous organization and standardizing all the processes at the same time can be a tedious task, but it is the need of the hour. Interviewee 3 also agrees that being agile is important in a business transformation according to the changes that come your way. He also adds that being agile in a way that every employee is an entrepreneurial in their way of working, that is having an entrepreneurial mindset can also act as an enabler to business transformation.

IT technologies at Philips are viewed as assets to the company. The reason behind every acquisition that is made in Philips is that the technology offered by it complements the business transformation portfolio to become a health tech firm. Interviewee 6 explains how Tomtec's IT technology can enable business transformation at Philips by filling the gaps in their portfolio as Tomtec offers a software product that is leading and cutting edge in the market and adding this product under Philip's name can accelerate the business transformation process and help Philips reach its goal to become a solutions company. Not only this but once the technology was added to Philip's portfolio, they were able to add the technology on several platforms to offer it to their customers and have brought it very quickly to the market. The IT technology offered by Tomtec has generated a decent amount of revenue and increased Philip's market share in the market of ultrasound products for Philips after its acquisition, which has proved that IT technology can act as an enabler for business transformation. Apart from the main business model of Tomtec that targets cardiovascular segments, with the help of Philip's network and resources the same IT technology can be leveraged to other business clusters of Philips like personal health and gynecology. Same goes with the IT Technology offered by Capsule. Interviewee 10 mentions Capsule's IT technology has proven to be an enabler to business transformation as it adds value to Philip's solutions portfolio. She claims that big part of the reason Capsule was added to Philip's product line as they bring an asset with their solutions that is "vendor neutrality". Vendor neutrality means that there is no monopoly of one product or one software by one manufacturer. Capsule's software offers a wide range of solutions on their platforms including the solutions of their competitors. So, the customers in the hospitals only need to buy this software package and they get access to libraries worth of 1000 different drivers, medical devices, licenses, and training videos thereby creating an ecosystem for the customer. Capsule's technology is designed to sell the customer a solution or the physical device integration platform or any other components, and as a customer you get full access to their device library autonomy in your workflow as a customer. Philips wants to set a footprint as much as possible in a hospital when Capsule coming into their portfolio opened the doors to play with other competitors in the market. The IT technology offered by Capsule can support the hospital fully in their needs and deliver solutions for them making Capsule the very best portfolio of comprehensive products. Respondents in their responses regarding the technologies are divided as per their profession. The people who are leading or part of implementing the digital transformation process have a vague idea regarding the technical aspects of the technology but are only concerned with how they will fit in the Philip's landscape. Nor there has been any mention of what part these technologies will play in the future. At the moment, Philips is in a process to onboard these technologies on companywide business models and generating

revenue on the acquired company's old business models and processes. This means that Philips is yet to reach its full potential on how these technologies can enable business transformation.

The respondents were asked to rank the barriers to digital transformation according to the impact they have on business transformation at Philips. The ranking of the barriers was conducted in way that the highest impacting barrier was given the weight of 1, and the lowest ranking barrier was given the weight of 4. The y axis of the graph in figure 14 shows the weight of the ranking corresponding to each interviewee plotted on the x axis. The raw data of rankings of each barrier were collected and used to analyze mean, standard deviation and variance to understand the relation between them. Low standard deviation means data are clustered around the mean, and high standard deviation indicates data are more spread out. The software used to analyze the data was IBM SPSS Statistics. The mean was calculated using the weights allotted to the ranking of each barrier.

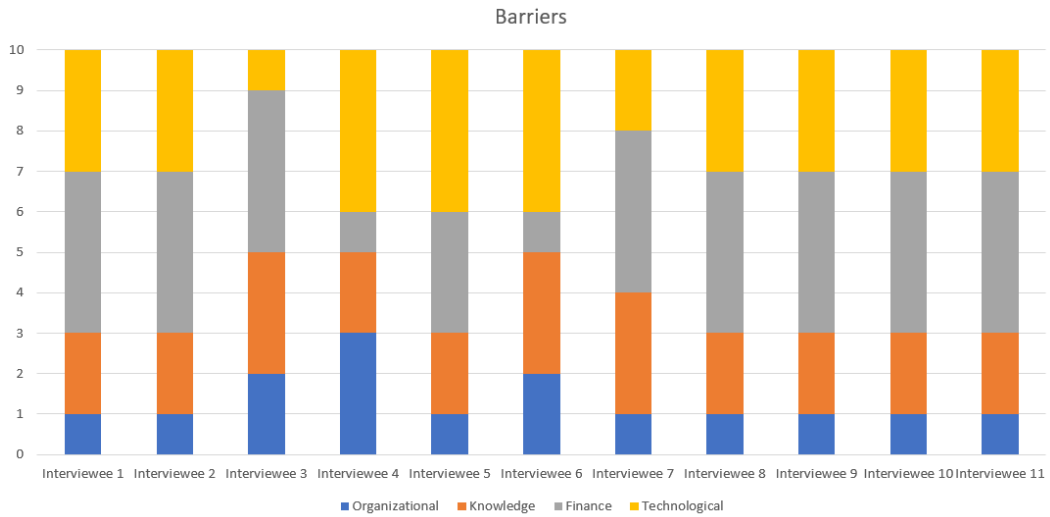

Figure 14 Barries of Digital transformation at Philips

The results show that there is a unison between the opinions of respondents that organizational and knowledge barriers have the highest impact and act as a hindrance to digital transformation. Looking at Table 7, the standard deviation of knowledge and organization barriers is low, meaning that most interviewees agree that they are the top barriers to business transformation. While standard deviation value of technological and finance barriers in relation to the mean are high which means that respondents have varied opinion on these barriers.

	N	Mean	Std. Deviation	Variance
Organizational	11	1.36	.674	.455
Knowledge	11	2.27	.467	.218
Technological	11	3.00	.894	.800
Finance	11	3.36	1.206	1.455
Valid N (listwise)	11			

Table 7: Descriptive Statistics of Barriers

Following the same method for enablers, the respondents were asked to rank each enabler referring to the theoretical framework. The highest impacting enabler was given the weight as 1, and the lowest impacting enabler was given the weight as 5. The weights of ranking are plotted on the y axis of figure 16 corresponding to the responses of respective interviewees on the x axis. These weights were used to calculate standard deviation, mean and variance of the raw data. The leading enablers identified here are strategy and people. It is worthy to note that most people put People on the first place but argue that strategy and people are equally important.

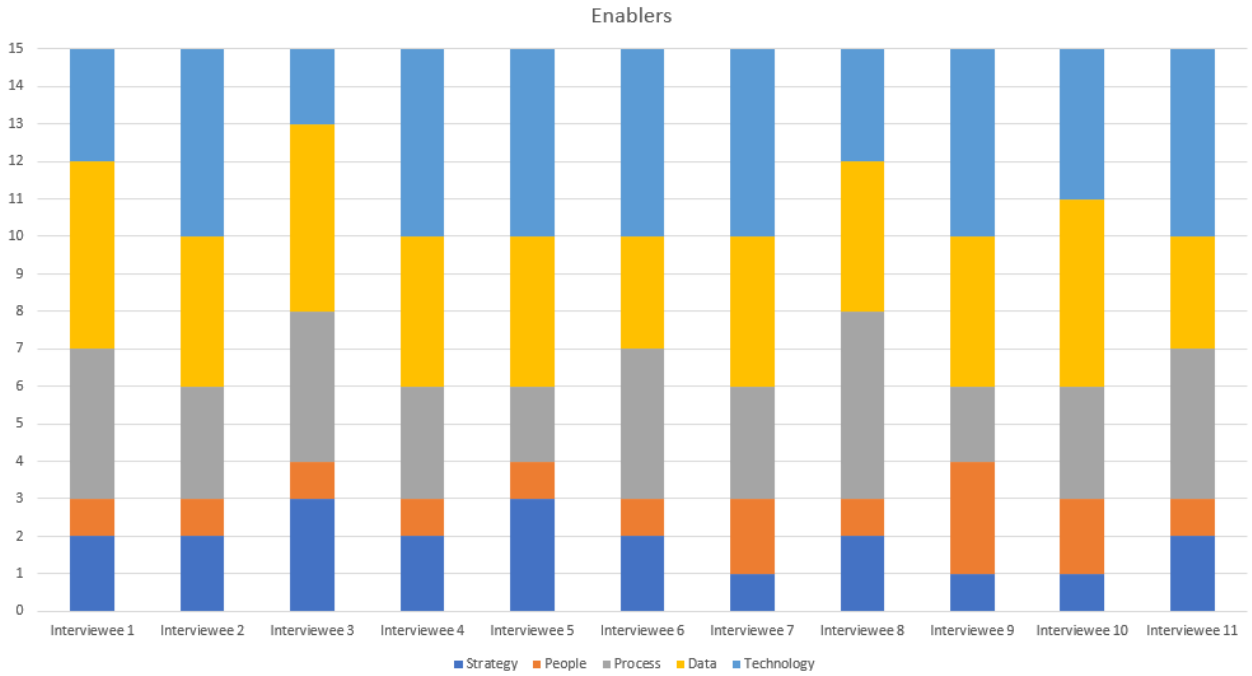

Figure 15 Enablers of Digital transformation at Philips

As the respondent's hand was forced to give a ranking, they have chosen people as the highest impacting enabler. Table 8 portrays the results of statistical analysis that people as an enabler have the lowest standard deviation, that means almost all interviewees agree that it is the highest impacting enabler. Table 8 shows the standard deviation of the data collected which indicates that people and strategy are highest impacting enabler, and data is the lowest impacting enabler. The standard deviation of technology as an enabler is quite high, which means that respondents were mostly part of business transformation may not know about relationship between technology or have varied opinion on technology as an enabler as compared to other respondents.

	N	Mean	Std. Deviation	Variance
People	11	1.36	.674	.455
Strategy	11	1.91	.701	.491
Process	11	3.36	.924	.855
Data	11	4.09	.701	.491
Technology	11	4.27	1.104	1.218
Valid N (listwise)	11			

Table 8: Descriptive Statistics of Barriers

Chapter 6. Discussions

This research addresses the topic of IT enabled business transformation by performing a case study on Philips. In line with the topic of business transformation, this research also identifies barriers and enablers to business transformation in the literature and at Philips. The results of the case study and the literature review are discussed in this section.

The theme hinderance to business transformation and accelerators of business transformation in the results section answer the research question on" what are the barriers and enablers to business transformation at Philips?". Starting with the theme of hinderance to business transformation, Interviewees from this study indicate that the organizational structure of Philips is by far the biggest barrier to business transformation. Philips is organized as a matrix organization which has a classification depending on the products and services offered by Philips to their customers. To give an example, all the businesses acquired by Philips who sell products and services related to image guided therapy are siloed into one business cluster. Given the goal of business transformation at Philips is to become one health tech organization, Philips is still functioning as a conglomerate with every business cluster working towards their individual goals and not contributing to the organization's goal to become a solutions company. The reason behind this can be that Philips is still at an infant stage in its business transformation. The business clusters are not yet fully integrated into Philips, and they are dedicated to meet the needs of the shareholders by following their legacy systems and processes. This is because fully integrating and transforming a company is time consuming. This point adds to the theory of Lammers et al (2019) who claim that shortage of time while undergoing a transformation is a barrier. The results of this research indicate that it very difficult for a company to transform and perform well simultaneously, but there is no way around this. Philips has very strict obligations to its shareholders and the company must take steps to meet these obligations. More than often these steps include organizational restructuring, budget cuts, and in some cases, loss of human resources, which can act as hindrance to business transformation.

This research also identifies a regulatory barrier to business transformation in case of Philips, which can be extend to all health tech firms who are undergoing a global business transformation, which can be added to the list of barriers in the theoretical framework. The existence of a regulatory barrier is because Philips has made acquisitions that could deliver products and services only in one geographical landscape in the past. But now, the scope of each business cluster has quadrupled as Philips delivers their products in different markets of the world, who have their own regulatory bodies with different norms.

This means that the products offered by Philips should comply with the rules and regulations of each regulatory body, and findings of this research say that Philips is still in the process of learning and lack capabilities to achieve this. This is in line with study of Vey et .al (2017) that lack of capabilities is a barrier to digital transformation. Lastly, because of the way Philips is organized, one persistent barrier observed through the interviews is miscommunication between the employees and leaders. The reason behind this can be that the philosophy at Philips has always been top down, that is the leaders will dictate the way of working. But this does not work while implementing a digital transformation initiative. A company who aims to be successful in their digital transformation initiatives should co-create with their business clusters and employees of that business cluster rather than following an overall company strategy.

Kutnjack & Phir (2019) in their research say that improving the skills and knowledge of the employees is crucial while undergoing a business transformation. This research supports this statement as all the respondents acknowledge the fact that there is a knowledge barrier at Philips, which is one of the reasons why Philip's business transformation journey has reduced its pace.

Researchers Hjalmarsson et al (2014), Peansupap & Walker (2005) and Pflaum & Gölzer (2018) claim that financial barrier is the most prevalent barrier to business transformation. Contrary to their opinion, the results of this research indicate that financial barrier is to be acknowledged but will not hinder the business transformation process at Philips. It can be the case that Philips is a multinational organization whose yearly budget is more than most company's total worth. So financial barrier can be a hindrance to small and medium enterprises, but it is not a highly impacting barrier to business transformation at Philips.

As far as technological barriers are concerned, this research shows that there aren't any technological barriers at Philips while talking about the IT technologies in the healthcare sector. Although, it is important to highlight that technological barriers exist in the enterprise IT of Philips. Researchers Tsiavos and Kitsios (2002) claim that outdated technologies can act as a barrier to business transformation. This research has two different viewpoints, that is of the employees involved technical part of business transformation who stress that novel technologies play a crucial role in business transformation, but leaders of business transformation believe that legacy technologies are enough to transform a company digitally as long as they are aligned with the company's goal and strategy. Although, interviewees in this research indicates that if employees and customers not provided with proper IT tools that ease the way of working, this can pose as a barrier to business transformation, which is in line with the theory of Borovkov et al. (2021).

The theme of accelerators of business transformation identifies five enablers of business transformation at Philips from the theoretical framework. The enablers of business transformation at Philips are strategy, people, process, data and technology.

This research identifies strategy as the highest impacting enabler of business transformation at Philips. The interviewees in the research follow the Philip's Business System as their business model which maps out a company wide strategy. The strategy at Philips starts by understanding the customer needs, then realizing the capabilities and technologies required to meet those customer needs followed by the standardized business processes to execute the customer demand. Although most interviewees agree that strategy is the most crucial enabler of business transformation, some doubt that the strategy that is devised at Philips is executed properly. Hence, according to the results of this research, there is a bottleneck in the execution of the strategy rather than devising the strategy. This research claims that employees fail to translate the corporate strategy into daily ways of working. The way strategy can be perfectly executed is when all the employees realize how their day-to-day activities are following the company strategy. Interviewees stress on focusing on developing a strategy that can fit the customer demands of each business cluster, and for this, one fit for all strategy cannot work. Researchers C Matt et al. (2015) and Hess et al. (2016) claim that it is strategy and not technology that drives business transformation. Contrary to their opinion, this research finds out that the strategy of any business transformation starts at the customer demands. This research identifies strategy as a core enabler when derived from the goal and vision of business transformation, which is in line with the theory of Kane et al. (2015).

There is no argument while discussing People as a key enabler of business transformation. The research conducted at Philips say the people are the biggest asset of the company and yet most people fail to realize this and focus on processes and technologies while implementing a digital transformation. Interviewees indicate that proper training of people and knowledge transfer is a must in any transformation. The literature on business transformation also agrees with the findings of this research that people competencies accelerate the business transformation as mentioned by Cavalcanti et al. 2022 in their research.

One of the goals of business transformation identified at Philips is standardization of business processes. The way business processes are visualized at Philips is through Philip's two core business models, that are Philips Excellence Process Framework (PEPF) and Philips Integrated Landscape (PIL). This research identifies a gap in Philip's business models that the standardization of processes at Philips is performed in a way that can act as one fit for all. This means that the above-mentioned business models

can be applied to all business clusters and their respective processes. The results of the interviewees conducted indicate that these business process models are not feasible as each business cluster has different customer demand, different range of products and services, and different technologies used. The interviewees suggest that there has to be different business process framework to be followed depending on the type of technology that the business is offering to Philips. Konopik et al (2022) in their research say that to have a successful digital transformation, operational processes are important to benefit the innovation drive of the company. So far, Philips's processes are designed to only onboard the acquired businesses and not innovate the technologies to unlock their full potential.

The theoretical framework mentions data as an enabler of business transformation in the healthcare sector. In this research, interviewees accept that it can act as an enabler but fail to comment on this factor as they do not have experience in the field of data, which is a limitation of this study.

The theme IT enabled business transformation in this research shed light on IT technologies in the healthcare sector which are classified as product IT as enablers of business transformation. Apart from the IT technologies in the healthcare domain, it is important to mention that there are also software-based technologies called enterprise IT which act as tools used by employees to automate their day-to-day processes. One common distinction can be made between the two can be made by quoting one of the interviewees is "product IT is something that makes money, and enterprise IT is something that costs money." Philips as a company decided to change its product portfolio from domestic appliances and lighting to healthcare products and entered a decade long business transformation with a goal of becoming a solutions-based company. To understand the role of IT technologies in business transformation, it is important to keep in mind that what is Philips trying to achieve with this business transformation. All the interviewees agree that the goal of business transformation is also to create sales and generate revenue for the company by selling their products and services. Now, to become a solutions-based company, Philips has brought companies that have various software and hardware products as part of their solutions delivery. Interviewees indicate that to become IT technologies can enable business transformation of Philips to become a healthcare company who provides solutions by offering software solutions that act as a bridge between business processes and medical care delivery in the hospitals. Philips aims to set a footprint in the healthcare segment with the help of these IT technologies. Adding these IT technologies to Philips portfolio creates sales and generates revenue for the company thereby enabling business transformation. Not only this, but once an IT technology is added to Philips's product portfolio, this technology can be leveraged to other businesses inside Philips who can

use it in their products but for a different application. In this way, IT technologies can accelerate business transformation by being an enabler.

6.1. Recommendations

This research is a part of a master's degree called Management of Technology which teaches about using technology as a corporate resource to maximize productivity, profitability, and customer satisfaction. Aligning with this objective in mind, this study identifies IT technologies as a resource and highlights the barriers and enablers to implement these technologies for Philips to digitally transform. Managers at Philips can use this study to understand the barriers and enablers while administering business transformation and opt IT technologies in the healthcare sector to reach their business goals. This section gives recommendations to managers dealing with business transformation in the healthcare sector.

This research sheds lights on the topic of business transformation by performing a case study on Philips. The results of this study show that Philips is on a transformation journey to become a solutions company in the healthcare sector, but there exist some barriers to this transformation at Philips as discussed in the previous chapter. The most persistent barrier observed at Philips is its organizational structure. After performing a case study on Philips, this research recommends changing the matrix organizational structure to a network structure. A network structure encompasses much more than a company's internal organization. It is an action taken to combine the efforts of two or more entities in order to deliver a single service or product. Teams in a network company are made up of both full-time employees and independent contractors, allowing internal staff to concentrate primarily on their area of expertise. Such a strategy enables businesses to quickly acquire the necessary skills and respond to market developments. Working with people that don't fit your corporate culture leads to less formalization and more agility(Daft & Marcic, 2012). Indicating towards the Philips Excellence Process Framework, the innovation domain can be formed into a network organization instead of forming business clusters that deliver their own products. This network organization can be structured in a way by classifying technology archetypes. For example, a product that is platform based can be identified under a platform archetype, a product that is AI based products can be classified as AI archetype, and so on. The results of this study indicate that there is no communication between the business clusters and that’s why the innovation of Philips in healthcare products is still lagging. By opting to a network organization structure between the research and innovation teams of these business clusters, Philips can

leverage a technological archetype to various products by co-creating and enhance innovation to enable business transformation. The results of this study show that Philips is using same business processes to sell products, services, software and solutions. It cannot be the case that same business process and tools will work for both, hardware products and software solutions. By creating a network organization depending on technological archetypes, Philips can automate its business processes and devise strategies that fit the technology archetype instead of using one fit for all model.

The results of this research also indicate that people are the highest impacting enabler of business transformation. Philips is undergoing a numerous transformation simultaneously, and hence an individual employee is impacted by several transformations. Not only this but the leaders of this transformation are responsible for more that two or three transformations at the same time. This research recommends leaders of business transformation to direct only one transformation initiative at a time. Instead of following a top-down strategy, leaders can co-create with the R&D leads to develop strategies that can fit the transformation initiative. The leaders of business transformation can form scrum teams, involving product owners, software developers, IT experts, and integration managers and follow agile ways of working. A scrum team is a group of collaborators, typically between five and nine individuals, who work toward completing projects and delivering products. As mentioned earlier, the benefit of network organizations is that not all employees are full-time. Philips can hire freelance specialists as integration managers to accelerate the integration process and involve the R&D leads in the scrum process while implementing the transformation. One or more than one scrum teams can be formed for each technological archetype identified. Business transformation leaders can act as scrum masters, R&D leaders can act as product owners and rest can be outsourced as a method to get knowledgeable people and cut costs. In this way, a two-year transformation can be reduced to one-year transformation. It is important to plan realistically when it comes to business transformation and execute accordingly.

6.2. Limitations

Single group studies are limited in generalizing their findings to their particular contexts. This study is no exception. Future studies will have to examine other settings to see if the findings can be applied to other organizations. This research performs a case study on IT technologies offered by only three companies and interview eleven people only from Philips for the research. Hence, the

generalizability of this research is limited by the small group of interviewees employed by Philips, and there is uncertainty if this can be generalized to all the companies in the healthcare sector.

Another limitation observed during this study is that the barriers and enablers are only identified according to the sample working in the business transformation department and technical departments. More interview data and insights can be gathered if the sample size was expanded, for example, to finance experts to comment on the financial barriers to comment on financial barriers, and data migration experts to comment of importance of data as an enabler. Not only this, but the financial data on how much revenue and sales each of the business clusters generates for Philips is confidential. Looking at the financial data can be helpful to look at how each business cluster is performing leading to a quantitative approach to find barriers and enablers of business transformation as well. While discussing the barriers to business transformation at Philips, interviewees were careful while giving the answers as they were being recorded and the data is to made public. In this case, some of the interviews may not have been completely honest but have given a diplomatic answer, which was observed during the interviews.

The data collection method used for this research was semi-structured interviews. Before the actual interviews were conducted, there were two mock interviews also conducted to get a better structure of the interview depending on the theoretical framework. After the mock interviews, a new theoretical framework was developed to match the objectives of the research. In case there was an already existing theoretical framework for barriers and enablers of business transformation, a more structured approach would be possible to conduct the interview. The methodology used to analyze the data was content analysis. But the data analysis was done manually without using any analysis software. The results of the study can be improved if the data analysis was done using automated software that can translate raw transcripts into results automatically. Also, the time allotted for each interview was only 30 minutes, while the interviewees were keen to share more on the topic, they were bound by the 30-minute time limit as they took time from their working hours. Not only this but the interviews were conducted using online tool of Microsoft teams and were not face to face. This did not provide an opportunity to read the nonverbal clues while interviewing.

Philips is an organization with fifteen companies in their portfolio who offer other technologies as well. This research was focused on only acquisitions made by Philips that offer IT technologies and software solutions. It can be interesting to interview R&D experts from all the business clusters and see how technologies like cloud, AI, deep learning, can enable business transformation of Philips.

Chapter 7. Conclusions

This study extends the research in the areas of digital transformation by finding the barriers and enablers to business transformation and the role of IT technologies as an enabler of business transformation. It empirically examines Philips to perform a case study and provides a foundation for theory building by designing a theoretical framework for barriers and enablers of business transformation with IT technologies as an enabler.

To answer the sub research question a), a literature review using five stage grounded theory was performed on the topic of business transformation. The literature review also sheds light on various barriers and enablers to business transformation. This research identifies four main barriers that are hindering the business transformation are organizational, knowledge, finance, and technological according to the literature review. The enablers of business transformation are categorized as strategy, people, process, data and technology. This literature review acts as the basis to create the theoretical framework for this research. As technology is identified as an enabler of business transformation, this research elucidates IT technologies like that healthcare firms can add to their business portfolio that can enable business transformation. To answer the sub research question b), the IT technologies in healthcare that can enable business transformation are remote patient monitoring, electronic health records, digital platforms, and telemedicine. A theoretical framework is created by identifying these IT technologies as resources according to the resource-based approach.

A case study was performed on Philips to test the theoretical framework developed as they are undergoing a huge business transformation from a conglomerate to healthcare solutions provider. To answer the sub research question c), an exploratory case study approach was chosen which involved desk research and semi-structured interviews. The organizational barrier has proven to be most prevalent barrier to business transformation at Philips. This research shows that the way Philips is organized, that is, their organization structure is a major barrier to business transformation. Philips has a matrix organizational structure which marks is difficult for the organization to transform. This study suggests opting for a network organizational structure to overcome this barrier. The research also indicates that Philips is currently facing a knowledge barrier as the company is lacking competent people who have knowledge about how to implement business transformation. The findings of this research show that there exists financial barrier at Philips, but it is not a pressing concern for Philips. There exist

technological barriers in the enterprise IT as Philips is still optimizing their tools and processes across innovation domain, sales and marketing, and supply chain. This research identifies a new barrier to business transformation in the healthcare sector that is regulatory barrier and Philips is still on learning curve to overcome this barrier. The enablers to business transformation identified are strategy, people, process, data and technology. Researchers argue that business transformation starts by setting a strategy by realizing the company goal. This research finds this approach misleading and says that the strategy of any business transformation should be devised by understanding the customer demands, and then align it with the goal of business transformation. This research shows that people are the key enabler of business transformation. In the research conducted, it is observed at Philips, leaders implementing business transformation usually focus on processes and technologies and fail to realize that people are their biggest asset, as they are the ones who are highly impacted by the business transformation. Although processes enable businesses to digitally transform, it is seen that the processes at Philips are not yet compatible to sell solutions.

The discussion presented in the previous section leads us to the main research question of this study – How can IT technologies enable digital transformation at Philips? This research contributes to the resource-based theory which states that an organization has a tremendous opportunity to gain competitive advantages over its competitors when it has strategic resources which can give the company competitive advantages and might also contribute to the company making significant profits. To answer the sub research question d), this research identifies three key IT technologies offered by the acquired companies of Philips namely Tomtec, RDT and Capsule technologies. This research indicates that after the acquisition of these companies, the IT technologies have contributed generously towards the sales and revenues of Philips thereby enabling the business transformation at Philips. The theory of resource-based view also suggests that the key managerial tasks to gain a competitive advantage using a resource are to identify key resources and develop them to their full potential(Barney, 1991). Philips can further develop these IT technologies which are resources to reach their goal to become a complete solutions-based company by leveraging these technologies to other products in their portfolio to enable business transformation. Although, the results of this research also indicate that the IT technologies have not yet reached its peak value as the Philips is lacking capabilities and innovation culture to optimize these technologies and create value because of existing barriers.

7.1. Scope of Future research

The topic of business transformation is making more heads turn day by day. It is observed from this research that almost all health tech companies are aiming to transform digitally. Not only this but this research can be expanded to different industries apart from the healthcare industry. Researchers can use the theoretical framework developed in this study as a starting point to research on the topic of barriers and enablers to business transformation. The methodology used for this study can be used to increase the scope of the research to more than five cases and fifty interviews as well. Researchers can use novel techniques of conducting interviews and data analysis like using ATLAS TI, HyperResearch, or Nvivo by following the same methodology. The results of this study are based on employees at Philips only, Future research should further develop and confirm these initial findings by exploring different companies undergoing business transformation might extend the explanations on the role of novel technologies used to transform digitally. This research also mentions enterprise IT as one of the enablers of business transformation. Interesting research questions can be derived from focusing on only enterprise IT in the field of business transformation. This research adds value to the body of literature of business transformation, future research should consider the potential effects of barriers and enablers more carefully focus to get an in-dept knowledge of the relationship between individual barriers, enablers and business transformation which can lead to more concrete results on each factor. Referring to the limitations of this study, there is little light shed on Data as an enabler and finance as a barrier to business transformation. Future studies could fruitfully explore these factors using the same theoretical framework and methodology. In addition, this research only performs a qualitative study by examining the IT technologies and their role in business transformation. Further studies should investigate quantitatively by researching financial data of the acquisitions that are part of the company and perform a cost-benefit analysis to explore new results. Doing this, researchers can compare the results of qualitative analysis and quantitative analysis to get a better understanding of the phenomenon of business transformation. This research identifies gaps in the business process models of Philips. Researchers exploring the business model transformation can take this as an opportunity to improve the business process models that can optimize the ways of working using IT technologies.

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